ROYAL COMMISSION

ON

AGRICULTURE IN INDIA

Volume II

Part I

EVIDENCE

TAKEN IN THE

Bombay Presidency.

CALCUTTA: GOVERNMENT OF INDIA
CENTRAL PUBLICATION BRANCH
1927

Government of India Publications are obtainable from the Government of India Central Publication Branch, 3, Government Place, West, Calcutta, and from the following Agents :—

EUROPE.

OFFICE OF THE HIGH COMMISSIONER FOR INDIA, 42, GROSVENOR GARDENS, LONDON, S.W. 1.
And at all Booksellers.

INDIA AND CEYLON.—Provincial Book Depôts :

MADRAS :—Office of the Superintendent, Government Press, Mount Road, Madras.
BOMBAY :—Superintendent, Government Book Depot, Town Hall, Bombay.
SIND :—Library attached to the Office of the Commissioner in Sind, Karachi.
BENGAL :—Office of the Bengal Secretariat Book Depôt, Writers' Buildings, Room No. 1, Ground Floor, Calcutta.
UNITED PROVINCES OF AGRA AND OUDH :—Office of the Superintendent of Government Press, United Provinces of Agra and Oudh, Allahabad.
PUNJAB :—Office of the Superintendent, Government Printing, Punjab, Lahore.
BURMA :—Office of the Superintendent, Government Printing, Burma, Rangoon.
CENTRAL PROVINCES AND BERAR :—Office of the Central Provinces Secretariat, Nagpur.
ASSAM :—Office of the Superintendent, Assam Secretariat Press, Shillong.
BIHAR AND ORISSA :—Office of the Superintendent, Government Printing, Bihar and Orissa, P. O. Gulzarbagh, Patna.
COORG :—Office of the Chief Commissioner of Coorg, Bangalore.
NORTH-WEST FRONTIER PROVINCE :—Office of the Manager, Government Printing and Stationery, Peshawar.

Thacker, Spink & Co., Calcutta and Simla.
W. Newman & Co., Ltd., Calcutta.
R. Cambray & Co., Calcutta.
S. K. Lahiri & Co., Calcutta.
The Indian School Supply Depot, 309, Bow Bazar Street, Calcutta, and 226, Nawabpur, Dacca.
Butterworth & Co. (India), Ltd., Calcutta.
Rai M. C. Sarcar Bahadur & Sons, 90/2A, Harrison Road, Calcutta.
The Weldon Library, 17, Park Street, Calcutta.
Standard Literature Company, Limited, Calcutta.
Association Press, Calcutta.
Chukerverty, Chatterjee & Co., Ltd., 13, College Square, Calcutta.
The Book Company, Calcutta.
James Murray & Co., 12, Government Place, Calcutta. (For Meteorological Publications only.)
Ray Choudhury & Co., 68/5, Ashutosh Mukherji Road, Calcutta.
The Oriental Publishing House, 34, Cornwallis Street, Calcutta.
B. C. Basak, Esq., Proprietor, Albert Library, Dacca.
Higginbotham & Co., Madras.
V. Kalyanarama Iyer & Co., Madras.
P. R. Rama Iyer & Co., Madras.
Rochouse and Sons, Madras.
G. A. Nateson & Co., Publishers, George Town, Madras.
The Modern Stores, Salem, Madras.
Theosophical Publishing House, Adyar, Madras.
Bright & Co., Trivandrum.
The Booklover's Resort, Taikad, Trivandrum, South India.
V. S. Swaminathan, Bookseller, West Tower Street, Madura.
E. M. Gopalakrishna Kone, Pudumandapam, Madura.
Vijapur & Co., Vizagapatam.
Thacker & Co., Ltd., Bombay.
D. B. Taraporevala, Sons & Co., Bombay.
Sunder Pandurang, Bombay.
Ram Chandra Govind & Sons, Kalbadevi Road, Bombay.
N. M. Tripathi & Co., Booksellers, Princess Street, Kalbadevi Road, Bombay.
Proprietor, New Kitabkhana, Poona.
The Manager, Oriental Book Supplying Agency, 15, Shukrawar, Poona City.
R. S. Gondhalekar's Book Depôt, Publisher and Bookseller, Budhwar Chawk, Poona City.
Managing Director, Co-operative Bookstall, Booksellers and Publishers, Poona City.
Rama Krishna Bros., Opposite Vishrambag, Poona City.
Karsandas Narandas & Sons, Surat.
Mangaldas & Sons, Booksellers and Publishers, Bhaga Talao, Surat.
Mrs. Radhabai Atmaram Sagoon, Kalbadevi Road, Bombay.
A. H. Wheeler & Co., Allahabad, Calcutta and Bombay.
R. S. Umadikar & Co., The Bharat Book Depot, Dharwar.
The Standard Bookstall, Karachi, Quetta, Delhi, Murree and Rawalpindi.
The Karachi Book Depôt, Elphinstone Street, Camp, Karachi.
The Standard Bookstall, Quetta.
U. P. Malhotra & Co., Quetta.
J. Ray & Sons, 43, K. & L. Edwardes Road, Rawalpindi and Murree.
The Standard Book Depôt, Lahore, Lucknow, Nainital, Mussoorie, Dalhousie, Ambala Cantonment and Delhi.
N. B. Mathur, Supdt., Nazir Kanun Hind Press, Allahabad.
The North India Christian Tract and Book Society, 18, Clive Road, Allahabad.
Ram Dayal Agarwala, 184, Katra, Allahabad.
Manager, Newal Kishore Press, Lucknow.
The Upper India Publishing House, Ltd., 41, Aminabad Park, Lucknow.
Munshi Seeta Ram, Managing Proprietor, Indian Army Book Depôt, Juhi, Cawnpore.
Rai Sahib M. Gulab Singh & Sons, Mufid-i-Am Press, Lahore and Allahabad.
Rama Krishna & Sons, Booksellers, Anarkali, Lahore.
Puri Brothers, Booksellers and Publishers, Katcheri Road, Lahore.
The Tilak School Bookshop, Lahore.
The Standard Bookstall, Lahore.
Manager of the Imperial Book Depôt, 63, Chandney Chowk Street, Delhi.
Oxford Book and Stationery Company, Delhi.
Supdt., American Baptist Mission Press, Rangoon.
Proprietor, Rangoon Times Press, Rangoon.
The Modern Publishing House, Ltd., 30, Phayre Street, Rangoon.
The International Buddhist Book Depôt, Post Box No. 971, Rangoon.
Burma Book Club, Ltd., Rangoon.
Manager, the "Hitavada," Nagpur.
Bishey Brothers, Booksellers and Stationers, Sitabaldi, Nagpur.
S. C. Talukdar, Proprietor, Students & Co., Cooch Behar.
Times of Ceylon Co., Ltd., Colombo.
The Manager, Ceylon Observer, Colombo.
The Manager, The Indian Book Shop, Benares City.
The Srivilliputtur Co-operative Trading Union, Ltd., Srivilliputtur (Satur S. I. R.).
Banwari Lal, Esq., Pakariya Street, Pilibhit, United Provinces.
The Manager, Educational Book Depôt Jubbulpore.
Raghunath Prasad & Sons, Patna City.
Dandekar Brothers, Indore City.
The Hyderabad Book Depôt, Chaderghat Hyderabad (Deccan).

INTERIM REPORT

THE KING'S MOST EXCELLENT MAJESTY.

It Please Your Majesty,

We, the Commissioners appointed to examine and report on the present conditions of agricultural and rural economy in British India, and to make recommendations for the improvement of agriculture and to promote the welfare and prosperity of the rural population; in particular, to investigate :—(*a*) the measures now being taken for the promotion of agricultural and veterinary research, experiment, demonstration and education, for the compilation of agricultural statistics, for the introduction of new and better crops and for improvement in agricultural practice, dairy farming and the breeding of stock; (*b*) the existing methods of transport and marketing of agricultural produce and stock; (*c*) the methods by which agricultural operations are financed and credit afforded to agriculturists; (*d*) the main factors affecting rural prosperity and the welfare of the agricultural population; and to make recommendations; having ourselves of Your Majesty's permission to report our proceedings from time to time, desire to submit to Your Majesty the minutes of the Conference which we have taken up to the 2nd of November 1926 on the subject of our Inquiry.

All of which we most humbly submit for Your Majesty's most gracious consideration.

(Signed) LINLITHGOW,
Chairman.
(„) H. S. LAWRENCE.
(„) T. H. MIDDLETON.
(„) GANGA RAM.
(„) J. MacKENNA.
(„) H. CALVERT.
(„) GAJAPATI NARAYANA DEO.
(„) N. GANGULEE.
(„) L. K. HYDER.
(„) B. S. KAMAT.

Signed) J. A. MADAN,
„) F. W. H. SMITH,
Joint Secretaries.

5th May 1927.

CONTENTS

		Pages
Terms of Reference	.. ..	iii
Questionnaire	.. ..	iv-xiii
Evidence of—		
1.	Dr. Harold H. Mann, D.Sc., Director of Agriculture	1–99, 266–272
2.	Dr. William Burns, D.Sc. (Edin.), Joint Director of Agriculture	100–117
3.	Mr. E. S. Farbrother, Superintendent, Civil Veterinary Department	118–135
4.	Mr. V. H. Naik, M.A., Bar.-at-Law, Collector of Bijapur	136–144, 181–192
5.	Mr. A. G. Edie, Chief Conservator of Forests	145–162
6.	Mr. Otto Rothfield, Khairpur State	163–180
7.	Mr. G. F. S. Collins, I.C.S., Registrar, Co-operative Societies	193–225
8.	Mr. C. C. Inglis, Executive Engineer, Special Irrigation Division ..	226–233, 237–265
9.	Mr. R. G. Sule, Executive Engineer	234–262
10.	Mr. R. T. Harrison, Secretary and Chief Engineer for Irrigation, Public Works Department	273–285
11.	Mr. H. F. Knight, I.C.S., Collector of West Khandesh	286–315
12.	Mr. F. B. P. Lory, I.E.S., Director of Public Instruction	316–335
13.	Mr. R. M. Maxwell, M.A., C.I.E., I.C.S., Collector of Kaira	336–355
14.	Mr. C. O. Lowsley, Superintending Engineer (on special duty)	356–369
15.	Mr. S. S. Salimath, B.Ag., Deputy Director of Agriculture, Southern Division ..	370–390
16.	Lieut.-Colonel H. M. H. Melhuish, D.S.O., I.M.S., Director of Public Health	391–398
17.	Mr. E. J. Bruen, Livestock Expert, Government of Bombay	399–437
18.	Mr. W. J. Jenkins, M.A., B.Sc., I.A.S., Officiating Secretary of the Indian Central Cotton Committee	438–506
19.	Rao Bahadur P. C. Patil, L.Ag., M.Sc. (in Agricultural Economics), Professor of Agricultural Economics, and Acting Principal, Agricultural College, Poona	507–526
20.	Mr. B. S. Patel, N.D.D., N.D.A., C.D.A.D., Professor of Agriculture, Agricultural College, Poona ..	527–571
21.	Rao Sahib Bhimbhai M. Desai, Deputy Director of Agriculture, Gujarat	572–603
x	.. ..	604–716
ary	.. ..	717–718

TERMS OF REFERENCE

Generally,

To examine and report on the present conditions of agriculture and rural economy in British India and to make recommendations for the improvement of agriculture and the promotion of the welfare and prosperity of the rural population ;

In particular to investigate—

(*a*) the measures now being taken for the promotion of agricultural and veterinary research, experiment, demonstration and education, for the compilation of agricultural statistics, for the introduction of new and better crops and for improvement in agricultural practice, dairy farming and the breeding of stock ;

(*b*) the existing methods of transport and marketing of agricultural produce and stock ;

(*c*) the methods by which agricultural operations are financed and credit afforded to agriculturists ;

(*d*) the main factors affecting rural prosperity and the welfare of the agricultural population ;

and to make recommendations.

It will not be within the scope of the Commission's duties to make recommendations regarding the existing system of landownership and tenancy or of the assessment of land revenue and irrigation charges, or the existing division of functions between the Government of India and the local Governments. But the Commission shall be at liberty to suggest means whereby the activities of the Governments in India may best be co-ordinated and to indicate directions in which the Government of India may usefully supplement the activities of local Governments.

सत्यमेव जयते

QUESTIONNAIRE

PART I

Question.

1. Research.
2. Agricultural education.
3. Demonstration and propaganda.
4. Administration.
5. Finance.
6. Agricultural indebtedness.
7. Fragmentation of holdings.

PART II

8. Irrigation.
9. Soils.
10. Fertilisers.
11. Crops.
12. Cultivation.
13. Crop protection.
14. Implements.

PART III

15. Veterinary.
16. Animal husbandry.

PART IV

17. Agricultural industries.
18. Agricultural labour.
19. Forests.
20. Marketing.
21. Tariffs and sea freights.
22. Co-operation.
23. General education.
24. Attracting capital.
25. Welfare of rural population.
26. Statistics.

सत्यमेव जयते

QUESTIONNAIRE

PART I

1. Research.

(*a*) Have you suggestions to advance for the better organisation, administration and financing of- -

(*i*) All research affecting the welfare of the agriculturist, including research into the scientific value of the indigenous theory and traditional methods of agriculture,

(*ii*) Veterinary research ?

(*b*) If in cases known to you progress is not being made because of the want of skilled workers, or field or laboratory facilities for study or by reason of any other handicaps, please give particulars. [Suggestions of a general kind should be made under (*a*) ; answers under this heading should relate to specific subjects. The purpose is to secure a list of the problems met with by scientific investigators in the course of their work which are being held over because of lack of resources or deficient organisation.]

(*c*) Can you suggest any particular subject for research not at present being investigated to which attention might usefully be turned ?

2. Agricultural Education.

With reference to any form of agricultural education of which you may have experience, please state your views on the following :—

(*i*) Is the supply of teachers and institutions sufficient ?

(*ii*) Is there an urgent need for extension of teaching facilities in any district or districts known to you personally ?

(*iii*) Should teachers in rural areas be drawn from the agricultural classes ?

(*iv*) Are the attendances at existing institutions as numerous as you would expect in present circumstances ; if not, state reasons. Can you suggest measures likely to stimulate the demand for instruction ?

(*v*) What are the main incentives which induce lads to study agriculture ?

(*vi*) Are pupils mainly drawn from the agricultural classes ?

(*vii*) Are there any modifications in existing courses of study which appear to be called for ; if so, what are they ?

(*viii*) What are your views upon (*a*) nature study ; (*b*) school plots ; (*c*) school farms ?

(*ix*) What are the careers of the majority of students who have studied agriculture ?

(*x*) How can agriculture be made attractive to middle class youths ?

(*xi*) Are there recent movements for improving the technical knowledge of students who have studied agriculture ?

(*xii*) How can adult education in rural tracts be popularised ?

(*xiii*) In suggesting any scheme for better educational facilities in rural areas, please give your views for (*a*) its administration and (*b*) its finance.

3. Demonstration and Propaganda.

(*a*) What are the measures which in your view have been successful in influencing and improving the practice of cultivators ?

(*b*) Can you make suggestions for increasing the effectiveness of field demonstrations ?

(*c*) Can you suggest methods whereby cultivators may be induced to adopt expert advice ?

(*d*) If you are aware of any striking instances of the success or the failure of demonstration and propaganda work, please give particulars and indicate the reasons for success or for failure.

4. Administration.

(*a*) Do you wish to suggest means towards the better co-ordination of the activities of the Governments in India or to indicate directions in which the Government of India may usefully supplement the activities of the local Governments ?

(*b*) Is it your opinion that the expert scientific knowledge required in the development of agriculture in the different Provinces could be supplied to a greater extent than is the case at present by increasing the scientific staff of the Government of India ? If so, indicate the types of work which would benefit by pooling the services of experts, and suggest how that work should be controlled.

(*c*) Are you satisfied from the agricultural standpoint with the services afforded by—

(*i*) The Agricultural and Veterinary Services,

(*ii*) Railways and steamers,

(*iii*) Roads,

(*iv*) Meteorological Department,

(*v*) Posts, and

(*vi*) Telegraphs, including wireless ?

If not, please indicate directions in which you think these Services might be improved or extended.

5. Finance.

(*a*) What are your views as to the steps that should be taken for better financing of agricultural operations and for the provision of short and long-term credit to cultivators ?

(*b*) Do you wish to suggest means whereby cultivators may be induced to make fuller use of the Government system of *taccavi* ?

6. Agricultural Indebtedness.

(*a*) What in your opinion are :—

(*i*) the main causes of borrowing,

(*ii*) the sources of credit, and

(*iii*) the reasons preventing repayment.

(*b*) What measures in your opinion are necessary for lightening agriculture's burden of debt ? For example, should special measures be taken to deal with rural insolvency, to enforce the application of the Usurious Loans Act, or to facilitate the redemption of mortgages ?

(*c*) Should measures be taken to restrict or control the credit of cultivators such as limiting the right of mortgage and sale ? Should non-terminable mortgages be prohibited ?

7. Fragmentation of Holdings.

(*a*) Do you wish to suggest means for reducing the loss in agricultural efficiency attendant upon the excessive subdivision of holdings ?

(*b*) What are the obstacles in the way of consolidation and how can they be overcome ?

(*c*) Do you consider legislation to be necessary to deal with minors, widows with life interest, persons legally incapable, alienation and dissentients, and to keep disputes out of the courts ?

PART II

8. Irrigation.

(*a*) Name any district or districts in which you advocate the adoption of new irrigation schemes, or suggest extensions or improvements in the existing systems or methods of irrigation by—

(*i*) Perennial and non-perennial canals,
(*ii*) Tanks and ponds,
(*iii*) Wells.

What are the obstacles in your district or Province to the extension of irrigation by each of the above methods ?

(*b*) Are you satisfied with the existing methods of distributing canal water to cultivators ? Describe the methods that have been employed to prevent wastage of water by evaporation and by absorption in the soil. What form of outlet for distribution to cultivators at the tail end do you regard as the most equitable and economical ? Have these methods and devices been successful, or do you wish to suggest improvements ?

(*N.B.*—Irrigation charges are *not* within the terms of reference of the Commission, and should not be commented upon.)

9. Soils.

(*a*) Have you suggestions to make—

(*i*) for the improvement of soils, whether by drainage or other means, not dealt with under other headings in this questionnaire.
(*ii*) for the reclamation of Alkali (Usar) or other uncultivable land,
(*iii*) for the prevention of the erosion of the surface soil by flood water ?

(*b*) Can you give instances of soils known to you which, within your recollection, have—

(*i*) undergone marked improvement,
(*ii*) suffered marked deterioration ?

If so, please give full particulars.

the method by which each transaction is financed, or in the case of barter, by which an exchange is effected.

(*c*) Do you wish to suggest steps whereby the quality, purity, grading or packing of agricultural produce may be improved, distinguishing where possible between produce destined for—

(*i*) Indian markets ?

(*ii*) Export markets ?

(*d*) Do you think that more effective steps might be taken to place at the disposal of cultivators, merchants and traders information as to market conditions, whether Indian or overseas ; crop returns ; complaints as to Indian produce from wheresoever originating ; and agricultural and marketing news in general ?

21. Tariffs and Sea Freights.

Do existing (*a*) customs duties, both import and export, and (*b*) sea freights adversely affect the prosperity of the Indian cultivator ? If so, have you any recommendations to make ?

22. Co-operation.

(*a*) What steps do you think should be taken to encourage the growth of the co-operative movement—

(*i*) by Government,

(*ii*) by non-official agencies ?

(*b*) Have you any observations to make upon-

(*i*) Credit societies ;

(*ii*) Purchase societies ;

(*iii*) Societies formed for the sale of produce or stock ;

(*iv*) Societies for effecting improvements—*e.g.*, the digging of wells and the construction of bunds, walls and fences, or the planting of hedges ;

(*v*) Societies formed for the aggregation of fragmented holdings and their redistribution in plots of reasonable size ;

(*vi*) Societies for the co-operative use of agricultural machinery ;

(*vii*) Societies for joint farming ;

(*viii*) Cattle breeding societies ;

(*ix*) Societies formed for any purpose connected with agriculture or with the betterment of village life, but not specified above ?

(*c*) Where co-operative schemes for joint improvement, such as co-operative irrigation or co-operative fencing or a co-operative consolidation of holdings scheme, cannot be given effect to owing to the unwillingness of a small minority to join, do you think legislation should be introduced in order to compel such persons to join for the common benefit of all ?

(*d*) Do you consider that those societies of which you have personal knowledge have, in the main, achieved their object ?

(*c*) What measures should Government take to encourage the reclamation of areas of cultivable land which have gone out of cultivation ?

10. Fertilisers.

(*a*) In your opinion, could greater use be profitably made of natural manures or artificial fertilisers ? If so, please indicate the directions in which you think improvement possible.

(*b*) Can you suggest measures to prevent the fraudulent adulteration of fertilisers ?

(*c*) What methods would you employ to popularise new and improved fertilisers ?

(*d*) Mention any localities known to you in which a considerable increase in the use of manures has recently taken place.

(*e*) Has effect of manuring with phosphates, nitrates, sulphate of ammonia, and potash manures been sufficiently investigated ? If so, what is the result of such investigation ?

(*f*) What methods would you employ to discourage the practice of using cowdung as fuel ?

11. Crops.

(*a*) Please give your views on—

(*i*) the improvement of existing crops,

(*ii*) the introduction of new crops including fodder crops,

(*iii*) the distribution of seeds,

(*iv*) the prevention of damage by wild animals.

(*b*) Can you suggest any heavy yielding food crops in replacement of the present crops ?

(*c*) Any successful efforts in improving crops or substituting more profitable crops which have come under your own observation should be mentioned.

12. Cultivation.

Can you suggest improvements in—

(*i*) the existing system of tillage, or

(*ii*) the customary rotations or mixtures of the more important crops ?

13. Crop Protection, Internal and External.

Please give your views on—

(*i*) The efficacy and sufficiency of existing measures for protection of crops from external infection, pests and diseases.

(*ii*) The desirability of adopting internal measures against infection.

14. Implements.

(*a*) Have you any suggestion for the improvement of existing, or the introduction of new, agricultural implements and machinery ?

(*b*) What steps do you think may usefully be taken to hasten the adoption by the cultivator of improved implements ?

(*c*) Are there any difficulties which manufacturers have to contend with in the production of agricultural implements or their distribution for sale throughout the country ? If so, can you suggest means by which these difficulties may be removed ?

PART III

15. Veterinary.

(*a*) Should the Civil Veterinary Department be under the Director of Agriculture or should it be independent ?

(*b*) (*i*) Are dispensaries under the control of Local (District) Boards ? Does this system work well ?

(*ii*) Is the need for expansion being adequately met ?

(*iii*) Would you advocate the transfer of control to Provincial authority ?

(*c*) (*i*) Do agriculturists make full use of the veterinary dispensaries ? If not, can you suggest improvements to remedy this ?

(*ii*) Is full use made of touring dispensaries ?

(*d*) What are the obstacles met with in dealing with contagious diseases ? Do you advocate legislation dealing with notification, segregation, disposal of diseased carcases, compulsory inoculation of contacts and prohibition of the movement of animals exposed to infection ? Failing legislation, can you suggest other means of improving existing conditions ?

(*e*) Is there any difficulty in securing sufficient serum to meet the demand ?

(*f*) What are the obstacles in the way of popularising preventive inoculation ? Is any fee charged, and, if so, does this act as a deterrent ?

(*g*) Do you consider that the provision of further facilities for research into animal disease is desirable ?

If so, do you advocate that such further facilities should take the form of—

(*i*) an extension of the Muktesar Institute, or

(*ii*) the setting up, or extension of, Provincial Veterinary Research Institutions ?

(*h*) Do you recommend that special investigations should be conducted by—

(*i*) officers of the Muktesar Institute, or

(*ii*) research officers in the Provinces ?

(*i*) Do you recommend the appointment of a Superior Veterinary Officer with the Government of India ? What advantages do you expect would result from such an appointment ?

16. Animal Husbandry.

(*a*) Do you wish to make suggestions for—

(*i*) improving the breeds of livestock,

(*ii*) the betterment of the dairying industry,

(*iii*) improving existing practice in animal husbandry ?

(*b*) Comment on the following as causes of injury to cattle in your district—

(*i*) Overstocking of common pastures,

(*ii*) Absence of enclosed pastures, such as grass borders in tilled fields,

(*iii*) Insufficiency of dry fodder such as the straw of cereals or the stems and leaves of pulses,

(*iv*) Absence of green fodders in dry seasons,

(*v*) Absence of mineral constituents in fodder and feeding stuffs.

(*c*) Please mention the months of the year in which fodder shortage is most marked in your district. For how many weeks does scarcity of fodder usually exist ? After this period of scarcity ends how many weeks elapse before young growing cattle begin to thrive ?

(*d*) Can you suggest any practicable methods of improving or supplementing the fodder supply that would be applicable to your district ?

(*e*) How can landowners be induced to take a keener practical interest in these matters ?

Part IV

17. Agricultural Industries.

(*a*) Can you give any estimate of the number of days of work done by an average cultivator on his holding during the year ? What does he do in the slack season ?

(*b*) Can you suggest means for encouraging the adoption of subsidiary industries ? Can you suggest any new subsidiary industries to occupy the spare time of the family which could be established with Government aid ?

(*c*) What are the obstacles in the way of expansion of such industries as beekeeping, poultry rearing, fruit growing, sericulture, pisciculture, lac culture, rope making, basket making, etc. ?

(*d*) Do you think that Government should do more to establish industries connected with the preparation of agricultural produce for consumption, such as oil pressing, sugar making, cotton ginning, rice hulling, utilisation of wheat straw for card-board, utilisation of cotton seed for felt, fodder, oil and fuel, utilisation of rice straw for paper, etc. ?

(*e*) Could subsidiary employment be found by encouraging industrial concerns to move to rural areas ? Can you suggest methods ?

(*f*) Do you recommend a more intensive study of each rural industry in its technical, commercial and financial aspects, with a view to, among other things, introduction of improved tools and appliances ?

(*g*) Can you suggest any other measures which might lead to greater rural employment ?

(*h*) Can you suggest means whereby the people could be induced to devote their spare time to improving the health conditions of their own environment ?

18. Agricultural Labour.

(*a*) What measures, if any, should be taken to attract agricultural labour from areas in which there is a surplus to—

(*i*) areas under cultivation in which there is a shortage of such labour ? and

(*ii*) areas in which large tracts of cultivable land remain uncultivated ?

Please distinguish between suggestions designed to relieve seasonal unemployment and proposals for the permanent migration of agricultural population.

(*b*) If there is any shortage of agricultural labour in your Province, what are the causes thereof and how could they be removed ?

(*c*) Can you suggest measures designed to facilitate the occupation and development, by surplus agricultural labour, of areas not at present under cultivation ?

19. Forests.

(*a*) Do you consider that forest lands as such are at present being put to their fullest use for agricultural purposes ? For instance, are grazing facilities granted to the extent compatible with the proper preservation of forest areas ? If not, state the changes or developments in current practice which you consider advisable.

(*b*) Can you suggest means whereby the supply of firewood and fodder in rural areas may be increased ?

(*c*) Has deterioration of forests led to soil erosion ? What remedies would you suggest for erosion and damage from floods ?

(*d*) Can you indicate any methods by which supply of moisture in the soil, the rainfall and supply of canal water can be increased and regulated by afforestation or by the increased protection of forests so as to benefit agriculture ? Would the same methods be useful in preventing the destruction by erosion of agricultural land ?

(*e*) Is there an opening for schemes of afforestation in the neighbourhood of villages ?

(*f*) Are forests suffering deterioration from excessive grazing ? Is soil erosion being thereby facilitated ? Suggest remedies.

20. Marketing.

(*a*) Do you consider existing market facilities to be satisfactory ? Please specify and criticise the markets to which you refer, and make suggestions for their improvement.

(*b*) Are you satisfied with the existing system of marketing and distribution ? If not, please indicate the produce to which you refer and describe and criticise in detail the channels of marketing and distribution from the producer to the consumer in India (or exporter in the case of produce exported overseas). State the services rendered by each intermediary and whether such intermediary acts in the capacity of merchant or commission agent, and comment upon the efficiency of these services and the margins upon which such intermediaries operate. Please describe

23. General Education.

(*a*) Do you wish to make observations upon existing systems of education in their bearing upon the agricultural efficiency of the people ? If you make suggestions, please distinguish, as far as possible, between—

(*i*) Higher or collegiate,

(*ii*) Middle school, and

(*iii*) Elementary school education.

(*b*) (*i*) Can you suggest any methods whereby rural education may improve the ability and culture of agriculturists of all grades while retaining their interest in the land ?

(*ii*) What is your experience of compulsory education in rural areas ?

(*iii*) What is the explanation of the small proportion of boys in rural primary schools who pass through the fourth class ?

24. Attracting Capital.

(*a*) What steps are necessary in order to induce a larger number of men of capital and enterprise to take to agriculture ?

(*b*) What are the factors tending to discourage owners of agricultural land from carrying out improvements ?

25. Welfare of Rural Population.

(*a*) Outside the subjects enumerated above, have you any suggestions to offer for improving hygiene in rural areas and for the promotion of the general well-being and prosperity of the rural population ?

(*b*) Are you, for instance, in favour of Government conducting economic surveys in typical villages with a view to ascertaining the economic position of the cultivators ? If so, what, in your opinion, should be the scope and methods of such enquiries ?

(*c*) If you have carried out anything in the nature of such intensive enquiry, please state the broad conclusions which you reached.

26. Statistics.

(*a*) Do you wish to make suggestions for the extension or improvement of the existing methods of—

(*i*) ascertaining areas under cultivation and crops ;

(*ii*) estimating the yield of agricultural produce ;

(*iii*) enumerating livestock and implements ;

(*iv*) collecting information on land tenure, the incidence of land revenue and the size of the agricultural population ;

(*v*) arranging and publishing agricultural statistics ?

(*b*) Have you any other suggestions to make under this heading ?

MINUTES OF EVIDENCE

TAKEN BEFORE THE

ROYAL COMMISSION ON AGRICULTURE.

Friday, October 22nd, 1926.

POONA.

PRESENT:

THE MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.
Sir THOMAS MIDDLETON, K.B.E., C.B.
Rai Bahadur Sir GANGA RAM, KT., C.I.E., M.V.O.
Sir JAMES MACKENNA, KT., C.I.E., I.C.S.
Mr. H. CALVERT, C.I.E., I.C.S.
Raja Sri KRISHNA CHANDRA GAJAPATI NARAYANA DEO of Parlakimedi.
Professor N. GANGULEE.
Dr. L. K. HYDER.
Mr. B. S. KAMAT.

The Hon'le Sir CHUNILAL V. MEHTA (*Co-opted Member*).

Mr. J. A. MADAN, I.C.S.
Mr. F. W. H. SMITH. } (*Joint Secretaries.*)

Dr. HAROLD H. MANN, D. Sc., Director of Agriculture, Bombay Presidency.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—(a) I think that so far as the organisation of research work in the Bombay Presidency is concerned, which is within the power of the Bombay Agricultural Department, the method adopted and described on page 21 of the Bombay Memorandum* is satisfactory and is working well. We have excellent laboratories in most directions, though we should like better facilities in connection with horticultural investigation, with the study of plant diseases and with the study of insect pests. The field laboratories in connection with plant breeding work might also be improved and will be improved when money is available.

I may describe more in detail the method of organisation now adopted in the Bombay Presidency. The Director of Agriculture is the final referee in research matters. At the Agricultural College in Poona, there is a corps of experts, who are also responsible for the teaching of degree students, and for the training of post-graduate students and workers. So far as teaching is concerned they are under the control of the Principal of the college, but for research purposes they deal direct with the Director of Agriculture.

Beyond this we have a number of research stations in different parts of the Bombay Presidency each generally existing for a specific purpose or for research on a particular subject. Some of these are supported by Government (Rice Research Station, Karjat, Tobacco Research Station, Nadiad, Soil

* Control of Research Work by Committees whose members have special knowledge of the work in hand with the Director of Agriculture usually acting as Chairman. Some members may be from outside the department.

Physics Research Station, Manjri, etc.), while in other cases they are maintained on subsidies from other bodies, notably the Indian Central Cotton Committee (Surat, Dharwar, etc.). The most highly developed part of the work in these stations is plant breeding and in this we have had very great successes in cotton at Surat and Dharwar, at Karjat in rice, and at Nadiad in tobacco. But other lines of work are now under intensive study with fairly satisfactory facilities, such as cotton physiology, and cotton entomology at Surat, certain cotton diseases at Dharwar, dry land conditions at Manjri, etc.

In major work the usual plan is that the necessity of a particular line of work is discussed by the Director of Agriculture with the officer to whom he proposes to entrust it, and a policy in connection with it is laid out. The officer selected then places his plans for carrying it out before a committee nominated by the Director of Agriculture where criticisms are received and suggestions made. A definite programme is then drawn up by the officer in charge, and a progress report is made generally twice a year, to the same committee. We thus get the pooling of the experience of workers in allied subjects for the benefit of any piece of work.

This method has, on the whole, worked well. Without interfering with a research worker in carrying out what has been entrusted to him, it has prevented the squandering of energy on lines likely to be unproductive, has led to concentration on the main ends to which the work leads, has stimulated the men to steady work, and has often led to economy in carrying out the research.

I am getting more and more inclined to the idea that research work must be classified by subject of research, rather than by science. This does not mean that a piece of work which involves plant breeding will not be carried out by men who are essentially botanists and so on. But we expect a worker who is studying, say the grass land of the Deccan and its improvement, to envisage the problem as a whole, and similarly a man who is entrusted with the improvement of tobacco in a particular region is expected to see how not only selection and purification of the plants grown, but also other lines of attack can be employed to advantage.

As regards the financing of research work, the line I have taken in recent years is to put up to Government definite schemes, specifying the purpose of the work proposed, the length of time which I estimate will be required to obtain valuable results, and asked for grants on this temporary basis. Many schemes proposed have, of course, been turned down, but a number have been undertaken, and in some cases definite results have been already achieved.

It would be an exceedingly satisfactory thing if a permanent fund could be created in the Presidency, from which researches could be financed, so that their continuance would not be subject to the fluctuations of provincial finance. But I recognise that this is likely to be a counsel of perfection, at any rate in the near future.

Of course, if we were provided with larger grants for research, we could do much more, and we have men now in fair number, who could be entrusted with the responsible charge of investigations—provided these are conducted under the general direction and control described above. Such an extension of research work is very much needed now as in many parts of the Presidency the people are coming to look to us for a solution of their difficulties in a way which was inconceivable ten years ago.

Under this head, I suppose I am to consider the question of the relationship of the research work done in a Province like Bombay, to that done by the Central Government at Pusa and elsewhere. I may say that we have got valuable help from the researches done at Pusa, more especially in connection with Mr. Howard's work in the improvement of crops, and also from the work on the improvement of sugar-cane done at Coimbatore. Pusa with its resources also form a valuable centre of information. But our research work is hardly dependent in any way on that at Pusa, nor would it be possible, I think, without general injury to the work, to have it in any way directed

from the Central Government, either by an All-India Research Board or otherwise.

For all the help that the Central Government can give we are thankful. The determination, however, of the nature of the problems that need investigation and on which money should be spent in the Bombay Presidency must be a matter in which the local authorities should have a dominating voice. And, yet, the Indian Central Cotton Committee has shown how an All-India body can, while preserving a very broad outlook, assist and stimulate agricultural research in every part of India. This body, composed of business men and farmers, as well as agricultural experts, is furnished with large funds from the cotton trade, which are to be devoted to agricultural research in the improvement of cotton cultivation. This it does on the one hand by subsidising a research institute at Indore, and on the other, by giving grants to local agricultural departments for the investigations of special problems in cotton growing. These grants are applied for by the local agricultural department, with a statement as to how the work is proposed to be carried out. The organisation adopted and the detailed programme is submitted for approval to the Indian Central Cotton Committee, while the progress made comes under review once a year. The grants are nearly all definitely for five years.

Now, a similar scheme might be adopted for the participation of the Central Government and its workers, in investigations in matters of interest in several Provinces. I would suggest that a Central Agricultural Research Board should be provided with funds, and that these should be utilised by a series of committees each dealing *ad hoc* with one large subject of agricultural research in a manner similar to the way in which the Indian Central Cotton Committee works. I should consider it essential that such committees should meet at least twice a year, and should contain a substantial proportion of representatives of Provinces, of business and of agricultural interests. There is the germ of something of this sort in this Sugar Bureau and the Tobacco Bureau at Pusa, but such committees must be in no way tied to Pusa, if they are to function satisfactorily.

QUESTION 2.—AGRICULTURAL EDUCATION.—Before attempting to answer the specific questions put in the Questionnaire sent to me, I should like to make clear what object I have in view in dealing with agricultural and rural education. Then we will see how far these purposes are being achieved in the Bombay Presidency.

There are four purposes which, in a country like India, agricultural and rural education should try to serve. These are—

(1) to saturate ordinary primary rural education with the agricultural outlook, especially with boys from ten or eleven years upward;

(2) to provide specialised agricultural education, in the vernacular, to well-to-do peasants and small cultivators. These will go back to their land, and, being cultivators themselves, will be centres of influence. These schools should be good and will not be cheap;

(3) to provide secondary education, including agriculture, either in special secondary English schools or in the ordinary English schools, leading up to a genuine test, including agriculture, of matriculation standard. These men should be preferred for all minor official positions in the rural areas, for clerks to zamindars, etc., and

(4) to provide college education of the highest standard of as high a standard as in any part of the world, in every Province. The men so produced would become the leaders in improvement, as they are becoming here in Bombay.

Now, at present, in Bombay we are trying to meet all these purposes except (3). The first purpose is attempted in the agricultural-bias schools, and the extension of these is only limited by the supply of trained teachers, for I can only train twenty teachers each year for the Educational Department, and hence progress will be slow until a regular centre for training these men,

on a large scale, in each of our language areas is provided. I am sure this line of work is in the right direction.

The second purpose is attempted in the vernacular agricultural schools of which Loni is the type. Details as to the present position of these have been separately supplied to the Chairman of the Commission, with details as to the evidence of their popularity.

The third purpose is as yet unfulfilled, and is undoubtedly a hiatus. One high school (at Bordi, District Thana) is now proposing to take a definite step in this direction.

The last purpose, college education, is one where we have tried in Bombay, to reach the highest standard, and I think I may say that the standard is high and is improving.

As regards the specific questions asked, I may reply as follows:—

(1) There is need for another Agricultural College of University standard in Sind, and the proposal to establish one has been put forward by an important Committee in 1924. We can staff now all the institutions demanded, except the agricultural-bias schools conducted by the Educational Department in consultation with the Agricultural Department.

(2) No.

(3) Teachers in rural areas should by preference be drawn from the agricultural classes. We have, however, to get qualified teachers where we can.

(4) The attendance at existing institutions is as great as can be accommodated, or nearly so. The Poona Agricultural College is overfull, and 85 applications were rejected this year. The vernacular agricultural schools are nearly full, except in the case of Jambul (Konkan). They would be full but for the leakage which takes place after boys join.

(5) No remarks.

(6) At the vernacular agricultural schools the pupils are nearly all drawn from the cultivating and landowning classes. In the Poona Agricultural College about 25 per cent belong to the cultivating and many more to the landowning class. The proportion from families definitely identified with agriculture is increasing.

(7) I do not think that any modification in the course of study is called for.

(8) In agricultural-bias schools we have definitely gone in for an area of ½ to 1 acre per school. Larger areas involving the use of bullock power and large scale implements are not desirable as a rule. In the vernacular agricultural schools of the Loni type we have a regular farm with about one-fifth of an acre of land per boy. I think this is necessary.

(9) The bulk of the students who pass through the Poona Agricultural College do it in order to make a career for themselves. In the past a very large number have been utilised in the Bombay Agricultural Department or in the Agricultural Departments of other Provinces and States. About 18 to 20 per cent have gone in for cultivating or managing their own lands. The number who have done this in a series of years is shown below, with the number graduating in that year.

I regret I have not data up to date.

	Total number graduated.	Number going in for private farming.
1913	14	6
1914	18	2
1915	20	4
1916	23	3
1917	30	5
1918	18	3

(10) We have two methods of assisting our graduates to improve technical knowledge. The first is by the provision of eight positions of graduates in training. These are trained on a farm of the Agricultural Department until an opening either in the department or outside opens.

The other is the offer to train men in business farming on the Jalgaon farm—living accommodation being provided but nothing else. This has not so far attracted candidates.

(11) No remarks.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—As to the methods of getting improvements introduced into Indian Agriculture, I would refer the Commission to a series of four reports, which I edited and which were published from 1909 to 1912 by the Imperial Department of Agriculture. I do not think that any new methods have been devised since that time, though, of course, with increasing experience, the stress laid on the different methods has altered.

But it must never be forgotten that the essential difference between agricultural departments in the East and in the West is that the latter have arisen to meet the spontaneous demands of the cultivators of the soil, while the former have been created by a Government anxious to give all the help it can to its agricultural citizens. In India, therefore, and this certainly applies to Bombay, it is necessary for the Agricultural Department to put forth every effort, first to ascertain the needs of the cultivators and then to demonstrate how they can most effectually be met.

I would, however, urge that on the whole the people with whom we have to deal are not more conservative than they have to be. In fact, I am inclined to think that they are less conservative than an average English farmer. The position of a cultivator, however, faced with a recommended improvement, is that if it costs any money he can only receive it with very great caution and only after such local demonstration as makes its value completely certain. Hence, all advertisement whether by leaflets, by speeches, by meetings, or by lanterns and cinematographs are of very little effect unless accompanied by actual demonstrations on the spot. This is a definite opinion after a good many years observation. The place of these things is as an accompaniment to demonstration and they will have little effect apart from it.

Now, we have, on the whole, been successful in introducing a number of implements, a number of improved and imported seeds, a certain number of artificial manures, certain remedies for plant diseases, and a few other things, and in creating an interest in better cattle, in pumps for irrigation, in land improvement to prevent erosion in certain areas, and so on.

Thus, within the past twenty years the iron turnwrest plough has almost crushed out the old Deccan plough in many parts of the Deccan, and the Egyptian plough has almost completely replaced the Sindhi plough in large areas in Sind. In the matter of seeds, the demand for improved seed of cotton in many areas, of tobacco in Northern Gujarat, of rice in certain areas in the North Konkan is far greater than we can supply, even though a good deal is spent in maintaining and multiplying the seed. Among artificial manures, the success of sulphate of ammonia as a more efficient partial substitute for fish and oil-cake in the Deccan Canal tracts only really dates from 1919, and the consumption is now nearly 3,000 tons per annum. The treatment of *jowar* seed for smut has very rapidly increased under intensive propaganda in the last three years during which the area for which treatment has been sold has increased as follows:—

	Acres.
1923-24	250,348
1924-25	343,976
1925-26	682,188

One of the most successful pieces of work of this kind has been the spraying of grapes on the Deccan for mildew. The industry was a dying one in 1908

on this account, now it is advancing very rapidly in the favoured areas and nobody would think of growing grapes without using the remedy. These are a few established successes, and I may note a few principles which I think have to be adopted if real success in introducing improvements is to be achieved.

1. The man who approaches a body of cultivators must have previously gained their confidence either by previous successful recommendation or in some other way. An expert, *qua* expert, will get little hearing. When I first worked among the potato growers of the Poona district, they listened but would do nothing. Only when I had been able to check potato moth, after guaranteeing them against financial loss if they used my method, was I able to get a hearing with regard to other matters. Now I can get men willing to test anything I recommend.

2. This winning of confidence, as a necessary preliminary to any success in propaganda, makes it necessary that practically all field demonstration should be done on the fields of cultivators. Generally this has been done under a guarantee to make good any loss, but if care is exercised no financial liability has in my experience ever resulted. Government demonstration farms, or even plots managed by the Agricultural Department are usually very ineffective. I pin my faith to working with the cultivators on their land, just coming in the one operation that we desire to recommend.

3. The necessity for gaining confidence emphasises the necessity of non-official agency being used for propaganda wherever possible. Until recently local agricultural associations had not been a great success except in a few cases. But we think, in Bombay, we have now got to the stage when Taluka Development Associations as established by Sir Chunilal V. Mehta when Minister of Agriculture, under a scheme which I drew up, promise to become one of the very important factors in agricultural advance here. They have certainly become very popular in several of our divisions though not universally and are doing very good work.

These bodies are formed for a Taluka containing 100 to 200 villages, and are intended as the agents of co-operative, agricultural and other forms of development. They receive an annual subsidy from Government equal to their other income but limited to Rs. 1,000, on condition that they employ a demonstrator approved by the Agricultural Department. These have undertaken the spreading of the use of improved implements, of improved seed, the formation of co-operative societies for various purposes, and they also supervise the non-credit co-operative societies in their areas. They are supported by subscriptions from individuals, from Co-operative Societies and in the last year or two, by grants from Taluka and District Local Boards. In recent cases, the tendency has been to obtain in the first instance a large capital fund, and make the interest on this a large factor in their income. I was at the inauguration of a Taluka Development Association in Gujarat a few days ago, which started with a capital fund of Rs. 12,000 specially collected for the purpose.

Their value depends on the guarantee of work which is given by the presence of an approved fieldman, on their non-official character, while the Government subsidy gives a title to stimulate work, and guide it in suitable direction.

4. Propaganda must usually follow a realised need or else improvements must be so introduced as to make a need realised. Many efforts have been failures because while good in themselves, they have not met a real need. I may illustrate by the many efforts to introduce winnowing machines. They are not wanted. The existing method is as good, only requires more time and there is plenty of time.

5. Improvement of organisation and finance may be wanted to make technical improvement possible. This indicates the need for close local study area by area, and even village by village.

6. The improvement must be worth while. That is to say, the increased return must make enough difference to make the risk worth while. In the case of a crop, I generally will not push an improvement unless I am confident it will give an increased net return of 15 to 20 per cent.

Most of these points are perhaps platitudes, but success in propaganda, in my experience, depends on—

(1) Winning confidence.

(2) Keeping official people in the background.

(3) Having an improvement which meets what people want, and giving a large net return.

(4) Being able to command finance, and to organise financial help if necessary.

One difficulty occurs when the success of propaganda depends on common action by a large number of people as in schemes of land improvement in the dry areas of the Deccan, or as in schemes of fencing a large area against wild pig in which we have had considerable success in Western Dharwar. In these cases, we do need legislation to provide that when such schemes are agreed to by a large proportion (say, 75 per cent) of the owners of land, the remaining landowners can be compelled to come into the scheme.

In Bombay, propaganda is now carried out as a combined effort of the Co-operative and Agricultural Departments. A programme of work is drawn out for each unit of area under the control of one agent of either department, and the work contained in that programme whether for co-operative development, or for technical agricultural improvement, is looked after by one man in that area. These men have their programmes passed and their reports received by the Divisional Board of Agriculture, composed of four non-official members, the Deputy Director of Agriculture, and the Assistant Registrar of Co-operative Societies, and work directly, as to policy under its control.

I really think that now, in many areas of the Bombay Presidency the idea of agricultural improvement has got into the minds of a considerable proportion of the rural population, and I anticipate that advance may be much more rapid in the next ten years than in the last. My fear for the future is rather that we shall not be able to meet the demands of the people.

QUESTION 4.—ADMINISTRATION.—I feel that the Government of India may usefully supplement the efforts of the various Provincial Governments towards agricultural improvement. But it may be well at once to state that they must come in as co-operators with the local agricultural departments, and must not, in any sense, come in as directors of what should be done. Within their own Province, the local Agricultural Departments (including in these the Co-operative Departments) know, I think, what is wanted better than any one else can.

I think the Government of India may undertake the following duties:—

(1) They may act as a centre of information and as a central publication centre;

(2) they may have a corps of experts, at Pusa or elsewhere, who can undertake fundamental investigations of general application. These would not necessarily be better men than those in the Provinces, but their work would, while directed definitely to practical problems, be more of a general character than is possible with local agricultural departments;

(3) they may establish a Central Agricultural Board, well supplied with money, which would form *ad hoc* committees for the co-ordination and subsidising of research in matters which are of interest in several parts of the country. I have fully described what I mean by this under question 1 (Research);

(4) they can establish national bodies where this is necessary, as, for instance, to maintain herd books of the chief breeds of Indian cattle;

(5) they organise the co-operation of various Provinces and States where such co-operation is necessary, as, for instance, in the checking of infectious cattle disease, or the prevention of the import of plant pests or diseases.

I do not think that there is any need for these purposes to increase materially the scientific staff of the Government of India. This may, however, be necessary as lines of research activity develop on the lines suggested above.

As regards services mentioned in (c) under this head, I only wish to remark on the difficulties of high railway freight in the marketing of agricultural products. I may also refer to the complaints against coasting steamers in the marketing of perishable articles like mangoes. Details with regard to this last matter will be found in the report of the Mango Marketing Committee sent to the Commission in connection with my replies to the questions about marketing.

As regards the Meteorological Department, I think there should be much closer co-operation between this latter and the Agricultural Department. There are a multitude of matters on which joint or closely co-ordinated investigations are necessary. I desire, in particular, to emphasise the importance of finding out such things as the maximum effective rainfall and the study of such questions as periodicity of rainfall, tendencies regarding the distribution of rainfall in the year as well as its total amount, the possibility of fixing critical dates or periods throughout the year when the course of events for the remainder of the season can be forecasted with reasonable probability, and the best distribution of rain from a crop point of view. All these are of great importance particularly in the precarious tracts, and if there were close co-operation between the meteorologists and the Agricultural Department not only in examining existing data but also in deciding the additional data to be collected, I believe that progress might be made. I hope to place graphs showing the results of some of my studies of the Deccan rainfall before the Commission.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—The actual condition of things with regard to the fragmentation of holdings, as a result of the present laws and customs of inheritance, has so often been described that there is no need to stress the fact. But there are one or two points which perhaps may be made clear.

Apart from a general increase in the value of land, the number of holdings and the number of fragments seem to tend to increase to a definite maximum. I have recently reinvestigated, at the request of the Hon'ble Mr. A. M. K. Dehlavi after nine or ten years, two Deccan villages which were studied in 1915 and in 1917 respectively. The following table shows the number of holdings, in the villages at different periods, and the change in the number of land fragments at an interval of nine or ten years.

Number of Holdings.	Pimpla Soudagar.	Jategaon-Budruk.
1771-72	24	...
1785	...	42
1790	...	34
1791-92	41	...
1796	...	23
1811-12	48	...
1817	...	36
1823	...	50
1829-30	52	...
1840-41	54	...
1914-15	156	...
1917	...	146
1926	156	148

Comparing the character of the holdings at Pimpla Soudagar in 1914-15 and at present, we find a tendency for the size of holding to concentrate at about 1 to 5 acres. This means that agriculture on a man's own land is becoming more of a partial occupation, with labour for wages as subsidiary.

The number of each size has been as follows:—

Pimpla Soudagar.

Number of Holdings of different sizes.

	1914-15.	1926.
More than 40 acres	1	3
30 to 40 ,,	1	1
20 ,, 30 ,,	9	5
10 ,, 20 ,,	18	20
5 ,, 10 ,,	34	32
1 ,, 5 ,,	71	81
Less than 1 acre	22	14
	156	156

Similar figures for Jategaon-Budruk are as follows. It must be remembered that two severe famines have meantime occurred.

Jategaon-Budruk.

Number of Holdings of different sizes.

	1917.	1926.
More than 150 acres	1	1
100 to 150 ,,	1	1
50 ,, 100 ,,	5	3
40 ,, 50 ,,	4	3
30 ,, 40 ,,	6	12
20 ,, 30 ,,	16	14
10 ,, 20 ,,	43	37
5 ,, 10 ,,	34	35
1 ,, 5 ,,	25	34
Under 1 acre	11	8
	146	148

I think the tendency is probably in the same direction here as at Pimpla Soudagar.

2. Fragments of land separately owned.

Jategaon-Budruk.

Number of Fragments of different sizes.

	1914-15.	1926.
Over 30 acres	3	4
20 to 30 ,,	8	8
10 ,, 20 ,,	51	46
5 ,, 10 ,,	95	101
3 ,, 5 ,,	69	68
2 ,, 3 ,,	58	73
1 ,, 2 ,,	98	111
¾ ,, 1 ,,	34	26
½ ,, ¾ ,,	31	28
¼ ,, ½ ,,	51	61
⅛ ,, ¼ ,,	40	27
Under ⅛ ,,	13	21
Total plots in village	551	574

The general character of the distribution has not been altered, but there is evidence that some consolidation is taking place as well as further subdivision. The number of separately owned plots under one acre in size has gone down from 169 to 163.

In this village I noted in 1917 that the units of cultivation (in which from an agricultural point of view we are chiefly interested) were larger than the units of land held, and that a man appears to cultivate a less number of fragments than he owns. In this connection the following two statements will be found interesting:—

Number of Holdings and Areas of Cultivation held by one man.

	1917.		1926.	
	Holdings.	Areas cultivated by one man.	Holdings.	Areas cultivated by one man.
Acres.				
Above 100	2	1	2	1
50—100	5	5	3	4
40— 50	4	9	3	2
30— 40	6	9	12	17
20— 30	16	21	14	13
10— 20	43	27	37	41
5— 10	34	24	35	20
Under 5	36	18	42	22
	146	114	148	120

2. Number of Fragments held and cultivated by one man.

The table shows the number of men holding and cultivating various number of fragments.

	1917.		1926.	
	Holdings.	Cultivation.	Holdings.	Cultivation.
	Number with specified number of fragments.	Number with specified number of fragments.	Number with specified number of fragments.	Number with specified number of fragments.
1 Fragment . . .	30	24	28	19
2-5 „ . . .	87	59	89	65
6-10 „ . . .	26	29	24	26
11-15 „ . . .	...	2	4	7
16-20 „ . . .	2	...	3	2
22-25 „ . . .	...	...	...	1
above 25 „ . . .	1	...	...	...
	146	114	148	120

These figures seem to show pretty clearly that the natural process of consolidation has now proceeded, in the last ten years, as rapidly as that of further fragmentation. This means of course the sale and consequent recombination of the holdings. As regards cultivation, the units are decidedly larger than those of land held; we have, in fact, in all appearance, reached a stable position in which, unless something happens to increase the value or the productivity of the land, it is not likely that the situation in this respect will get materially worse.

The position is, however, bad enough now, and it is urgently necessary to deal with it. The Punjab experience has shown that in flat land, with limited variation, it is not an insurmountable problem to deal with the problem by co-operative methods. With us in Bombay, such areas occur to a very limited extent, and in the areas where the problem is most acute, the irrigated areas of the Deccan, the Konkan, etc., the soils differ so widely that restriping is a matter of the extremest difficulty. In spite of this, a committee of which I am the chairman has, by the orders of Government, taken in hand the planning of a restripement in the irrigated village of Manjri Budruk. The present position will be shown to the Commission on a map, and the proposed lines of work explained.

For the purpose of restripement by voluntary agency, I feel only one piece of legislation is needed, namely to provide that when the owners of 75 per cent of the land agree to a plan, the remainder can be compelled to come into the scheme. For the present, I propose that Government should bear the cost of survey and replanning, and the remapping of the area including the setting up of boundary marks.

As regards future fragmentation, legislation is under consideration in Bombay to prevent this taking place beyond a certain limit. But as I am not in close touch with the position of this proposed legislation, I cannot say anything about it.

QUESTION 20.—MARKETING.—(*a*) I am not sure I have understood the meaning of this question. Marketing of all sorts of marketable produce in Bombay presents no difficulty at present, in the sense that there is no real trouble in getting a market for it. The arrangements for disposing of any agricultural produce are, in fact, very highly organised, and with those which are common market commodities a man need usually not leave his holding in order to sell, and many products, like fruit, are often taken possession of before reaping and reaped by the purchaser. So that I cannot say that in Bombay there is any lack of facilities for marketing; whether the arrangements are such as to give the biggest return to the producer is a different matter, and will be dealt with under the next heading. But if the question intends to ask whether there is usually any difficulty in selling produce after it is grown, I should say, No, as far as the Bombay Presidency is concerned. I do not know of a case where produce is not grown because it cannot be disposed of, except in the case of new or improved products, and here there certainly is difficulty.

I need, therefore, only refer to the marketing of such new and improved products and quote the case of certain improved cottons. When an improved cotton has been produced, it has been found generally difficult to get a proper price for it. This has happened when we introduced Broach cotton in Dharwar, improved cotton in Surat and American cotton in Sind. In the first of these cases (Broach cotton in Dharwar) in order to secure a fair price for an infant production, we introduced special Government auctions of *Kapas* in Dharwar, which were successful. We did the same with the lint of improved cotton at Surat, but there the problem was not so difficult as Surat is a lint market and not a *Kapas* market. In Sind the difficulty was temporary and now I think that the American *Kapas* gets its proper price.

(*b*) To this I think it is obvious that the answer must be No. Nothing like this is ever perfect. But I would insist that for important products the system is very highly organised, and every link in the chain has its function. The repeated and frequent failure of amateur attempts to replace the present system by something apparently much simpler shows either that the system on the whole works well, or else that there are vested interests in it so powerful as to be able to resist any but very well considered changes backed by very general support of the producers. Probably both alternatives are correct.

But I am not sure that, except in a few cases in the Bombay Presidency, we know very much about the whole course of the marketing of any product. This certainly came to light in connection with the enquiries I recently organised for the Indian Central Cotton Committee on the finance of cotton production and marketing in Khandesh and in Upper Gujarat. First a questionnaire was issued to people thought to be likely to know the whole of the process through which *Kapas* passes before it reaches the larger buyer in the markets. Answers were received from a considerable number of people. Then it was decided to organise an extensive enquiry in a number of villages and in all the local markets. The result, in Khandesh at any rate, has been to show that the impression given by the answers to the questionnaire was very largely incorrect, to show that the reputed dependence of the cotton grower, in regard to the marketing of his produce, on the moneylender is a myth, and that there is generally a preference to sell his produce in the village to petty traders over taking it to market because of bad market practices. The complaint was not against the recognised market charges, but on account of (1) disputes about the rate after weighment had commenced, and (2) arbitrary deductions from the weight.

Now I am not aware that any investigation of a really serious character, apart from the above, has been undertaken in any part of the Bombay Presidency, on the course of marketing of a product from the actual grower until it reaches the big merchant and so enters the ordinary stream of com-

merce. Hence it is not now possible to give an account of the chain of hands through which a product passes, as desired in the Commission's questionnaire. What we do know is that—

(1) with almost every product, there is a certain amount of forward sale before crops are reaped. The proportion of the whole to which this applies is quite unknown in any case;

(2) with almost every product there are a considerable number of compulsory deductions in the market, for religious and charitable purposes, for samples and the like;

(3) in many cases, in the same market, the unit weight for buying from the cultivator is larger than the unit weight for selling by the dealer. Thus in the *gul* market in Poona, the cultivator-seller has to supply 256 lbs. per *palla*: on the other hand, the unit for a purchaser of *gul* from the middlemen is 240 lbs. per *palla*. In the same market, potatoes are purchased from the cultivators at 300 lbs. per *palla* and sold to the public at 280 lbs. per *palla*;

(4) in most products there are, at present, two necessary middlemen in any market, if a cultivator is selling, the *adti* or *aratya* who represents the seller, and the *dalal* who negotiates on behalf of the buyer. The *dalal* will not deal direct with the seller. There seems little justification for the two middlemen. Thus with potatoes in Poona, all the stuff must pass through the hands of five *adtis*;

(5) bargains are usually made secretly by manipulation under a cloth, and without the knowledge of the cultivator-seller. This is always brought up as a grievance by the people, but open marketing is usually resisted by the *dalals*.

How much weight must be attached to each of these criticisms must be different in each case and requires a series of special investigations. I have recently asked the Government of Bombay, to allow me to organise two such inquiries, in the cases of ground-nuts and *gul* (in the Deccan) in the coming year. We have now a Professor of Agricultural Economics (Rao Bahadur P. C. Patil) and the actual control of the work would be with him. It is intended that these should be the first of a number of such marketing studies.

In one case, namely that of mango marketing, we have recently had an investigation by a committee into the present organisation and its report* is attached, and gives a very vivid illustration of the difficulties in the way at present. It insists on the evils of the secret buying system above described, and on the careful grading of the produce, before being sent to market. The whole question of action under this report is now before Government.

(*c*) As to steps to be taken to improve the quality, purity, grading, and packing of agricultural produce, I find difficulty in saying very much. I have not studied the question as regards the export market, and as regards the Indian market only in a few cases. The safeguarding of the purity and quality of the produce from any special tract has only been a matter for action in two cases. The first of these is cotton, where an attempt has been made to secure that cotton of standard quality for a particular area should be marketed by itself. This has been done in three areas by different methods.

(1) In Gujarat the first step was the organisation of the supply of pure cotton seed of improved, even, standard quality in the South Gujarat area. This dates from 1919. Since that time the Agricultural Department organises the growth of seed from freshly selected materials, each year over from 5,000 to 9,000 acres, and rogues the fields in which this is grown, in five different centres. This is supposed to give seed for 100,000 acres at least in the following year. This seed is ginned in selected gins and graded under the supervision of the Agricultural Department. There is

* Not printed: Report of the Mango Marketing Committee—Bombay—Government Central Press—1925.

a demand to be included in the 9,000 acres from which seed is obtained, as the lint from this always secures a specially high price. The seed so produced is bought by Government and sold so as to cover the actual cost. There is now a very great demand for this seed. Locally two Indian States (Rajpipla and Chota-Udaipur) have forbidden the growth of any other seed in their States, and this policy is being considered for certain areas in Baroda.

But the reputation of this cotton was made when the sales of the produce from our 9,000 acres of seed area were conducted by auction by the Agricultural Department and in the first years regular auctions were held under the supervision of a committee in Surat of merchants and cultivators. Now the importance of keeping it pure is fully realised and auctions are no longer needed.

The whole work has been very materially helped by the Cotton Transport Act, which by prohibiting the entrance of cotton, cotton seed, *Kapas*, or cotton waste into the area where the improved seed will grow except under license, has prevented adulteration, which, if it did not spoil the lint, would certainly have spoilt the seed.

I should like the financial and selling part of the organisation to be now taken over by a non-official agency, and this will probably come. It has been hindered hitherto by the fact that the most suitable bodies for this purpose, the Cotton Sale Societies in Lower Gujarat, have not been hitherto convinced of the advantage of the improved seed to the grower.

(2) In the Bombay Karnatak the first step was that the Agricultural Department began about 1910 to organise auctions for Broach cotton at Dharwar. This was then a new introduction and serious complaints were received that the proper value could not be obtained for the *Kapas* produced. Hence auctions with grading of the *Kapas* on the basis of ginning percentage were opened and succeeded beyond expectations. These were applied also to improved type of Kumpta and Dharwar American (Upland) cotton and were finally taken over by Cotton Sale Societies in 1919. A supply of pure seed for 5,000 acres in each case promised and (1) also the roguing of this area and (2) the grading of the *Kapas* for the societies. On the other hand the societies were to finance the cotton seed and distribute it in the area where the cotton is grown. This has continued and has proved a great success and the graded improved cotton always has fetched a higher price in auction than could be obtained otherwise and it is much appreciated by the trade. Arrangements are being made now to supply pure improved seed for a larger nucleus area of Dharwar American cotton and a very strong demand has risen for a very large increase in the case of Kumpta cotton.

Here also the Cotton Transport Act has helped but the centre of the success of the system is, I think, the Government grading of improved cotton for auction.

(3) In Sind where the cultivation of Punjab American cotton is rapidly growing on the Jamrao Canal the arrangement is that *Kapas* grown from seed supplied by the Agricultural Department is given a certificate of the fact when it is taken to the factories of the big buyers in Mirpurkhas and some other centres. This is much valued and at the same time enables the Agricultural Department to secure good seed for further distribution and the cultivators to obtain a full price. This applies, of course, only to a small part of the area under American cotton but the rest now secures its fair price.

The above is the only case in which the Agricultural Department or other public authority has attempted to take any part in grading produce. The Co-operative Bank which markets so much of the Deccan *gul*, grades its

produce and of course many merchants do so also. But there is no other grading by a public authority. In the case of ground-nuts where the present value of Khandesh ground-nuts very largely depends on the fact that pure Spanish peanuts are grown, originally introduced by the Agricultural Department, we use every moral suasion possible to prevent the invasion of the area by other varieties. The same is the case with the small Japan variety grown in the Panch Mahals. But no public authority has attempted more than this. Questions of packing have not been seriously studied in Bombay except in the case of mangoes (*vide* report* sent herewith). (*d*) As regards market information for the use of growers and up-country merchants, I find that for products like cotton and oil-seeds with a world market, traders are generally as quickly informed in any local market as could be arranged by any agency, I can think of. As regards the cultivators our experience is that they quickly learn what the course of the market is or is likely to be when they are anxious to sell their produce.

I do not think that there is opening at present for much action in the direction suggested under this heading in the questionnaire.

Generally as regards marketing for the future, I pin my faith to the development of co-operative marketing. But it will have to be much better-informed organisation than has been usual in the past, and must be based on very close study of the whole existing organisation, for the disposal of produce with a world market—up to the time when it enters into the stream of wholesale commerce. I append a copy of a note* which was drawn up by Mr. Rothfield and myself in 1923 embodying our experience up to that date. The principles therein laid down I still believe should guide development. I shall refer to this again under another heading.

Question 25.—Welfare of Rural Population.—Under this head I propose to consider the problem of rural development as a whole, in what must be its ultimate object, namely the welfare, the happiness and comfort of the rural population. At present in the Bombay Presidency the village population has rather been left in a backwater, but the time has come to look at the rural problem as a whole, and see to whether definite progress cannot be made not merely in the technical improvement of agriculture, or the organisation of village finance, or in pushing village sanitation, or in increasing the number of villages with schools, but in taking all these things as part of one end, the recreation of the villages as self-conscious units, with the idea of progress and of improvement.

Such a conception, it will be said, requires a missionary, and so it does. It can hardly be created by a Government agency, though if such an agency can be developed there is no reason why Government should not aid it. And I would, hence, like to see an agency develop, more or less on the lines of a number of educational societies in the Bombay Presidency and elsewhere, which will provide the missionaries needed to carry out the idea. The general conception was suggested to me by the Hon'ble Sir Chunilal V. Mehta, and seems a most productive one. It would work from the Taluka Development Association as a base, and would envisage the village problem as a whole. The link would be to study a typical village in a tract on thorough lines. My own village study of Jategaon-Budruk in the Deccan would, perhaps, serve as a type. This would be done, as mine was, with the close and hearty co-operation of the people. Then the needs would be considered and the possibility and cost of satisfying them.

In most of our Bombay areas the needs are usually primarily economic. The land does not produce its maximum, even without greater current expenditure than is now made; a too large proportion of the value is taken away by others than those who have had a share in producing it, and there is too much waste of time. Once produce a hope of better economic position, and the desire for sanitation, for education, and for land improvement will follow. With the proper missionary, who has the resources and information

* Not printed.

of the agricultural, co-operative, sanitary and other departments at his back, the future is more than possible. To me this is no fancy sketch. I know villages where work could be taken in hand at once, provided the men are available, and here the scheme for a Society of " Servants of Rural India " suggested by Sir Chunilal V. Mehta seems to supply the missing link, if only the men can be found who will accept the conditions and devote themselves to the work. I would strongly recommend any move in this direction, and be prepared to subsidise such missionaries, without in any way limiting their independence.

Only by some such means can the all round progress be made which alone results in increase of happiness and welfare. It is useless to have technical improvement if all the extra produce is to be taken by unsuitable expenditure: it is useless to provide co-operative credit, if this means (as has often been the case in the dry tracts of the Deccan) that the extra credit is used to the full without care enough, and is lost in the next year of scarcity.

My scheme would, therefore, be—

1. A Society of " Servants of Rural India " to inspire and supply men, and inspire the movement. It is hoped that the plan would attract large public funds, which with Government subsidies would in the first instance provide the men.
2. Local Development Associations, which would organise the area in which such men should be placed, beside doing more general propaganda over the whole area to which they belong, and preparing the way for the intensive work in villages and groups.

Again I would insist on the consideration of the village problem as a whole, and the attack on the present uneconomic, and despairing condition of the people of many of our villages, as perhaps the most serious problem in the country at present. Whether enthusiasm can be organised and whether men can be found who will devote themselves to such a purpose, which can never be under the direct auspices of Government or even of semi-Government bodies, is a matter which can only be tested by trying. It is, however, I feel a matter to which Government resources might well be devoted, and to that extent the general creation of further extensive Government paid staff, whether for agricultural, co-operative, sanitary or other similar propaganda.

सत्यमेव जयते

APPENDIX A.

Village Economic Studies. (*Vide* Question 25 of the Questionnaire.)

I have, with a number of colleagues, conducted several intensive village economic studies. Two of these done in the Deccan in 1914-15 and in 1917, respectively, have been published and results are available to the Commission. Another from the Konkan is now awaiting final working up for publication.

I was however, recently requested by the Hon'ble Minister for Agriculture, Bombay, to re-examine the villages studied in 1914-15 and 1917, and with the help of my colleague Mr. N. V. Kanitkar, this has been done. I can now give a comparison of conditions in the village of Jategaon Budruk in 1917 and 1926. This is a village in the *very* precarious region, and it has had two serious seasons of scarcity since the former study, namely, in 1918-19 and in 1920-21. It represents a fair picture of a large proportion of the Eastern Bombay Deccan.

1. *Population*—

1917	736	
1926	667	Loss 9·3 per cent.

In the Census of 1921, the population was only 458. This is partly due to famine, and partly due to the season when the figures were taken.

2. *Cattle Population*—

	1917.	1919.	1926.
Bullocks and bulls	306	178	238
Cows	182	57	110
Calves	171	no record	58
Buffaloes and calves	25	...	16
Goats	97	...	292

The 1919 figures show the *immediate* result of famine. The 1926 figures show the slow recovery.

3. *Balance Sheet for the Families in the Village.*—The following figures are based on the income of all families added together, and the necessary expenditure at the people's own standard of living added together. These families had to be omitted in 1926:—

Income.

	1917.	1925-26.
	Rs.	Rs.
Income from land	15,802	11,682
Income from other sources	8,546	14,736
Income from trees	615	

The crop was taken as of the same *anna* valuation in the two years. Omitting the trees the total income per family compares as follows:—

	Rs.
1917	166
1925-26	208

Expenditure.

	1917.	1925-26.
	Rs.	Rs.
Interest on debts	6,755	4,868
Necessary personal family expenditure	32,221	31,304

The standard expenditure per family in the two years was as follows:—

	1917.	1925-26.
	Rs.	Rs.
Interest on debts	46	33
Necessary personal family expenditure .	219	241
TOTAL .	265	274

These figures seem to show that—

(1) On the people's own standard of life, the village is not at present an economic proposition even without allowing for debts, taking the average season of the last ten years as the basis. Without counting interest on debts the deficiency per family has been—

	Rs.
1917	53
1926	38

This would be made up by under-feeding and under-clothing, or by movement of a portion of the population away for part of the year.

(2) The pure cultivators, *i.e.*, the people who depend solely on agriculture, are very much fewer in proportion. That is to say there is a tendency towards wage-earning, as supplementary to agriculture, among a large proportion of the population.

If we divide the families into three groups, namely:—

Group I.—Solvent from land income alone,
Group II.—Solvent from land and labour income, and
Group III.—Insolvent.

We get the following results. Solvency is judged by the people's own standard.

	1917.			1926.		
	Group I.	Group II.	Group III.	Group I.	Group II.	Group III.
Number of families in Group .	10	12	125	7	16	107
Number of population in Group	43	25	664	44	55	556
Excess or Deficiency per family	+Rs. 232	+Rs. 18	—Rs. 137	+Rs. 99	+Rs. 170	—Rs. 123

Thus while in 1917, 15 per cent. of the families were solvent, in 1926, 18 per cent. were solvent. But the solvency is due to a very much greater extent to the receipts from labour than it was in 1917.

(3) The debts have diminished, even in this period, due to the falling in of mortgages and hence the cancelling of the corresponding debts. Several families have left the village as a result of losing their lands. Compared with 1917 the total debts were as follows:—

	Rs.
1917	29,384
1926	20,120

APPENDIX B.

The Problem of Precarious or Famine Tracts.

Perhaps the biggest problem before agriculture in the Bombay Presidency is that of the extreme precariousness of a large proportion of the area. In the latest edition of the Statistical Atlas, the area (excluding Sind) has been classed as follows:—

	Sq. miles.
Total area of Province	**77,011**
Area not liable to famine	24,498
Area somewhat liable to famine but with frequent scarcity	26,595
Area very liable to famine	25,918

Thus 33·6 per cent. of the total area is very liable to famine.

What this extreme precariousness means, can best be judged by two tests. The first of these is the suspensions and remissions of land revenue, which are chiefly given on account of failure of crops; the other is a test of the goodness of the season which I have devised, by combining the areas of the staple crops with the anna valuation of the crop obtained in each case.

The first method gives the following results for the years since 1918, for each of the natural divisions of the Bombay Presidency proper:—

Gujarat.

——	Current Revenue demand.	Current suspensions and remissions.	Proportion suspended and remitted.
	Rs.	Rs.	Per cent.
1918-19	95,14,666	56,57,302	59·5
1919-20	96,36,966	1,53,471	1·6
1920-21	96,27,011	42,10,123	43·7
1921-22	95,59,058	2,26,419	2·4
1922-23	96,15,292	4,07,462	4·2
1923-24	98,18,489	24,45,446	24·9
1924-25	1,00,81,855	1,18,697	1·2

16(iv)

Deccan.

—	Current Revenue demand.	Current suspensions and remissions.	Proportion suspended and remitted.
	Rs.	Rs.	Per cent.
1918-19	1,47,42,781	82,32,837	55·8
1919-20	1,47,31,875	3,99,173	2·7
1920-21	1,51,64,673	67,39,515	44·4
1921-22	1,55,52,188	20,90,929	13·4
1922-23	1,58,55,987	18,47,932	11·7
1923-24	1,62,83,234	18,28,186	11·2
1924-25	1,67,59,837	6,85,139	4·1

Karnatak.

—	Current Revenue demand.	Current suspensions and remissions.	Proportion suspended and remitted.
	Rs.	Rs.	Per cent.
1918-19	68,64,289	15,29,072	22·3
1919-20	69,14,299	65,771	1·0
1920-21	68,95,374	15,62,554	22·7
1921-22	60,06,351	1,10,329	1·7
1922-23	69,58,778	12,67,347	18·2
1923-24	71,72,179	14,12,116	19·5
1924-25	72,62,169	1,23,346	1·7

Konkan.

	Current Revenue demand.	Current suspensions and remissions.	Proportion suspended and remitted.
	Rs.	Rs.	Per cent.
1918-19	51,26,014	12,98,626	25·3
1919-20	51,41,705	47,689	0·9
1920-21	52,02,625	73,274	1·4
1921-22	51,67,803	34,334	0·7
1922-23	52,68,819	40,683	0·8
1923-24	54,35,159	59,855	1·1
1924-25	54,72,704	54,158	1·0

Now I take it that when over 40 per cent. of the current Government land revenue has to be remitted or suspended, it means essentially a crop failure over very large areas; when over 10 per cent. is remitted or suspended, it means a very bad year. Therefore, we have for the seven years quoted.

	Crop failure.	Serious deficiency of crops.	Normal.
Gujarat	2 (29 per cent.)	1 (14 per cent.)	4 (57 per cent.)
Deccan	2 (29 „)	3 (42 „)	2 (29 „)
Karnatak	..	4 (57 „)	3 (43 „)
Konkan	..	1 (14 „)	6 (86 „)

Thus taking the last seven years in Gujarat, two have meant crop failures over very large tracts, one had a serious deficiency, and the others were normal. In the Deccan only two years were normal while five had serious crop deficiency or failure. In the Karnatak, there was never a crop failure over such large areas as in the two former divisions, but four years out of seven had a serious crop deficiency, while in the Konkan, only in the almost unprecedented famine of 1918-19 were the crops seriously affected. Thus in Gujarat the crops are likely to be seriously deficient or a failure in 43 per cent. of years (or say two out of five), in the Deccan in 71 per cent. of years (or say in seven years out of ten), in the Karnatak in 57 per cent. of years (or say in three years out of five) and in the Konkan in 14 per cent. of years (or say in one year out of seven).

These figures are for certain areas confirmed by the results of the other method. In this I have taken 1915-16 as the standard good year for four Deccan districts (Poona, Ahmednagar, Sholapur and Bijapur), and called this year 100. My records extend for 39 years. I have classified all years giving over 60 per cent. of the goodness of 1915-16 as " reasonably good." Those from 40 to 60 per cent. of the year 1915-16, as " poor," and those below 40 per

cent. as "bad," meaning that there was an extensive crop failure. On this basis the following are the results:—

—	"Reasonably Good."	"Poor."	"Bad."
Poona	22	8	9
Ahmednagar	21	8	10
Sholapur	24	9	6
Bijapur	17	15	7

In these four districts, all of them largely in the very precarious tract, the chance of a good crop is only about 54 out of 100, and the chance of a "bad" year, meaning extensive crop failure is about 20 out of 100.

The precariousness revealed by these figures is very great indeed, and it is doubtful whether cultivation is carried on so extensively in such precarious conditions in many parts of the world. It is not that the *average* rainfall is low, but the *variability* is *extreme*.

In such a precarious tract, which, by the way, has an average population of 180 per square mile, the natural way to deal with the situation is by irrigation, whether by extensive schemes for the harnessing of rivers, or by stimulating the construction of local scheme of irrigation by wells or otherwise by the grant of *taccavi* loans or otherwise. Now irrigation by canals constructed by the State, if feasible may be considered as an absolute cure for the effects of drought, so far as they will command, and every effort should be made to exploit this method of dealing with famines. The glorious results of efforts in this direction in the Deccan are very visible in the splendid prosperity of a number of the Deccan valleys. *But* the possibility of this method is limited, even apart from any question of capital cost involved. In the Deccan and Karnatak the Indian Irrigation Commission estimated the maximum amount of land irrigable if all the rivers were harnessed to the maximum extent, as 500,000 acres. The present area is 224,000 acres. The area under wells is now 422,000 acres, and might possibly be doubled. The area under irrigation might, if all sources of irrigation water were exploited, be raised to 1,500,000 acres. But the actual net cropped area in 1925-26 was 21,179,000 acres. Thus the maximum area irrigable by exploitation of all the present methods is only 7¼ per cent. of the area actually under crop in 1925-26. Similar calculations for Gujarat give a possible figure for the maximum possible proportion of land irrigated not greater than 5¼ per cent.

So that while I would urge the development of irrigation at the fastest possible rate, and while *so far as it extends*, I would consider it as a perfect method of dealing with the problem of uncertainty of rain, I would call attention to the fact that in the two main famine tracts of the Bombay Presidency between 90 and 95 per cent. of the area can *never* be protected by these means, and must depend on the rain, whatever it be. It is to *this* area, and country similar to it extends far beyond the bounds of the Bombay Presidency, that I want to call the attention of the Commission in the present note.

In the area discussed the character of the rainfall is peculiar in that in almost every year there is enough water to raise substantial crops. I hope to show the Commission graphs showing how even in some of the most famine years there was ample water for crop growth, and in most cases there were times when the water available was excessive. There are some famine years when the water was never sufficient but in all but one or two out of series of sixty years, there was enough.

In a region like this, therefore, there are three problems which must be faced if the situation is to be met. These are as follows:—

1. The most essential problem is the use of the water properly in all except one or two years out of sixty.

2. The next problem is that of finding some way of insurance against the occasional complete crop failure.

3. The third matter is to so arrange matters that the cultivators in these areas should not be solely dependent on agriculture, which cannot possibly fill in more than half a man's time.

The first of these problems then is the proper use of the rain water. During the last three or four years, particularly, attempts are being made in Bombay to approach this question from two angles. On the one hand every encouragement is given to the increase of wells, but beyond this a Superintending Engineer on special duty has been appointed to investigate and prepare plans for land improvement schemes of considerable size, which will then be carried out either by Government, or by co-operative organisations of villagers, the capital being largely found by Government under the *taccavi* rules. This matter is so far new, and has hardly got under way. For similar schemes in the same direction, to be carried out by individual landowners, the Agricultural Department is supplied now with three "bunding officers" who prepare plans for small works of value from Rs. 100 to Rs. 5,000 including terracing, field embankments, and the like. The problem of field erosion is so important and is so constant that this encouragement and planning of these small works is a matter of very great importance. The other angle is the attempt to increase the absorbing and holding power of the soil for water. Nearly all "dry-farming" experiment elsewhere has been done on deep alluvial soils. Many, if not, most of our famine areas, on the other hand, are composed of relatively shallow black cotton soil, with a very dry hungry subsoil. Up till recently our experiments with dry farming have been somewhat uncertain. But now, thanks to the appointment of a Soil Physicist, we are well on the way to devising a method for securing *rabi* crops even in fairly bad seasons by (1) the usual dry farming cultivation methods, (2) the burial of green matter during the *kharif* season (this works when the rainfall after burial is substantial), and (3) trenching deeply in the lines of sowing of the crop. (This worked well even in the bad season of 1925-26.) This is only a beginning, but I think the possibilities are now very great, and I should like to see the investigations in this direction very much reinforced.

The next problem is to find some method of insurance. With things as they are, I certainly would not cultivate under the conditions of the Eastern Deccan without some form of insurance. Of course, a well is a first class insurance, but a one-mhot well, which is all that one is likely to get even under favourable conditions, will only safeguard a very few acres (8 to 10). On the other hand, I have approached insurance companies both in London and here as to whether they would or could devise a scheme of insurance against crop failure, but the opinion seems definitely to be that the risk is not an insurable one. There are perhaps two things that can be done:— (1) to arrange that in these famine tracts the unit of time for co-operative loans should be a longer period than one year. I do not think this would help much, but it has been approved by the Bombay Provincial Co-operative Conference, (2) to organise the building up to a famine reserve in all co-operative societies in the famine areas. The whole question of this insurance, which I regard as in some form essential to make agriculture anything but a bad gamble in these precarious tracts, is still unsolved, and if the Commission could give a lead, I should, for one, be very grateful.

In these tracts, apart from irrigation, there can be usually only one crop a year, and hence there is a very large amount of spare time which hitherto has been quite unprofitable. Therefore, not only in famine areas but in all "one-crop" tracts the emphatic necessity of secondary occupations. Such

as used to exist, have largely disappeared. And, at present, the following are chiefly followed:—

(*a*) Industrial work in Bombay and other industrial centres. The relief afforded by this is, I think, considerably exaggerated, as taking the whole male population of the six largest industrial centres it only forms a small per cent. of the total male population of the country.

(*b*) Carting. This is the ideal secondary occupation for a cultivator, as it utilises not only his own but also his bullock's labour.

(*c*) Local labouring work in the nearest town or for local public bodies, or in connection with land improvement.

(*d*) Poultry keeping, among the depressed classes, Mahommedans, and Christians, but only with country fowls.

The field is, therefore, open, and much study has been made recently as to what supplementary occupations are feasible. It must be understood that such occupations are totally different from village industries, as such, and, being supplementary occupations, must be simple and yet give a return in useful material, if not in actual money. Many of those suggested are local, and the only ones which afford widespread possibilities are apparently:—

(*a*) Poultry keeping with improved fowls. The future of this is decidedly rosy, and it has proved itself so far particularly useful in the most precarious tracts. The demand for large sized eggs and good fowls is very great, and probably is capable of increase to almost any extent, especially if an export trade in dried eggs or frozen eggs could be developed. The most effective work in Bombay has been done by Mr. J. L. Goheen of Sangli.

(*b*) Spinning. I attach copies of a leaflet* prepared, at my request, by the All-India Spinners' Association for the Presidency Agricultural Show which well states the position regarding this.

(*c*) Simple weaving. We are trying to develop this as a secondary occupation for farmers by (1) having a school for simple weaving which is kept six or eight months in a village and then passes on, and (2) making simple weaving a subject for school boys in our vernacular agricultural schools.

(*d*) Lac growing. This can be extended widely, I think, and recently it seems likely to be taken up by one or two large landowners on their estates.

Silk growing and bee-keeping have been suggested, but seem out of the question except in a few places in the Bombay Presidency. There are, of course, many small local occupations, like cane-making, broom-making, etc., which have persisted in some areas. There are perhaps more of these in the Konkan than anywhere else.

But on the whole the line of development in the famine tracts, where irrigation cannot be extended (and this amount to over 90 per cent. of the cropped area), seems to consist in (1) vigorous development of land improvement schemes, both large and small, with Government assistance in preparation of plans and in finance at a low rate of interest, (2) further investigation into methods of utilising the rain which actually falls, and hence the strengthening of the work of the Soil Physicist, (3) some method of insuring against crop failure below a certain amount, and (4) the development of secondary occupations for cultivators. I have tried to show what we are attempting in each of these directions.

---

* Not printed.

Oral Evidence.

2747. *The Chairman:* Dr. Mann, you are Director of Agriculture, Bombay Presidency?—Yes.

2748. You have put in a very interesting memorandum which my colleagues and myself have had an opportunity of reading. We are indebted to you for that. We are also indebted to you for a good deal that is in the original memorandum* presented by the Province?—Yes, a very large proportion of it.

2749. Taking first the printed memorandum which is before the Commission, I mean your note of evidence, would you like to make any statement amplifying your note, or would you like to proceed at once by way of question and answer?—I would like to proceed at once with question and answer.

2750. On page 1 of the document you talk about the Agricultural College in Poona where you have a corps of experts who conduct agricultural research and who are equally responsible for the teaching of degree students and for the training of post-graduate students and workers. Is it your experience that research has a valuable bearing upon teaching?—Most emphatically. I would not like to have a teaching institution unless associated with it there was a very large amount of research going on.

2751. You think the benefit is mutual?—I do. I think it is of very great benefit to the student to be in an atmosphere of research and I think it keeps a research worker practical to be in touch with the teaching of students.

2752. Research workers have occasionally complained that the duties of teaching interfere with their research work. Do you think it is a sound complaint?—I think it is quite true that a man who has to devote a good deal of time to teaching cannot do quite as much research as when he devotes his whole time to research. But I think the gain is greater than the loss.

2753. Now, as regards your post-graduate training, do you find that the post-graduate men who come up for training and who have taken degrees in Indian Universities reach the desired standard in the pure sciences?—I think they reach just about the same standard as we had when we passed the science degree in the English Universities. That is to say, from the research point of view they are beginners, just the same as I was when I got my degree.

2754. Do you think that the grounding in the basic sciences is sound?—I think it is sound. I think it probably is not quite as good as that of a graduate in an English University, but I think it is sound.

2755. It is very important, is it not, from the angle of teaching research workers capable of directing from the higher posts?—It is a very important matter, but my experience is that of the graduates whom we get here, a certain number of them are capable, or develop the capacity, to conduct research of a very high quality.

2756. I do not know whether you would wish to tell the Commission what you think may be the future of the higher posts in research in this country, and particularly in relation to the future recruitment, if any, of European research workers?—Our experience in the Bombay Presidency, I think, is that we can develop here a corps of experts as good as we can get from Europe. I will not say that there are not better men in Europe than any we produce, but these are unobtainable. I think therefore that we develop as good men as can be got from Europe.

2757. What is it you think which makes the highest posts here unattractive to the best research workers in Europe?—They prefer to stay in Europe where they can get other positions. A man who can get a first class position in England is not likely to come out to India. For India we get men who do not usually belong absolutely to the first class.

*Not printed: Memorandum by the Bombay Government for the Commission.

matter. I think to the best science research workers, the reputation gained

2758. It is a question of pay, is it not?—I think that is only part of the through being in Europe is much more than the extra pay. I do not think any amount of money will draw the best men out to India.

2759. You do not think that a successful stay of five or ten years in this country would add to the prestige, or forward the future, of a research worker?—You might get a few good men in that way. But I do not think you can rely on getting them.

2760. On page 2, there is a point which I would like you to develop. You say: "It would be an exceedingly satisfactory thing if a permanent fund could be created in the Presidency, from which researches could be financed, so that their continuance would not be subject to the fluctuations of provincial finance." I take it it is impossible to over-emphasise the importance of continuity in research?—I entirely agree. To feel that very valuable work might be closed down at any moment because provincial finance is in a bad position destroys the power to do the best work. In order to get the best result, I think you must have a definite period settled over which you know the thing can be carried on.

2761. In all important lines of research, results cannot in the nature of things be expected in a limited time?—I think in most of our research schemes we can never expect to get valuable results under five years.

2762. Then you say, "Such an extension of research work is very much needed now as in many parts of the Presidency the people are coming to look to us for a solution of their difficulties in a way which was inconceivable ten years ago." Is that not very significant?—It is one of the most interesting features I know of and one of the most satisfying for one who has been in touch with the work. There are areas where there are people who now confidently come to us and say "We have this or that new difficulty; show us how we can best meet it." Many of them are difficulties which demand very considerable investigation.

2763. I notice in the memorandum you express the fear that this demand may grow to such an extent that you may not be in a position to meet it?—I fear that, undoubtedly. I will just give an illustration. In Upper Sind we have been working on rice for three or four years particularly, and last year we had a special disease, which people call rust. It is not rust at all but nobody knows what it is. They say "you must help us to get rid of it." At the present moment it is a very mysterious thing which will certainly take several years to clear up.

2764. They look to you to do it?—Yes; they look to us. Every association I went to at the end of the last rice season wanted us to tackle this question and asked us to do what we could.

2765. Then you go on to consider the directions in which the Central Government could assist agricultural research in the Provinces, and you point to the Indian Central Cotton Committee as an example of the value of organisation crop by crop over all-India?—Yes. I think it has given us a line to follow which we had not before. I think its work promises to be exceedingly successful. And it is a central body which has been able to help work not merely in one Province but in all Provinces.

2766. You point out that under the Reforms, since 1919, the Provinces are responsible for the conduct of research and the administration of agricultural matters within their boundaries?—Yes.

2767. Accepting that, do you yourself think that the Government of India should take no interest in India's premier industry?—Never. I think that would be rather absurd. I think it would be a very great pity if the Central Government considered itself in no way responsible for the development of agriculture.

2768. After all, there are Provinces more backward than Bombay?—Yes. We think so.

2769. I thought you might probably think so. Would you desire to see a day when the Central Government will say "After all it is no longer our affair. If you cannot look after your own agricultural matters you must suffer." That would be a calamity?—I think it would be a calamity. If you look at page 7 of the memorandum I have given definitely a series of purposes which I think the Government of India might and should always fulfil.

2770. Yes. I have read that. I also notice on page 3 you rather suggest the idea of a central stimulus for research backed by financial assistance as the basis upon which the Central Government could take an active share in agricultural research?—I do suggest that, yes. One feeling I have is that any funds placed at the disposal of some central body like this should not be raised from provincial contributions. I mean what the Provinces have to spend on the matter should be spent by themselves. But if assistance can be given in somewhat this manner from the Central Government, independent of any special contributions, then I think a scheme like this might work well.

2771. That would give the Central Government an opportunity of satisfying themselves, through this Advisory Body that you suggest, that reasonable co-ordination between Province and Province was being attained?—Yes, and that, of course, is what we get in the Central Cotton Committee. We do know, those of us who are members of that, as we have never known before, what is being done in each Province, and how our work is related to what is being done in the Central Provinces or Madras, for instance.

2772. Under present conditions, the power for good which a research institution like that at Pusa possesses depends very largely upon the prestige of its workers, does it not?—I think you may say, at present, almost entirely. I do not think the fact that it is a Central Government institution carries much weight. But if they have the best men, it carries the weight of the men.

2773. I do not know whether you would like, either in public or in private, to tell the Commission your views about Pusa at the moment?—I would rather give my views in private.

2774. Proceeding with your note of evidence, I come to Agricultural Education. I should like to ask you whether in this Presidency agricultural education, or education in general for that matter, enjoys the patronage of leading and wealthy citizens and landlords in the way in which it undoubtedly enjoys in certain other countries?—I think in Bombay it enjoys that patronage to a very great extent indeed. As far as public men are concerned it is one of the things on which you can rouse enthusiasm, and not only rouse enthusiasm but gather a good deal of money.

2775. Quite apart from the value of the money subscribed, the patronage and support itself is of immense value?—Of enormous value. We are the home of educational societies which are one of the most valuable factors in the public life of India.

2776. How about the larger landowners in the rural areas? Have you many men of wealth in that position in the Presidency?—No. Our rural landowning classes are not very large in numbers and not very wealthy. In Sind the position is different, but I am not dealing with that now. In the Presidency we have not a very large landowning class apart from the peasant cultivators.

2777. Then you go on to give four purposes which, in your view, in a country like India agricultural and rural education should try to serve. I come to the first "to saturate ordinary primary rural education with the agricultural outlook, especially with boys from ten or eleven years upwards." I take it that you consider the primary object of education in relation to agriculture to be literacy?—I think that the primary purpose of education is literacy. Up to the fourth standard, up to the age of 10 or 11, I aim at nothing but literacy, and not any specialised education of any sort. But after that stage we might begin to think what the future purpose of the boy's life is.

2778. You want the boy to be taught the three R's in terms of physical things with which the boy is accustomed to deal in his own home in the

village?—I think that is very important. I published some years ago a little book on agricultural arithmetic in which all the problems given are those relating to agriculture and farming. I think efforts in that direction might be made. I think our early readers might be given more of an agricultural bias, but the primary aim of all education up to the tenth or eleventh year should be literacy.

2779. In dealing with the matter of literacy, do you agree that one of the reasons why a high percentage relapse to illiteracy is due to the fact that they have illiterate homes?—That has a very great deal to do with it.

2780. They have no reading matter in the villages?—Practically none.

2781. Do you think that any firm attempt to increase the amount of literacy should be accompanied by an equally firm endeavour to spread adult education?—I think it should, but I think we are up against an exceedingly difficult proposition, because I do not know, except in one case, of a really successful effort at adult education.

2782. I noticed at once you did not bring that forward in your memorandum to any great extent?—Simply because I am almost in despair about it. There was an attempt on the part of the Co-operative Institute, out of the funds given by Sir Vithaldas Thakersey, to bring about a large amount of adult education in villages which had co-operative societies. The success was only moderate and the attempt has now been given up because the fund came to an end. But the success was small.

2783. Can you account for it at all?—No. I think it is very difficult to account for it. I do not think there is a feeling of the necessity of reading, writing and arithmetic in the villages. Take for example a village 18 miles away from Poona. The very best cultivator in that village is a man who cannot read and write. That is the man whom I look on as one of the best cultivators in that village. He says: "I want my boys to read and write, but I am not very particular about it myself. I can get on very well without it."

2784. A man of outstanding capacity who was very well able to take care of his interests might get on without reading and writing?—That is so.

2785. You would not argue from that that the cultivators in general would not benefit from education?—No. I do not think they realise the extent to which they would benefit.

2786. Do you not think that improved communications and greater opportunities for practice in reading and writing (in other words, a greater necessity for reading and writing) will make adult education more easy to popularise?—I think it will to a certain extent, but I am not very satisfied that the present generation will ever be very much altered.

2787. Then I come to No. (2), provision of specialised agricultural education in the vernacular. The type of school you refer to is at Loni. Has that type been a success in this Presidency?—It depends upon what you mean by "success." We have these schools. They are all full. In all of them we have a much bigger demand for places than there is room for, and hence we can make a selection. The Government policy is that we shall have one such school for every district, and many districts which have not a school are applying for it and are offering in many cases to lay down money for getting such a school.

2788. In a document which you have been good enough to send me in answer to a letter written by my direction asking for further information on various points brought out in the original draft memorandum you have been able to point to a very considerable demand for the extension of this type of school?—Yes. I think it is clear there is a very considerable demand for that.

2789. These schools are, I take it, very expensive?—They are expensive. I was working it out to-day. Of course we cannot get exact figures, but I find that the cost of a Loni school, on the basis of the 1924-25 figures, works out at Rs. 262 per boy per annum. That includes boarding and everything for

the boys. They take two years, and therefore the total cost for the period is Rs. 520 per boy.

2790. *Sir Ganga Ram:* How many such boys are there?—There are about 180 now. The figures are given in one of these papers.

2791. *The Chairman:* Now, is it your experience that many of the boys entering the Loni school change their mind about their future half way through the period of their training?—No, not many.

2792. If they do, then of course they are in some difficulty, are they not, at a vocational school?—They are in a difficulty, but if they have not been there more than one year, they simply go back to the other type of education. Of course we have always a certain amount of leakage in the first month. That is to say, the boys join the school and then in the first month there is 10 per cent leakage.

2793. The boys do not like to work?—We get them to work very hard at it, and they complain that that is not the sort of education they expected. Otherwise the schools would be absolutely full. At Loni we take about 50, but we are usually left with 40 or 45 at any time. The difference between that and 50 is due to the leakage.

2794. Did you meet with many cases of caste prejudice against this type of vocational schools?—No: not here.

2795. You probably know that another system is followed in the Punjab?—I do not think there is another system in the Punjab. The Punjab type is exactly like my type No. (1). No. (2) is an entirely different type, and I do not think that what we are attempting at these schools is being attempted anywhere else in this country.

2796. You think there is no alternative; if you are to have a vocational type of education this is the only way to achieve it?—We have not had any practical suggestions for any other method. We think there is room for both types, the agricultural bias schools corresponding to the Punjab middle school and the schools for specialised agricultural education.

2797. How much non-technical education is given to the boys in the Loni schools?—I suppose about one-third of the time is devoted to education of a general type, but that of course has all got the agricultural outlook. For instance, nature study forms part of that. Then you have arithmetic, but the arithmetic entirely deals with agricultural problems and so on.

2798. Do you think that the plan of educating boys for Government service in an agricultural college alongside of those who go to the college with a view to return to their "father's farm" is a good plan? Or do you find that contact with those who are going in for official life is apt to turn the minds of those who come to the school with a view to returning to the farm, towards an official life?—There has been an influence in both directions. Some of the students who come to the college with a view to taking up work on their "father's farm" are tempted away to Government service; on the other hand, there are some who come definitely with the idea of Government service and who decide afterwards to go in for farming on their own. Hence I do not see any very great disadvantage in keeping the two classes together.

2799. One of the difficulties of a boy who goes to the business of farming from an agricultural college is that he has not had any commercial experience?—It is an exceedingly great difficulty. I mean, the men who leave our college are not as a rule fit to undertake commercial agricultural work.

2800. They get a certain experience of farm management, I suppose?—Yes, but it is in regard to theory rather than as something which may affect their pockets. I certainly would not turn one of my graduates, however brilliant, at once into an estate manager before giving him further training first in the management side of the work.

2801. Have you any suggestions to make as to how this difficulty might be overcome?—Yes; we have three methods which are actually adopted for this end. One is that Government have given me a certain number of posts of

graduates under training. These are definitely allotted as far as we possibly can to students who have in view positions as managers of estates or at any rate outside positions. The second method is we are offering graduates an opportunity to come and study for a year on our most developed commercial farm, for definite training in farm management and come into contact with the whole business management of the farms. We offer them residence and accommodation. But this has not attracted many students; in fact, it has not tempted any so far but the scheme is there and is open and we are making every effort to push it in the near future.

2802. *Sir Chunilal Mehta:* Why has it not attracted students?—Because, I think, so many of the students have spent all the money they want to spend on education by the time they leave college and require at least a living wage if they are to come for training. Thirdly, there are numbers of private estates now where they like to get our men as assistant managers. Ultimately they can get training there and then go back to a farm of their own.

2803. *The Chairman:* I want to put certain questions to you with regard to your answers to the questions about demonstration and propaganda. I observe with interest that you lay great emphasis on the value of demonstration on the cultivators' own fields?—We have almost given up all other sorts of demonstration. Demonstration farms, as far as we are concerned, are done with. We do practically all our demonstrations now on the cultivators' own fields.

2804. There is always a suspicion that you top-dress your Government demonstration farm, is there not?—Something of that sort. At any rate, there is an idea that conditions there do not correspond to those under which the cultivator works.

2805. Have you been successful in your peripatetic demonstrations?—Most of the work is done in that fashion. We have a number of demonstration plots on cultivators' holdings. We have got officers who go to the cultivators' fields at critical times of agricultural operations in order to demonstrate the improved methods.

2806. You emphasise the value of the Taluka Development Associations established by Sir Chunilal Mehta and initiated according to the scheme drafted in part by yourself. I want to ask you a question about them. Are these associations dependent at all on outside driving force or stimulus or management or help or is the whole drive and personnel discovered within the Taluka?—I think most of them are dependent to a certain extent on outside drive. Certainly most of them are.

2807. You admit that is a very important point?—It is exceedingly important. I do not think you can carry on this Taluka Development Association scheme unless you have a certain amount of outside driving force.

2808. Do you not foresee a time when these societies will be in a position to carry on their work practically without outside help?—I do; in some cases in a very few years the societies will be so self-dependent that they will not want any outside drive but they will still want, probably, the subsidy they get. As far as actual push goes they will be able to furnish it themselves. One or two of our Khandesh Associations are approaching that stage now.

2809. Both from the educational angle and the agricultural development angle, I think it is to be desired that direction and stimulus should come from within the community itself?—Precisely; that we have got very much in view. In fact, I think they will be a failure if they continue to depend on outside drive to the extent they have done in the past.

2810. I think the figures you give on page 6 are very significant. The initial fund of the Taluka Association in Gujarat was Rs. 12,000?—That was only inaugurated a fortnight ago, and I went specially to Gujarat to inaugurate it. Out of that sum, Rs. 8,000 was contributed locally in the Taluka.

2811. I was going to ask you how much of the Rs. 12,000 was with you when you went?—Rs. 8,000 was contributed locally, and the balance by natives of the Taluka now living outside it.

2812. People who were anxious to give a helping hand to their old home?—Yes. For instance, Rs. 3,000 was contributed by a partner of Ambalal Sarabhai of Ahmedabad.

2813. On page 7 you speak of winning the confidence of the people and of keeping officials in the background. How do you do that?—I do not know how we do it, except that we push the non-official people forward as the originators of everything as far as we possibly can.

2814. Provided an official has established a reputation for being able to assist the cultivators, I suppose he is an asset, is he not?—Certainly he is. When I wrote this I meant officials *qua* officials; I did not mean to exclude a man who has made a reputation as an individual. In such a case he is a most valuable man, though an official unfortunately.

2815. You point to the need for legislation to compel a small and obstinate majority to conform in the interests of progress?—Yes; I think that is essential in a number of cases. There are two particular matters to which I think I have referred in this note. One is in connection with fencing against wild pigs. There you often find an obstinate minority whose land is right in the middle of the area and who consequently suffer little damage from the wild pigs, and who will not have anything to do with the scheme. I know cases where the matter has been held up for years on that account. Again, in connection with land improvement, terracing and planting, such powers are really necessary; often a single individual, or two or three at the most, may hold a scheme up. I hold it is not unfair, if the owners of 75 per cent of the land come into a scheme like this, that the others should be compelled to.

2816. 75 per cent. of the land, not 75 per cent. of the owners?—That has been discussed. I feel disposed to say the owners of 75 per cent. of the land.

2817. Do you think the adoption of that principle in a statute would be well received by the public?—Yes, on the whole I think it would.

2818. You think the time has arrived when it might be tried?—Yes.

2819. *Mr. Calvert:* Would you not have a proportion of the owners as well?—Mr. Madan drew up a scheme recently embodying both—60 per cent. of the owners and 75 per cent. of the land.

2820. *The Chairman:* Recent French legislation embodies that dual principle?—Yes.

2821. Then comes, on page 7, what we have already referred to, your fear that a time may come in the future when you will not be able to meet the demands of the people?—I think that time is coming very fast.

2822. I suppose the limiting factor will be financial?—I think it probably will. How far we shall be able to have our research work mature is an important point, and of course that depends on the amount of money we get. I think a point has now been reached when we have got the men to do the work; hence it is a matter of finance rather than a matter of men.

2823. I should like to ask you, under the heading of Administration, about one or two questions you do not touch on in your proof of evidence. I suppose you have considered the subject of how to solve the problem that will lie before you of choosing officers for the new superior Provincial Service which I take it is to take the place in this Presidency of the old established Imperial Agricultural Service?—Exactly.

2824. Do you think some special training institution will be required?—So far as the lines of work which we have already developed are concerned, I do not think we want any special institution. I think the training in our own existing departments is the very best that can be given.

2825. That is to say, at the agricultural college?—Yes, and as subordinates of the men who are now doing the work. For instance, if I want a

Cotton Breeder I would rather place a man under one of my Cotton Breeders for five years than send him to any institution.

2826. You think you will be able to man this new service without any very great difficulty?—Yes, except in certain directions where we are short of men. For instance, quite recently we wanted a good Mycologist and a good Plant Pathologist. We have waited a long time, and ultimately we have had to get a man trained in one of the American Universities. There have been some cases like that, but for most of our lines of work we are now producing men as rapidly as we are likely to need them.

2827. How about the Royal Institute of Science in Bombay? Is that institution capable of turning out workers of the necessary calibre?—I would prefer to take the best of my own men and give them post-graduate training.

2828. Do you think you will be able to recruit enough?—Yes, I think so.

2829. A word or two on communications. Do you think that in this Presidency you are getting the railway development, particularly in the matter of branch and feeder lines, that you deserve and require?—I think there are tremendous possibilities in the direction of branch and feeder lines. I am not speaking of it as a commercial proposition but as an agricultural need. In some of our areas the roads are good; in others they are bad, and always will be bad; and in those areas I think feeder railway lines would be a tremendous agricultural asset.

2830. You do not commit yourself to their being a commercial success so far as the railways are concerned?—I am not qualified to speak on that.

2831. The fact that you are of opinion they would be of tremendous help to the country suggests, at least, that a considerable amount of produce would travel over them?—Yes, and undoubtedly they would stimulate the growth of the more valuable materials in areas where they are not now grown.

2832. Do you ever as a department represent the need of railway development in any particular district?—We never have done so so far.

2833. Do you bring to the notice of the railway departments complaints with regard to freights or lack of facilities for the transport of produce?—Very commonly, and I must say that on the whole we have been received by the railway departments with sympathy. Quite recently I have approached the railway companies on two matters, one being the freight on artificial manures. There they have been good enough to reduce very considerably the freights that were previously charged. The other instance was with regard to the distribution of cattle manure from Bombay, and there again the freight has been brought down very considerably as a result of representations.

2834. With whom do you deal in this connection?—We generally write to the Agent of the railway in question.

2835. Have you ever taken a complaint before the Rates Advisory Committee?—Not direct.

2836. Is the Railway Advisory Council an active body in this Presidency?—I do not know very much about it. I see the reports published in the papers; that is all.

2837. Do you know anything about the representation of rural interests on that body?—No, I do not know anything about that.

2838. How about roads? Have you anything to say about roads?—On the whole, our main roads are good in most districts, though there are exceptions, such as Surat and so on. The second class roads are only moderate, and the village roads are just about as bad as they can possibly be.

2839. Have you anything to say about District Boards in their capacity as bodies responsible for these roads?—I do not like to say very much, but I certainly think since they took second class roads under their charge those roads have not improved.

2840. I hope you will say a great deal if you think you ought to; it is very important that the Commission should know?—I certainly think that

those roads which are no longer provincial but now come under the District Boards are tending to deteriorate.

2841. To the disadvantage of the cultivator?—Yes. He has to cart over them.

2842. Does the Irrigation Department maintain certain roads?—They maintain only their own service roads. Some of them are open to public use and some are not, but they do not form a big factor.

2843. Are they good where they do exist?—Where they exist they are.

2844. To what do you attribute the failure of District Boards even to maintain these roads at their existing measure of efficiency? Is it disinclination to raise local taxes?—I think it is competition between various needs for a limited amount of funds. I think the tendency is now to prefer other means of spending the money. If there is competition between education and roads it is probable nowadays that education will get the money.

2845. Of course, competition between various money spending activities is a common experience in all walks of life and in all directions of public experience, is it not? It cannot in itself be a sufficient argument, do you think?—No, but I am only stating the fact.

2846. From the agricultural angle you do regard communications as of paramount importance?—I do.

2847. Have you anything to say with regard to the policy of extending Postal Services to rural parts?—I certainly feel that if it is possible we ought to extend them. But I know they have been gradually improving since I have been in the Bombay Presidency. Still they have got a long way to go.

2848. Extension of Postal Service is closely connected with the removal of illiteracy?—It is vital.

2849. Do you envisage the future of broadcasting in the vernacular with any enthusiasm in this country?—I think it is still a long way off.

2850. Still, I suppose the remarkable Agricultural Show which may be seen in this district at this moment seemed a long way off 24 months ago, did it not?—Yes. I think there are possibilities in broadcasting, but I do not envisage it as an immediate possibility.

2851. I notice that both in your note of evidence and in the provincial memorandum which was provided for this Commission at an earlier stage, very little is said about the provision of long-term credit. Do you regard that as a very important matter?—I think it is an exceedingly important matter, because I look on land improvement in a very large part of our area as being vital to any big agricultural improvement.

2852. And substantial measures of land improvement depend upon long-term credit?—They do.

2853. Have you any ideas as to how long-term credit might be provided?—The present arrangements are that it is provided by Government through co-operative societies as a rule.

2854. But you have no suggestions for the improvement or amendment of the present facilities?—No, except this, that I think most agricultural improvements will not pay the interest which is now charged on such long-term credit, and I think Government will have to recognise that they have an interest in the improvements, and an interest which ought to lead to a definite reduction in interest charges.

2855. I sometimes see words such as, "the need for adapting existing credit facilities to meet the demands of to-day," and phrases of that sort; do you know at all what these phrases mean?—No, I do not; most of them do not have any meaning at all.

2856. You have heard them used yourself?—I have heard them used.

2857. Of course, the present credit facilities represent a certain amount of credit or liquid capital, and in any credit organisation such as the deve-

lopment of credit banks, no doubt a certain amount of that credit or capital would find its way through such organisations into agricultural improvements?—It certainly would.

2858. And to that extent the phrase I have used has some meaning?—Yes, but it is often very difficult, in the way in which it is used, to make out what it does mean. There is only that one point I want to make on this matter, and that is that any permanent agricultural improvement is not merely an improvement made on behalf of the owner of the land, but the Government have a part of it; the Government get a substantial amount out of that improvement by way of insurance, if in no other way; hence the Government ought to take a definite financial responsibility and pay definitely for it.

2859. It is, for instance, a very important insurance against famine?—That, of course, is one of the points.

2860. Turning to the question of fragmentation of holdings, am I right in thinking that certain draft Bills are in the offing?—There is a draft Bill actually prepared. I do not think it has yet been actually approved by the Bombay Government, but I hope to-morrow to be able to lay that before the Commission.

2861. We had better leave that till to-morrow, but I will ask you this question, because you may wish to deal with it to-morrow. You have supplied us with these tables which merely suggest that there is some natural limit to the extent of fragmentation. Do you think that the population of the village might have an important bearing on fragmentation?—Yes, I think it might. But, except in the irrigation tracts, our village population is very constant or slightly declining. Most of our areas are not in the position of very rapidly developing country; but, as soon as you get a rapidly developing country for any reason whatever, then fragmentation will increase, and this condition of stability will cease.

2862. You mention that in your view there is some evidence of consolidation taking place as well as further sub-division; that consolidation being due, I take it, partly to sale and purchase?—Yes.

2863. And partly, perhaps, to peasants owning land dying without direct heirs?—Both, but it is mostly due to sale.

2864. Now on the question of Irrigation, do you think the relations between the Irrigation Department and your own department are sufficiently close, and, if I may say so, sensitive?—I wish they could be closer.

2865. Because, after all, it is really one problem, is it not?—The problem is one, except that the angle of approach is inevitably very different. I do not blame anybody: the angle of approach of the Irrigation Department is, and I think must be, a question of making 5 or 6 per cent. on the capital invested; that is the angle of approach and that is the dominant consideration. In our department, of course, the angle of approach is that of making the cultivators under the irrigation scheme as prosperous as we possibly can. I do not think anything can alter the difference in the angle of approach; I do not think any further machinery can alter that attitude, but I think we ought to be in as close touch as possible.

2866. You have no constructive proposals to put forward?—No, because I think it is very largely a matter of personality. I think if you get an irrigation officer who at the back of his mind has a very large view as to the prosperity of the people, and if you get an agricultural officer who does recognise the necessity of the scheme paying, then we can get on even as it is without any further machinery. Of course, there is one possibility, and that is that the same Minister should deal with both departments that would bring us together at once. I think that would be a very very good thing.

2867. *Professor Gangulee:* Do you think it would change the angle of vision?- It might to a certain extent; but, even then, the irrigation people would necessarily feel that they had got to make 5 per cent. on their capital. But it would be a great advantage if we could have the same Minister dealing with both.

2868. *The Chairman:* On the question of soils, do you advocate a thorough soil survey of the Presidency?—In the Presidency, no, in Sind, yes. In the Presidency, no, because, except in a few areas, we have no large areas of uniform soil. It would be such a vast task, and the value you would get out of it would not be worth it.

2869. I suppose it would be expensive?—It would be tremendously expensive. For instance, in the Deccan the actual crops which you can get from the land are very much more determined by the depth than by the nature of the soil. We have got data for every survey number in the Deccan of the depth of the soil, and that is very much more important than anything you can get out of an actual soil survey. On the other hand, in Sind, it would be a very great advantage.

2870. *Sir Henry Lawrence:* A soil survey of some character does exist as regards depth?—A soil survey does exist and has existed for many years as regards depth. The whole of the soils of the Presidency are classified into groups of so many inches of soil—2 inches, 3 inches, 6 inches, 12 inches, 18 inches. The whole of our revenue system is based on that.

2871. *Mr. Calvert:* At what depth do you stop?—Two feet, I think.

2872. *The Chairman:* As regards agricultural implements, do you think local initiative is coming forward to supply these wants in the way that it should?—I think it is.

2873. You are satisfied?—I am satisfied at the present moment. If there is a demand for any implement, it can be made here. When I first came to this Presidency we had not, I suppose, more than a dozen iron ploughs in use. Now, it is a question of hundred thousand, two hundred thousand, or something like that. At first, they were entirely supplied by English and American firms. Then Mr. Kirloskar started his workshop, at first in Dharwar and then in Belgaum. He manufactured ploughs, which were of the same pattern. Now, he has got very large works, which I hope the Commission will visit, and similar works have been started in Satara. They are working in close co-operation with me, and they are prepared now to make any implement I like to give them, provided I order 6.

2874. Do you know whether these firms are meeting with any particular difficulties in the manufacture or distribution of their wares?—Kirloskar complains very bitterly about import duties and railway freights.

2875. Does he not manufacture the implements in this country?—Yes, but he complains that implements which are imported from other countries come in free.

2876. That is absence of import duties?—Yes, absence of import duties.

2877. But surely, these people should be able to compete successfully with any imported implements?—They can compete. They have practically captured the market, but they have captured it, because they are very considerably cheaper; but, on the other hand, they are not so good.

2878. Is there a large import of agricultural implements to this Presidency from over-seas to-day?—Not a very important one, except in matters of big machinery like engines, pumps, tractors, and things like that; the smaller implements, no.

2879. Probably, the demand for agricultural implements of an improved kind will increase?—Yes, it is increasing very fast.

2880. And the natural ambition of India must be to manufacture implements to meet that demand in India?—I think so. I will give you an illustration. We have introduced ridge cultivation in lower Gujarat which, as a result of this year's working, is going ahead very fast, and I anticipate there will be 100,000 acres of such cultivation in five years. That requires certain kinds of implements, which we are now getting from the International Agricultural Implements Company, of which Messrs. Macbeth Brothers are the Agents. Those implements might very well be made here in five years.

2881. How about the relation between the Veterinary Department and your own department in the matter of research and administration?—In the matter of administration, formerly the Veterinary Department was under the Director of Agriculture. About 7 years ago, it was made independent. That did not matter so much, but, when the Reforms came on, it was not only made independent, but it was put under a different Minister. That, I think, has been fatal. I do not think there is any objection to its being separate; in fact, I think there is a great deal to be said for its being separate, but I thing it ought to be under the same Minister.

2882. I see there are three departments, the Veterinary Department, the Agricultural Department pure and simple, and there is a branch, namely, the Animal Improvements Section?—The Veterinary Department simply deals with the investigation and checking of disease and with horse-breeding.

2883. So, there is a close link between the Veterinary Department and the Agricultural Department?—A very close link, which ought to be represented by a very close relationship between the two.

2884. Does that exist?—Not to the extent that it ought to. I am in close relationship with the Civil Veterinary Department, but the relationship is not so close as it ought to be.

2885. How about the relations between the Veterinary Department and Muktesar? Is that close?—Yes, it is close. Muktesar is the Research Department of all the Veterinary Departments in India. Practically no research is done in the Bombay Presidency.

2886. Does the prestige of Muktesar stand high in the Presidency?—Yes, it does.

2887. I do not know whether you would care to say anything with regard to what the Government of India might do in the veterinary line?—I have not thought the thing out sufficiently closely.

2888. Do you know anything about the co-ordination of veterinary work as between this Province and other Provinces, and particularly contiguous Provinces?—No, I do not know. At least, my knowledge is not special.

2889. I suppose veterinary education does not touch your immediate responsibility?—It does not. I have always wished that the Veterinary College and our Agricultural College should be much more closely related. What we want primarily is that the two departments should be under the same Minister; then I think we should get closer relationship between the two departments.

2890. There is a good deal to be said for the Veterinary Department being a separate and independent department as such?—Yes, I think so; I am not at all anxious that it should come under my control.

2891. You do not feel any avidity in that direction?—No.

2892. As regards marketing, the question, which I am afraid was not quite clear to you when you read the Questionnaire, was intended to apply to the physical market itself: whether the market arrangements and provision of the markets were satisfactory?—I see.

2893. I think you have answered the question fairly fully. A good deal of your answer to the question about marketing appears to me to apply to the produce which is destined for export abroad?—At any rate, it is destined for the world market in some form or another.

2894. Could you tell me whether there is any important stream of produce from any producing area in this Province to any consuming area within the bounds of the Presidency or outside?—There is a tremendous stream of material of all sorts which goes from the districts to Bombay. That, of course, is a very constant and a very regular stream. That is more or less on the same footing as the over-seas marketing.

2895. Is there any stream running in the other direction eastwards?—There is nothing on which I could speak.

2896. You would probably agree with me that it is just as important that the producer shiuld receive a fair share of the ultimate price when you are

dealing with produce consumed within the borders of India as it is important that he should receive a fair share of the price for produce exported abroad?—Yes.

2897. The internal market is a very important question?—Yes, in regard, for instance, to the cottons that are utilised in India. Of the Kumpta cotton, none goes abroad. In fact, Bombay is the worst market in India for Kumpta cotton.

2898. I have read through your reply to the question on Marketing, and I have read through the report of the Mango Marketing Committee which reported in 1925. I should judge from the two that it is your view that the data which must be collected before an accurate analysis of the marketing system could be achieved, have not yet been collected?—They have not. I would not have been so sure of it a year ago, but, since I carried out my investigation in regard to the marketing of cotton in Khandesh for the Central Cotton Committee I have been convinced that even in regard to the products about which we know most, we know very little with regard to the finance and marketing of the produce from the time it leaves the hands of the man who grows it till it enters into the stream of wholesale commerce.

2899. You agree that an examination and publication of those details is very important?—I think it is very important; in fact, so important that I have actually now before Government definite proposals for such an investigation in connection with two products in the coming year.

2900. Do you propose to utilise the services of your Agricultural Economist in that direction?—Yes; he will conduct the enquiry.

2901. I take it that in this country, as in Great Britain, where I am more familiar with it, public opinion is the ultimate tribunal to which you must refer?—Of course.

2902. So that it is very important that your results should be made public as soon as possible?—I entirely agree.

2903. Do you think any statutory regulation of marketing practices would be practicable in this country?—I think it would certainly be practicable. In fact, I drafted a Bill for the Government some time ago for the control of district markets, in connection with cotton, which is still before the Government, and may be introduced for aught I know within a reasonable time.

2904. How long has it been before Government?—It finally passed out of my hands about two years ago.

2905. Do you recommend for instance, statutory standardisation of weights and measures in the Presidency?—I am very strongly convinced that that must be done before we can get anything satisfactory.

2906. I find it hard enough to understand these matters when a pound is a pound on both sides of the table; it must be almost impossible to understand them when a pound is not a pound on the other side of the table?—It is impossible at the present time. If you look to page 102 of the memorandum* which I have submitted, you will find the number of seers per maund of cotton in the various markets in Khandesh. Without going outside Khandesh there you see the various values. Then when you leave that and you come to a market like Poona, if I am a cultivator I have to provide 256 lbs. per maund as a seller, and if I am buyer, I get only 240 lbs.

2907. I recall reading about some work done by Mr. Simcox in connection with standardising these measures. Do you know whether any of his work stands to-day?—I think it has gone, though I cannot speak for certain.

2908. He achieved a certain measure of success in the area in which he worked?—Yes, for the time being.

2909. *Mr. Calvert:* Is standardisation a practical proposition?—Most of the committees that sat on it have been very doubtful about it, but I cannot see why it should be an impossible proposition.

---

* Not printed: Memorandum by the Bombay Government for the Commission.

2910. *The Chairman:* It must come sooner or later you think?—I think it is certain to come sooner or later.

2911. The question is whether the time has come or not?—Yes. I think with regard to many products it has come.

2912. I do not quite follow the logic of the latter part of your reply in sub-section (4) on page 13. You say "Thus with potatoes in Poona, all the stuff must pass through the hands of five *adtis*." How is that?—A cultivator brings his produce to the market; as he comes into the market, he is met by the representative of one of the five *adtis*. The *adti* asks the man; 'Will you let me sell this for you?' If the cultivator says 'No,' and does not make a bargain with that *adti* or one of the others, he cannot sell his stuff. If he makes a bargain, the *adti* goes to the *dalal* for the buyer, settles rates, and also settles that no other *dalal* will deal with the cultivator. That means two middlemen.

2913. So that, these five people work the whole potato market in Poona?—Yes. When we tried to introduce a sixth in connection with co-operative potato marketing, they boycotted the whole thing and killed the society.

2914. I should have thought 5 were probably ample. I do not quite understand you?—None of these *adtis* would come in on the terms which we wanted as a co-operative society, so we tried to introduce a sixth man on behalf of the society, but they said no.

2915. How about these charitable and other deductions? What percentage do they amount to?—You will find on pages 99-100 of the memorandum* a statement of the actual amounts in various cotton markets in the Southern Division, which are fairly representative. I could not give you the actual percentages; they could be worked out.

2916. Do you think the cultivator willingly pays the charity cess?—I have never heard any serious objection to it.

2917. Is it an important amount?—Not very important. I have never heard very much objection to it. I do not think people very seriously object to it.

2918. It is not sufficiently heavy?—It is not sufficiently heavy. What they did object to in Khandesh was the other evils, which have nothing to do with charity. They objected to disputes as to the change in the rates after weighment had begun, and things like that.

2919. Have you any control of cotton markets in this Presidency?—No, we have not. They have in the Central Provinces and it was the purpose of the Bill which I drew up to bring that in force.

2920. *Dr. Hyder:* What is the quantity per *dokara* taken for sample?—It is 2 lbs. per *dokara*. That is, the man who brings the cotton is supposed to supply 2 lbs. of cotton out of every *dokara* to the man who is buying, without payment. It is taken as a sample for the person who buys. I do not know where it goes; it is taken out by the *dalal;* it does not go back to the cultivator.

2921. *The Chairman:* I take it that one of the main purposes of regulating the producer's output so as to aggregate an important volume of a particular grade of produce, is to secure value for quality?—That is the idea.

2922. Do you think that is a very important service which Government have been able to render?—I think it is exceedingly important, and I think both in Gujarat and in the Southern Mahratta country, the whole success of our improved cotton has been due to the fact that Government has undertaken that responsibility.

2923. It is not of much use your research workers researching or your demonstrators demonstrating unless the cultivator is going to get the better price for improved quality? No.

2924. Which he will not do unless he sells his produce along with other similar produce so as to get a sufficient bulk to claim the best market price?—No.

---

* Not printed.

2925. I notice there is an indication that experiments as to better containers for mangoes might be carried out. Do you think containers for horticultural produce as a whole are satisfactory in this country?—I do not think they are at all, especially for perishable produce.

2926. An extension of markets very often depends in great measure on better packing and better containers?—Precisely, and really we are now investigating the question of the best container for mangoes. I look upon that as the first step towards producing better containers for other perishable goods.

2927. If this work can be carried out, will it not be a very important service to the cultivator?—Yes, it is an exceedingly important service. To give an example, there is a very large number of eggs coming into Bombay from the Deccan. It is estimated that the average amount of loss is nearly 20 per cent. before they reach Bombay. That of course is purely a matter of proper containers.

2928. In marketing, do you think that bad communications tend to bind a cultivator down to a particular dealer and to limit his choice of markets?—I think very much so.

2929. Is it often the case in this Presidency that cultivators are bound to local markets rather than to more distant markets, through lack of pack animals?—I do not think lack of transport animals is a very big factor in the Presidency proper; in Sind it is. There we have pack animals rather than animals drawing wheeled vehicles. That is in Lower Sind, it is not so much so in Upper Sind. For the rest of the Presidency, I doubt whether it is a very big factor.

2930. In the matter of the welfare of the rural population, the Commission is interested in the proposal you have put forward. I understand your idea to be to remove help from outside as soon as the infant can walk by itself?—Exactly. I mean that, unless we can get an organisation or a group of villages feeling self-conscious and appreciating the necessity of an improvement, I do not think we are really out of the wood. But I think we have got a long way to go before we can get to that stage.

2931. Are you looking forward to any detailed economic surveys of villages? Is that likely to be done by your Agricultural Economist?—Yes, I think it is. These economic surveys of villages are very difficult things to do. They are not things you can take up wholesale, and they are not things that can be taken up by everybody. I reckon that the economic survey of a village takes me a year, that is to say, it takes so long to get into the confidence of the people so that you are sure that you are getting correct information. Unless you gave me a year, I would not undertake to give you correct data.

2932. Does your experience suggest that even having got that data you should be extremely wary of applying a particular instance to the generality of things?—I would be extremely wary. For instance, the first village that I studied in close detail was Pimpal Soudagar, which is a few miles from Poona. I am convinced now that that is not a type. I did not realise it at the time, but I am convinced that it is not the type for a very large number. On the other hand, I investigated a second village east of Poona and after 10 years I am convinced that that is probably a type of 100,000 villages.

2933. *Professor Gangulee:* What do you mean by type?—It is a type of the dry, semi-arid famine areas of the Eastern Deccan.

2934. *The Chairman:* In the memorandum* which you have submitted, you give some very interesting diagrams dealing with the relations between prices and wages?—Yes, I got those out at the request of my Government about three or four weeks ago. I should like to hear what the Commission has to ask about them.

2935. I take it from what you have said in these papers that it is your view that the rise in agricultural wages has been due in the main not to a

* Not printed.

rise in the cost of living, but to an increasing shortage of agricultural labour?—I am more and more convinced, the more I study it, that it is due to a shortage of agricultural labour.

2936. Does that shortage show any signs up to this moment, of encouraging the use of labour saving machinery?—I cannot say there is any very marked change in that direction. Possibly, in Lower Gujarat one sees signs of it in the development in the last couple of years of tractor cultivation, but that is the only case I can think of where there has been any very material change.

2937. Sooner or later that must be the tendency, must it not?—If there is an increasing shortage of agricultural labour, and I think there is, that will certainly be the only solution.

2938. This shortage really represents a raising of the standard of living, does it not?—Not necessarily.

2939. You yourself attribute it to two causes, firstly, the fact that more and more labourers are returning to the cultivation of their own small holdings, and secondly, to the fact that they are being attracted, I suppose by higher wages, to the towns?—Yes.

2940. In so far as they are being attracted to the towns by higher wages, presumably their standard of living is rising?—So far, that is so.

2941. So far as the first cause is concerned, why are they turning from labour which, on your own showing, is paying a higher wage, to the cultivation of these small and presumably uneconomic plots?—I think the desire for the possession and cultivation of land, the land hunger feeling, is very, very strong. The man would really rather get Rs. 10 a month by cultivating his own plot, than get Rs. 15 a month and work for somebody else. I was particularly struck by something that Sardar Jogendra Singh said to me when I was last in Simla. He has a good many people on his large estate in the Punjab. He said that if he treated them as tenants, he was sure they could not make more than half as much as they could if he paid them wages, and yet they preferred it, and it gave him very much more.

2942. I do not quite see why this desire to own land in preference to earning a better living should have grown lately?—No, nor do I. But the fact did come out in the last census. I have not yet been able to trace the cause of it, but it did come out clearly in the last census.

2943. It may be due to the boom which existed before the fall in prices of the last few years?—That may have something to do with it because the last census was taken at a time when cotton had been exceedingly prosperous for the preceding 5 years.

2944. That may be the explanation of the whole thing, may it not?—It may quite easily.

2945. Do you wish to say anything about rural sanitation and hygiene? Would you like to say anything as to the dwelling houses in which the cultivator exists and rears his family?—The cultivator's dwelling-house, as it is at present, is certainly very cheap, but I do not think it is bad, on the whole. I am not one of those who condemn in every way the conditions under which the people live in the villages. They are not nearly so bad as people make them out to be, especially when you realise that the greater part of their time is spent out of doors. The house is not to the people here anything like what the house is to the people in England. You must remember in the Deccan, for instance even in Poona, we have got no fireplaces whatever in our bungalows. We could, with very little trouble, live outside. I could live outside in a tent, without the slightest feeling of chill all through the year.

2946. Probably the provision of a pure water-supply in all the villages would be the greater contribution?—That would be the greatest contribution towards sanitation you could make. But there is one point in connection with this, it seems to me you have got to look on sanitation and public health as one of the development activities. We call these taluka associations of ours not taluka agricultural associations, but Taluka Development Associa-

tions; that is to say, our idea was that they would look at the problem not merely as an agricultural problem, or a co-operative problem, but as a problem of the development of 100 or so villages in that taluka, and I look upon rural health as being a thing which is bound to come into that development scheme sooner or later.

2947. We all agree that by concentrating the administrative and financial resources on any one point, sanitation, education, or cultivation, it might be possible to obtain great results, but your view is that advance on the whole front of rural economy and rural life is what is required?—That is absolutely and very strongly my opinion. I feel that we must somehow get out of the idea of looking upon ourselves as agricultural men, or as co-operators, or as sanitarians or educationists. We must look at the thing from the point of view of rural reconstruction as a whole.

2948. Do you feel that the relations between your department and the Forest Department in this Province are sufficiently sympathetic?—No, I think, again, we are practically in the same position as we are in our relations with the Irrigation Department. In the Forest Department, I have no complaints on that score, they look upon forests as a proposition which they have got to make pay as well as they can. We, on the other hand, look at it from a different angle. I think it is impossible to alter that fact; there are these two angles. But, at the same time, even apart from that, I think we ought to get closer together than we have been, and I think we are getting closer together. There was a time in Kanara, for instance, when the position between the two departments was very considerably acute but I think we are working much more closely together now.

2949. In the matter of *kumri* cultivation and things of that sort, it is hardly reasonable to expect the rural population, where the cause and effect are so remote, to restrain themselves?—I think they ought to be restrained. I think the whole of the propaganda influence of the Agricultural Department ought to be spent in bringing to the knowledge of the people the necessity for this.

2950. Do you agree that forest officers might well be attached to your department for a short time to see things from the agriculturist and animal husbandry point of view?—I should very much like that to happen.

2951. *Sir Henry Lawrence:* I would like to ask you hundreds of questions, but I will confine myself to a dozen or so. In the first place, do you wish to improve your Poona college? Have you any scheme for enlarging or improving your present college there?—There has been a very important scheme recently devised by a committee appointed by Government for a very extensive enlargement of the Poona college.

2952. You have at present something like 184 students there?—About that.

2953. How many do you wish to provide for?—250.

2954. What would be the cost in broad figures?—I will bring that figure with me to-morrow, if you will allow me. I can work it out.

2955. If you enlarge your college to 250 students you will want to increase your staff very considerably?—Very considerably, of course.

2956. So there will be both an initial expenditure on laboratories and hostel accommodation and a further and recurring expenditure for staff?—Certainly.

2957. Have you any prospect of getting the money for that?—We have asked our Minister to provide us with a lakh of rupees in the budget as a first step to that.

2958. The college has done good work on the whole?—I think the college has done excellent work. Perhaps I am partial to it, because I was the first Principal; I was Principal there for nearly 12 years. On the whole, however, I am not disappointed with the work it has done.

2959. The character of that work has been recognised by other Governments, who have sent their students to you?—Very much so. We have become almost cosmopolitan.

2960. From what quarters outside Bombay have you drawn students?—We have had a very large number from Burma, a number from Ceylon, and we have even had students from Persia and East Africa. We have had a considerable number from the Central Provinces and a lot from Mysore, as well as a few from other parts of India.

2961. Have you had any from the Punjab?—We have had a few Punjabis, but not to any great extent. As a matter of fact, our standard of admission is higher than that of any other college in India.

2962. I think I heard you had a student from Brazil: is that correct?—We had one.

2963. *Dr. Hyder:* A Brazilian?—Yes, a Brazilian.

2964. *Sir Henry Lawrence:* I am not quite clear as to your view on the policy that should be adopted with regard to the future recruitment of Europeans. Do you wish to close that down altogether?—No, I do not, but I do not want to recruit Europeans *as* Europeans. There are positions in my department (and will be for a long time to come) for which I do not think we can get satisfactory men in India. For these I would certainly recruit men wherever I can get the best people; but for most sections I think we can recruit in India.

2965. You mentioned the fact you had drawn up a primer for use in schools. Was that adopted?—What I said was that we had drawn up an agricultural arithmetic. It was a primer in arithmetic.

2966. I did not catch that. Was it adopted?—It has not been adopted generally by the Education Department, but it is being adopted in the agricultural bias schools.

2967. Under your control?—No; they are under the control of the Education Department; but they have adopted it for use in those schools.

2968. You said there was not much interest taken in agricultural improvement by rural landholders, but I gathered you did not consider there were enough of such men to matter: is that correct?—I think that is the case. There is a large number of rural landowners who do take a good deal of interest, but the majority do not. After all, however, except in Sind they are a very minor factor in the rural problem here.

2969. A considerable amount of land, at any rate in the Deccan, is held by *Inamdars*?—Yes.

2970. Can you say what proportion that bears to the rest?—I cannot say off-hand.

2971. Can you find out the figure?—Yes, I think so, I will do that.

2972. Do such men take an interest in the improvement of their estates?—Only a very few of them.

2973. *Mr. Kamat:* Is there any incentive for them to do any work? Are they not entitled to take only a certain income from the villages and nothing more?—Yes. Most of them have a right to a certain proportion of the Government assessment.

2974. And there is no further incentive for them?—Not as a rule.

2975. *Sir Henry Lawrence:* On page 13 of your Annual Report* you state that you are greatly indebted to the Indian Central Cotton Committee and the Sir Sassoon David Trustees for financial assistance?—Yes.

2976. Approximately what sums do you receive from those bodies, compared with the grant from your own Government?—The Indian Central Cotton Committee now provides Rs. 65,000 a year for investigations, and they have promised another Rs. 20,000 for certain special investigations in Sind, so they are prepared to subsidise us at present at the rate of Rs. 85,000 a year. In addition to that we have had Rs. 10,000 in the last year for special economic inquiries; that is to say, in the last year Rs. 95,000 has been available.

2977. And the Sassoon David Trustees?—They give us between Rs. 20,000 and Rs. 30,000 a year.

---

* Annual Report of the Department of Agriculture, Bombay, for 1924-25.

2978. That is something less than 1½ lakhs, taken together, while your annual budget is something like 15 lakhs?—Between 15 and 16 lakhs.

2979. So the amount of extra work you undertake is not very great in comparison with the work you do which is financed from your own Government funds?—Except that the whole of this is definitely earmarked for research. We use Government offices to superintend the research and engage special assistants for the purpose of actually carrying it out.

2980. One criticism one sometimes hears made in regard to your operations is that you are spending a good deal of time and money over minor interests as compared with that given to the major interests of the country?—Yes.

2981. I suppose you would regard *juar* and *bajri* as two crops of the greatest agricultural importance in Bombay?—Yes.

2982. They represent half the total area cultivated?—12,000,000 acres in the Bombay Presidency are under these two crops.

2983. 12 millions out of 24?—Yes.

2984. How much time is given to the study of what improvements can be made in these two primary crops?—The proportion of time given to these has been increasing in recent years, but I must say until about 5 years ago they were somewhat neglected. They were neglected because of the insistent demand from the market crops like cotton, tobacco and so on. We are giving more and more time to them now. For instance, I have got 3 *juar* breeding investigations on now, one in Dharwar, one in Surat and one in Sind. Both in Dharwar and in Surat we have now types which give us nearly 20 per cent. increase in the yield.

2985. Have you the money and the men with which to spread this work?—No. We put up to Government in 1924 a scheme for largely increasing the staff in these directions, but at that time Government had not the money to provide.

2986. Very important work is being done in other parts of India with regard to rice and wheat?—Yes.

2987. Are you in close touch with the improvements they are introducing there?—Yes; we are in close touch with all the materials they publish. You will find the varieties they have worked out have all been tested with us, some of them with success and some not. For instance, the *indrasail* paddy which has been successful in Bengal has also given good results in Upper Sind.

2988. There is no overlapping of experiments between you and Imperial officers in these matters?—I do not think there is any very serious overlapping.

2989. You are fully informed of what they are working at?—I think so.

2990. And they are fully informed of what you are working at?—I think so.

2991. It has been suggested to us that there is a lack of cohesion between the different departments?—I think I may say we have always welcomed co-operation with Imperial officers. At the present time Dr. Shaw, of Pusa, is co-operating with us very closely in our tobacco station in Gujarat. We are co-operating with Dr. Warth at Bangalore in regard to his nutrition experiments and supplying him with material for his nutrition investigations on grasses. When we were considering cattle-breeding work in Sind we got the Agricultural Adviser to the Government of India and their Imperial Cattle Expert to come down and co-operate with us and advise us what to do. That is the sort of thing which is always going on.

2992. In regard to cattle, do you regard the improvement of the milk supply as an important problem before you?—A very important problem, but not the primary problem.

2993. Do you wish to improve cattle from the point of view of ploughing rather than from the point of view of milk?—I think we want both, but I think also the primary need is for good cattle for ploughing, and that is certainly the cultivator's point of view. I made a desperate effort in the

Belgaum district some years ago to get the people interested in purely milk cattle, and I absolutely failed. They said " We do not want breeding animals to produce milk; we want them to produce bullocks."

2994. In regard to cities, the milk supply is important?—Very important.

2995. I understand you had some scheme with regard to Ahmedabad; is that progressing?—No, that is not progressing at present; at least, I do not think so. The Bombay scheme, in which I was particularly interested, is being held up on account of legal difficulties. The scheme, that is, which the Bombay Municipality had sanctioned has now been held by the legal authorities to be outside its powers, and they say it would take 2 years to get the law amended.

2996. Could you give us some information as to what sort of difficulties were encountered?—This was the point. I reported for the Bombay Municipality some years ago on the future of the Bombay milk supply, and my report was accepted in principle. I said the future of the milk supply of Bombay must lie in dairy farms at some distance from the city, the cattle being kept where they could live under natural conditions and the milk being brought in by train in a pasteurised condition. This was accepted, and the Bombay Corporation put forward a scheme whereby they took shares in companies which were established in suitable districts for the purpose of supplying milk to Bombay. Two such companies were either floated or at the point of floatation. To one of them, in which I was particularly interested, the Bombay Municipality was prepared to grant 1 lakh of capital; to the other, rather more.

2997. It might be worth while for the Government to remove this legal difficulty?—I think it is essential, if you are to get the Bombay milk supply on a satisfactory basis.

2998. *The Chairman:* How was the law tested? Did some ratepayer protest?—I do not quite know how it happened, but the legal advisers of the Bombay Municipality came in at the last moment and said " You cannot do this."

2999. *Mr. Calvert:* The point was it was spending money outside its own area?—That is the point.

3000. *Sir Henry Lawrence:* Do you think enough is being done to improve, by selection and cross-breeding, the milk capacity of those herds which are under your control?—I think as much as we can do is being done, and in connection with two breeds we have been very successful. In the case of the Kankrej breed, the most beautiful, I think, in India, but which is not a milk breed, we took the matter up 15 years or more ago at Surat. The result is that now we have by gradual elimination been able to raise the standard of milk production to an extent no one would have believed possible 15 years ago.

3001. I notice on page 83 of your Annual Report* it is stated, with regard to Surat, that the majority of cows in the Gopi family yield more than 3,000 lbs. a year. We were told in Simla recently that within a very few years the Military dairies were able to raise the average of their cows' outturn to between 4,000 and 5,000 lbs.?—In the first place, that includes the cross-bred animals, and in the second, it includes animals which are bred only for milk. We cannot use cross-breds and we cannot breed only for milk. We cannot use cross-breds because we dare not. If I was a large landowner trying to run my own estate in which I could keep my cattle in a ring fence I would use cross-breds, but I dare not when I have to distribute animals all over the country.

3002. Why? Rinderpest?—Rinderpest and foot and mouth disease.

3003. *Professor Gangulee:* They are very susceptible to these diseases?—They are.

3004. *Sir Henry Lawrence:* Does not the Muktesar simultaneous inoculation help you?—It is too risky at present; we cannot recommend it on a large scale.

* Annual Report of the Department of Agriculture, Bombay, for 1924-25.

3005. *The Chairman:* Is that the view of your Veterinary Department?—That I am not quite sure, but at any rate there have been accidents and we dare not do it.

3006. *Sir Ganga Ram:* Have you ever taken borings from the soil?—We have done a large and extensive series in every part of the Presidency.

3007. Up to what limit?—Usually 200 feet.

3008. You have not gone beyond that?—No.

3009. Up to 200 feet have you never met any water-bearing sand?—Yes, we have in many places, and particularly in Upper Gujarat.

J. Up to what depth?—They vary 100 feet or 120 feet.

3011. That is just the soil for putting tube wells in?—Yes, and tube wells have been put in very largely in that area.

3012. Do you put in an ordinary pump on each well?—Yes, there are centrifugal pumps on all these wells.

3013. Does it pay?—In certain cases; generally speaking it does pay in Upper Gujarat.

3014. What do you reckon the cost per acre at for pumping, supposing it is 20 feet depth?—I cannot tell you that off-hand.

3015. Have you any system by which you can co-ordinate the pumping of different wells?—Yes, to a certain extent.

3016. We were shown at the Agricultural Show here that it was possible to bring water up several wells into one sump: is that right?—That is so, provided the wells are very close together.

3017. But not if they are far apart?—Not if they are far apart, as you can easily realise.

3018. What do you mean by "close together": within 20 feet?—Yes, within 20 feet you could do it.

3019. But not 1,000 feet?—Of course not.

3020. Have you considered the use of compressed air to send power to 1,000 or 2,000 feet?—No, I have not considered that.

3021. You know it is done in America?—I know it is done in America and I know we can do it in Sind, but I do not think the underground supply of water in the areas of Gujarat to which I am referring is sufficient to make it worth while.

3022. You say there is a 100 feet supply?—No; what I said was that we hit the water-bearing strata at 100 feet from the surface.

3023. What is the thickness of the water-bearing sand?—That varies exceedingly; sometimes 10 feet and sometimes 15 feet.

3024. Not more?—It is not very thick, but if you go to 200 feet you can often reach 3 or 4 separate water-bearing strata.

3025. You referred to the funds given you by the Indian Central Cotton Committee. Do you know how much they charge per bale? What are their funds derived from?—From a cess which was originally 4 annas a bale, but which has now been reduced.

3026. Have you ever thought out any scheme by which you could, by putting a small cess on produce or on exported produce, get some money in the same way?—We have often thought about it, but it has never come to the stage of a practical proposal.

3027. What had you in mind? Do you export any cereals overseas?—A certain amount of rice.

3028. Have you any returns showing the exports and imports of cereals from Bombay?—I can give you exact figures for that to-morrow so far as wheat and rice are concerned.

3029. *Dr. Hyder:* Showing the exports from the Bombay Presidency which are the produce of that Presidency?—I think I can arrange to eliminate those exports which are first imported into the Bombay Presidency from outside.

3030. *Sir Ganga Ram:* Is it not true, so far as primary education is concerned, that boys are apt to forget everything they have learned two years after leaving school?—Large numbers of boys who go through the lower standards of primary schools afterwards lose their literacy.

3031. Altogether?—Almost.

3032. Your budget is 16 lakhs. What is the budget for primary education?—Something over a crore.

3033. Your Loni school costs Rs. 520 per student for the whole course?—Yes, taking the 2 years together.

3034. That means, if you have 50 boys, Rs. 26,000?—Yes, for the two years; it costs about Rs. 13,000 a year.

3035. Who gives this money; is it a provincial grant?—It is a provincial grant.

3036. Not given by the District Boards?—No, though a number of the District Boards give small grants towards it.

3037. What departments do the District Boards finance?—The District Boards maintain the whole of the education under the Education Department.

3038. And the hospitals?—I think so, but I am not an authority on what the District Boards do.

3039. Is there any percentage laid down for them, as there is in the Punjab, so much for one thing and so much for another?—I had rather you asked a revenue officer about that. It is outside my province.

3040. Have you ever considered the question of tramways or light railways of, say, 2 feet gauge?—We have considered it, and considered doing it on a very large scale. In many parts of the Presidency we have already got such light railways.

3041. Ordinary tramways where the trucks are drawn by ponies?—No.

3042. Nothing of that sort?—Nothing of that sort.

3043. Do you know a pony on a line like that can draw 150 maunds?—I know it can take very much more than it can on a road.

3044. 125 times as much?—I will take your word for that.

3045. Could you not grow wheat in your *rabi juar* area?—Only to a very small extent.

3046. Do you know that *juar* takes more water to mature than wheat?—Perhaps, but we can put it in 2 months earlier than wheat.

3047. That makes no difference, does it?—It makes a great deal of difference.

3048. How?—At the time you put in the *rabi juar* the soil is well supplied with water.

3049. That goes a long way towards wheat, you know. We put wheat in in October?—Yes. We cannot put wheat in until the end of October.

3050. Why?—We can put *rabi juar* in in the second-half of September and that makes a great deal of difference.

3051. Have you a list of the data of water required to mature each crop?—Yes, I can give you that.

3052. For each crop?—For each crop, or at any rate for each important crop.

3053. Do you think if a small cess was levied, as the Cotton Committee has levied it, and the proceeds were earmarked for all your researches, that would meet your needs?—That is a very general economic problem as to whether a product will stand a cess or not.

3054. Say a very small cess?—Some products would not stand it. They are already subject to very highly competitive conditions.

3055. I think you said the tendency nowadays was to consolidate holdings in order to sell them?—No, I did not quite say that. I said that in our

villages the tendency towards fragmentation and the tendency towards consolidation were almost equal, and a stable position had been reached.

3056. Is not there a tendency with the people here not to sell to brothers or cousins but largely to sell to outsiders?—I do not think there is any tendency in that direction.

3057. Under a law of pre-emption relatives would have the right to buy first?—There is no law of pre-emption like that.

3058. You said you were employing post-graduates in research work?—Yes.

3059. Do you pay them anything?—I usually take on these men under the scheme for post-graduates in training under which Government gives them Rs. 100 a month pending appointment either in the department or outside.

3060. Can you absorb all your product like that?—Not all.

3061. In one year you say you turned out 50, and out of those only 5 got appointments. Have you ever ascertained what became of the other 45?—We generally get information about 80 per cent. of the men we turn out. The other 20 per cent. we lose sight of.

3062. Do you know what became of those others who did not get employment?—As a matter of fact those men who are referred to in this list (which is an old one, as you know) got employment later on.

3063. On page 4 of your memorandum you refer to teachers being drawn by preference from the agricultural classes. What do you mean by "agricultural classes," agricultural by caste or avocation or what?—The agricultural classes are those whose main occupation is something in connection with agriculture.

3064. Irrespective of caste?—Irrespective of caste.

3065. Who own some land?—Some landowners decidedly belong to the agricultural classes, while some do not. Some landowners simply enjoy the revenue from the land and live in a city; others, who live on the land and definitely carry out the duties of a landowner, belong to the agricultural classes.

3066. Do you ever induce your graduates to take land on lease and try their hand on it?—A number of my graduates have gone in for that, but I do not recommend it immediately they leave college.

3067. There are no Government lands here you could set apart for that?—There is some land which might be so used, but I think at the present time there is land available for men who are fit to take it.

3068. You know the Punjab Government have recently allotted 2,000 acres for that purpose, and a boy who passes out of the Agricultural College can get about 80 acres for 3 years. He is not allowed to employ tenants on the *batai* or cash system; he must work the land himself and pay wages. Can that system be introduced here?—I am proposing that system in connection with the Barrage in Sind.

3069. Have you any Crown land there?—There is a lot of Crown land there, but in the rest of the Presidency the amount of Crown land is small. We are pushing this sort of thing, but not with raw fresh students.

3070. Have you ever thought of using your students to take on lease a whole village at say 10 per cent. more than it is fetching now?—That is all on the supposition that you have got villages as a whole: in other words, that you have got a zamindari system; we have not got such a thing; there is no such thing as taking a whole village, except in Sind. The whole of the Bombay Presidency is ryotwari with the exception of Sind.

3071. That is to say, the land belongs to the Government?—The land is held direct from Government by the peasant who cultivates it; at least, that is the principle on which we are going.

3072. Have you ever given any consideration to any indigenous deposits here which you could turn into manure; for instance, have you ever observed that there is a great export of bones and blood?—There is a very large export of bones from the Bombay Presidency.

3073. But it comes from other Provinces I suppose?—I am talking about the bones from the Bombay Presidency itself, and there is a very large amount of bones produced here and crushed here. Now we have tested and tried those bones in the cultivation of almost all our crops, and they have been very ineffective, except in the case of rice.

3074. Certainly they would be ineffective unless you converted them into super-phosphates. If you treat them with sulphur they will be effective?—As a matter of fact, super-phosphates have done us generally no better than the raw bones, and in fact in many areas ground raw phosphate and ground bones have given us better results than super-phosphates.

3075. What do you say about the export of blood?—The export of blood does take place to a very considerable extent, but there are very considerable caste prejudices against the use of it, and while we have other fairly concentrated manures which are also exported, we prefer to push those.

3076. Do you know that animals are buried under the roots of grape vines?—That is also the policy here, and in the Nasik district I may tell you it has been the custom until quite recently to bury a man in a grape vine garden when it is being established, the man being of one of the lowest castes.

3077. Supposing you put a duty on the export of blood and such things, that would be a duty which people would not care to protest against; how much would that bring you in money?—I do not quite follow you.

3078. The people might take objection to an export duty of cereals on the ground that it would fall on the zamindar, but no objection could be taken to an export duty on blood and bones and that sort of thing, which are really useful to agriculture?—Speaking of my own Presidency, bones are of no use except for one or two products.

3079. What I mean is supposing you put an export duty on those two articles and appropriated the proceeds of the duty for your own purposes, that would not be objected to by the people?—That is an economic question which has more far-reaching considerations than one can think of on the spur of the moment.

3080. I lent you a book to read; do you accept the statement in that book that every acre of wheat taken from the soil deprives it of 180 lbs. of nitrogen?—That is approximately the amount. You sent me the book and I looked the matter up; it is approximately the case, provided the crop is large. At any rate, it is near enough for argument's sake.

3081. So that if you do not put manure in the soil, by what process is that lost nitrogen replenished in the soil?—As the result of investigations done both in the Punjab and in Bombay we find there is a natural recuperation of nitrogen which is much larger than was thought.

3082. By what process?—By a process of fixation in the soil.

3083. Is it not brought about by constant ploughing of the land?—Not necessarily.

3084. You wrote to me that it was, but that there was a limit to it?—There is a limit.

3085. What is the limit?—Nobody knows, but there is a limit. For instance, if we take black soil here which has been exposed to the sun during the hot weather and moisten it, we find there is a fixation of nitrogen. Then if we allow it to dry and again moisten it, we again get fixation of nitrogen; but there is a limit.

3086. Constant hoeing does not extract more nitrogen from the air?—There is no evidence that it does.

3087. We have strong evidence of that in the Punjab?—No, you have not, if you will pardon me.

3088. By ploughing 20 times I gain 25 times the nitrogen?—Precisely, that is quite easy to explain, but that does not show you that the whole of that is fixed from the atmosphere; you are utilising what is already in the soil.

3089. But you cannot go on utilising what is in the soil from year to year? —And you will not be able to utilise it for very long.

3090. Well, we have been utilising it for the last 20 years. You very kindly gave me the analysis of what each crop takes away from the soil?—I gave you figures indicating what 100 lbs. of each crop takes away.

3091. You did not give it me for *bajri* and *juar*?—Because these figures do not exist.

3092. Will you make some research as to them?—Yes, I will. Since I got your enquiry that matter has been in my mind and in a year's time I shall be able to give you some figures.

3093. What fodder crops do you grow?—I think we grow almost all the fodder crops available. The area under *berseem* is growing very fast. The area under *berseem* is growing as fast as we can do it.

3094. Our fodder crop in the Punjab is *bajri;* we cut it before it is fully grown?—I was going to mention to you *juar:* it is a very large fodder crop and particularly in Gujarat it is grown for the purposes of fodder. In other parts of the Presidency it is grown primarily for grain, but also for fodder.

3095. Do you know of any tree which will not cast an injurious shade on the crops if it is sown on the edge of the fields?—Yes, we have several; there are several trees which are not injurious to the plants round about them.

3096. What are they?—If you will leave that till to-morrow I will give you the names.*

3097. Very good. Can you suggest any industries which can be started from the raw material of these trees?—We are trying to push the lac industry to a very considerable extent.

3098. Are you pursuing the lac industry here in this Presidency?—In Sind very largely; there on the *babul* tree there is a very large production of lac; here in the Presidency we are trying to push it not so much on *babul* as on *palas* and on *ber*.

3099. Can you give me any idea of how many cattle and how many sheep and goats should be kept per acre in order that the farmyard manure alone may replace the lost chemical properties in the soil?—I cannot give you these figures at the moment, but I will tell you to-morrow.

3100. Will you take a note of that?—Yes; but I think I may say at once that it is impossible to keep more than one-fifth of the stock which would be required adequately to manure the land.

3101. We understand that agricultural implements are imported and that the duty on them is the same as the duty on any steel or iron imported?—Agricultural implements are imported free.

3102. Does the railway give you any concession in respect of the carriage of agricultural implements or do they make the same charge as for any other iron or steel?—I forget now, but there is a regular rate for agricultural implements which I can look up.

3103. A complaint has reached me from your own Presidency that the railways give no concession for the carriage of agricultural implements?—They do not give any concession beyond the classification which is given in the regular code, and I can find out exactly what stage of classification they come into.

3104. Is *taccavi* given for sinking additional wells here?—*Taccavi* is given more frequently for well-sinking than for almost anything else.

3105. Then, after a man has sunk a well, does he get any guarantee of exemption from increased assessment for a certain number of years?—He gets absolute immunity from increased taxation for ever in the Bombay Presidency; in the Bombay Presidency, Government have guaranteed that landholders' improvements should never be a cause for increased assessment.

3106. It appears that you produce much more oil-seeds than you require for your own needs?—Yes, we have a very large export of oil-seeds.

**Vide* Appendix A, page 271.

3107. Do you export the oil?—We export both seeds and oil; we export a large quantity of seeds.

3108. Overseas or inter-provincially?—Both.

3109. Do you not think it would be better to adopt some process of hydrogenation and keep the cake here?—An attempt has been made to hydrogenise ground-nut oil in Bombay in connection with the preparation of vegetable *ghi;* it was made by one of the biggest firms in Western India, but it has not been a success though they spent a great deal of money on it.

3110. Do you know the cause of failure?—In the case of ground-nut oil they could not get rid of a certain objectionable acrid taste.

3111. I had in mind all this grease which has to be imported from foreign countries for railway axle boxes; could not vegetable oil be thickened so as to take the place of that imported grease?—As a matter of fact, a very large proportion of some of our oils which are suitable for that purpose are used; for instance, the B., B. & C. I. Railway have their own castor oil mill and produce practically the whole of the castor oil they require for lubrication at their own mill.

3112. For axle-boxes?—Yes.

3113. It is required to be much thicker, is not it?—It is used for the purposes for which castor oil is used. I am not enough of an engineer to know exactly where it comes in.

3114. *Sir Thomas Middleton:* How long is the course at the college?—3 years, but the students who come must have passed a year in an Arts College after Matriculation before they come.

3115. In most colleges in India now I think the course is 4 years?—Yes, ours is 4 years after Matriculation.

3116. You mean that in no other case does the college exact the same entrance standard as in Bombay?—That is precisely the case.

3117. About what number of graduates are there each year?—Between 40 and 50 now.

3118. In a 3-years period about how many men would you expect to have the qualifications that would be desirable in one of your research workers?—I should say that out of those 40 or 50 there may be two or three who will become really first-class research men.

3119. Two or three per annum?—Two or three per annum.

3120. Your system is to take them on as assistants and train them here?—Yes.

3121. Have you ever thought of giving them a post-graduate training elsewhere, so that after finishing a course at Bombay they might have an opportunity of seeing what is being done in other Universities?—We have not only thought about it, but we have done it in two ways: we have taken our graduates immediately after graduation and sent them abroad, and we have taken graduates who have some years experience with us and then sent them abroad.

3122. Have you a practice of sending a certain number each year or in each period of 3 years?—No, not a regular system, but as a rule, we have one of our men abroad almost all the time.

3123. How many research stations are there altogether in the Presidency now?—Altogether about 20; I am speaking from memory.

3124. What is the number of the technical staff at each station?—It varies very much; it varies from one to ten.

3125. Could you give me the approximate size of the whole research staff that you are employing at the present time?—It is in Appendix 2 of the original memorandum submitted by the Bombay Government.

3126. You have quite a considerable staff: how many do you require to recruit each year?—To the department as a whole we recruit anything from 6 to 12 graduates each year.

3127. I think in answer to one of the Chairman's questions you indicated that you would approve of the Central Government offering you grants for research work?—Yes, certainly.

3128. Was it not in your mind that the Presidency itself might also put up a proportion of the sum required?—I think it certanly would, and in fact we are spending in the Bombay Presidency here a very large amount on research work already. In the case of the Cotton Committee the reason why we have got bigger grants than any other Province I think has been because we were already spending more ourselves on cotton research than anybody else.

3129. From your evidence I gathered that you entirely approved of the system which is being adopted by the Cotton Committee?—On the whole, yes.

3130. Would you say that the two matters in which central assistance would be of especial value would be: (1) the provision of funds, and (2) ensuring continuity?—Yes, and (3) that the Central Cotton Committee enabled us to be in closer touch with other work that is going on elsewhere.

3131. Incidentally you mentioned that you had quite given up demonstration farms but now have demonstration plots?—We have entirely given up demonstration farms, and we have plots on cultivators' holdings.

3132. Are these plots very numerous?—Very numerous.

3133. Do they run into many hundreds?—Yes, many hundreds; for instance, at the present time in connection with the Sassoon David Fund grant I am trying to popularise sulphate of ammonia as a manure for cotton in Khandesh. In connection with that alone we are running between 40 and 50 plots.

3134. But are you not still using Surat for demonstration purposes?—Yes, Surat farm is useful for demonstration, but that is not its primary purpose; it incidentally serves for demonstration but it is definitely a research station, and its first purpose is that of a research station.

3135. You have in mind a greatly extended programme in the same direction to be put into operation as soon as circumstances are favourable and you are able to get the men and the money?—Certainly.

3136. Has that programme been drafted and laid before the Government?—In the year 1924 we were asked by Government to give them a programme for 5 years. That programme was laid before Government and is now before Government. We are gradually working towards it, I am afraid not nearly as fast as I should like at the moment.

3137. And no doubt it will be available for our information?—Yes, I could give you that.

3138. You advocate the provision of agricultural education, in special secondary English schools or ordinary English schools?—Yes.

3139. You have got no such type of institution in the Bombay Presidency?—We have nothing of that sort in the Bombay Presidency and the general tendency of opinion has been rather against it.

3140. Do you yourself think that that type of education is likely to prove satisfactory?—I do want the men who come to the Agricultural College to have more information; I want agriculture to have been more in their minds before they come.

3141. I see your object, but do you recognise that before these men get through the Matriculation and the Intermediate and have got up the necessary amount of English and science, they have a very heavy course of study?—Precisely.

3142. Do you think it would be wise to expect these men also to study agriculture as a University subject?—It is much more in my mind the idea that they should not get entirely out of touch with it. You see the position is that even village boys who ultimately go to the Agricultural College now practically leave their home and agriculture and go to a city at the age of 10 or 12. Then until they reach the age of 18 they have no further connection, so far as education is concerned, with agriculture whatever.

3143. I quite appreciate the point, but I doubt whether requiring them to pass an examination of a University type in the subject is the way to keep up their interest in agriculture?—I realise your objection and I fully sympathise with it.

3144. I have examined Bombay students for the School Final, and I did not think the type of agricultural education they got at that stage was of much use to them?—Of course you are basing your opinion on something which has actually existed, but which has been abandoned. My idea is not merely to have agriculture as a school subject; I am thinking of something rather different from what has existed in the past. I could not explain it in detail here, but what I do want is to retain in some measure contact with agriculture during those 6 or 7 years.

The Commission then adjourned till noon on Saturday, the 23rd October, 1926.

Saturday, October 23rd, 1926.

POONA.

PRESENT:

THE MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.
Sir THOMAS MIDDLETON, K.B.E., C.B.
Rai Bahadur Sir GANGA RAM, KT., C.I.E., M.V.O.
Sir JAMES MACKENNA, KT., C.I.E., I.C.S.
Mr. H. CALVERT, C.I.E., I.C.S.
Raja Sri KRISHNA CHANDRA GAJAPATI NARAYANA DEO, of Parlakimedi.
Professor N. GANGULEE.
Dr. L. K. HYDER.
Mr. B. S. KAMAT.

The Hon'ble Sir CHUNILAL V. MEHTA. } (*Co-opted Members.*)
Dewan Bahadur A. U. MALJI. }

Mr. J. A. MADAN, I.C.S. } (*Joint Secretaries.*)
Mr. F. W. H. SMITH. }

Dr. HAROLD H. MANN.

Further Oral Evidence.

3145. *Dr. Hyder:* I wish to deal with a few points of detail before I proceed to the general questions. May I ask you whether you are of opinion that local centres of research are necessary apart from the Central Institute at Pusa? In every case you have variations of climate, soil and other factors, and that being so you must have in your Province local centres of research. You cannot absolutely depend upon Pusa?—It is entirely out of the question. Not only should there be local centres of research but we must have many separate local centres within our own Province.

3146. I find from this note that there is a diminution of subsoil water in Gujarat and the eastern parts of the Deccan. Has any investigation been carried out in connection with this matter?—To determine why?

3147. Yes?—I do not think there has been any. We have simply noted the fact. We do know, of course, that in Gujarat the rainfall has been diminishing and hence that might account for part of it. But there has been no definite investigation why there has been such a large lowering of the subsoil water.

3148. With regard to the rains which begin after September in your famine-stricken districts (Ahmednagar, Sholapur and Bijapur), has any work been done in collaboration with the Meteorological Department to find out the currents of air, etc.?—No, I cannot say there has.

3149. Would you like to have it done?—Yes.

3150. There might be a sub-station of the Meteorological Department, just as we have at Agra, to find out whether these currents show normality or otherwise?—I should welcome such a station, especially in famine tracts, because it is really one belt of country starting from about ten miles east of Poona, which forms the most famine-stricken area in India.

3151. I am interested in the matter of irrigation. I find in your Government canals in the Deccan you have got this question of aquatic weeds. May I know what department does the investigation? Is it yours?—We do the investigation and the Irrigation Department carry out the methods which we suggest. My colleague Dr. Burns has made a great many investigations into the weed trouble in the Deccan canals, and attempts have been made to use the results of his investigation in the canals by the Irrigation Department.

3152. Have you large areas of Usar or alkali lands here?—Not very large areas. In one case there was a large development of water-logging amounting to 20 per cent. of the irrigated area within 15 years of starting the canal.

3153. Do you think that the experiment of reclaiming such lands by means of co-operative societies has got a future?—I do not think there is much scope for reclaiming such lands once they have developed salt.

3154. You do not think so?—If it is merely a case of water-logging, then it can be reclaimed at low cost.

3155. If it is a matter of efflorescence?—If it is development of salt in the soil, it has never been a really practicable proposition. It ought to be a matter of prevention and not a matter of cure.

3156. I was wondering whether your department was closely associated with the Irrigation Department. You are, I understand, carrying on certain experiments in the neighbourhood of Poona with regard to the utilisation of city sewage. Is there close association between your department and the Irrigation Department in this matter?—I cannot say the association is very close, but it is there.

3157. Then I come to another point of detail. I am very interested in your schools of a vocational type. I was wondering whether you could tell us whether these schools could exist if the State ceased to provide free tuition and free lodging?—It is a very difficult question to answer. At the present moment I should say they would exist but on a very much smaller scale. We should have to build up a new clientele again for the schools on a paying basis. I think we should get it, but not at once and probably we would get a different type of boy.

3158. With regard to graduates and under-graduates of your Agricultural College, I wonder what you do with them in the long vacation? Do you think it might be useful to draft these boys into the different talukas of your districts so that they may pass the long vacation with the farmers and give them some theoretical instruction and get some practical training themselves. Probably they might act as a leaven for the whole inert mass of our agricultural population?—You are speaking more particularly of the graduates. The graduates, of course, naturally get jobs under Government or elsewhere, and they would not be available.

3159. But so far as the under-graduates are concerned?—I think it would be an exceedingly good thing if that could be done. I have already done that, for instance, in connection with our economic enquiries, I have nearly always utilised a number of college students to work under one of my workers in the districts in the long vacation.

3160. I understood you to say yesterday that you would not entrust your graduates with the management of a small estate or farm as a business proposition. This scheme of giving such practical experience to the student in his college career might be of help to him when he goes out?—I think it would be of advantage, but I do not think it would make him fit to take charge of an estate immediately he left the college.

3161. I was wondering whether you were giving your under-graduates any training in rent and revenue matters?—We do to a limited extent in the final year. And in the course which has recently been sanctioned by the University we are emphasising that much more than now.

3162. I was wondering whether your department had worked out the economic side of agricultural matters; I mean, cost of production, yield, and net profits?—We have done that for a number of crops, particularly in the case of sugarcane, but not as completely as we should like to do. But since we have appointed a Professor of Agricultural Economics, the two questions of cost of production and marketing form two special subjects of study.

3163. We know enough in India: we do not require more knowledge. Our problem is how to embody our existing knowledge in practical agriculture. I was wondering whether you would be able to suggest some agencies by means of which we could carry the results of the laboratories to the fields?—

That is the whole aim of my section on demonstration and propaganda. Its work is to organise the carrying of the results of the laboratories to the fields. And we have devoted more attention and more time and more money, almost, to this than to any other purpose.

3164. Then with regard to agricultural finance, we have this co-operative movement. I was wondering whether you knew that in this country we had the ancient rule of *damdopat*, that is to say the interest should in no case exceed the principal sum lent. Do you think it is desirable to embody in some sort of legislation this ancient rule for the welfare of the agriculturists?—That takes us into a very wide matter. The whole question of the State regulation of interest is a matter on which I hardly dare embark at present. We have had some legislation for the relief of agriculturists, the Deccan Agriculturists' Relief Act, which was an attempt by the State to regulate interest. There is a good deal to say on both sides, but it is a very big matter.

3165. I was very interested in your remarks on rural development (Question 25, page 15) in which you say: "At present in the Bombay Presidency the village population has rather been left in a back-water, but the time has come to look at the rural problems as a whole, and to see whether definite progress cannot be made not merely in the technical improvement of agriculture, or the organisation of village finance, or in pushing village sanitation, or in increasing the number of villages with schools, but in taking all these things as part of one end, the recreation of the villages as self-conscious units, with the idea of progress and of improvement." I was wondering whether you could give this Commission your view about this central problem: how far the problem of Indian agriculture is technical and how far it is psychological. I was wondering what your view on this psychological part of the problem is?—I feel it is very largely psychological: it is more psychological than people have imagined. If you can get the idea of progress into the minds of the people more than at present, I think there are enormous possibilities.

3166. Through what agencies?—I have suggested a line under this very head from which you have just now quoted. It is a matter for missionary agency and not for Government agency.

3167. You utilise your Taluka Associations. Would you utilise educational agencies? Would you enlist non-official sympathy to enable these results of the laboratory to be carried to the fields? I was wondering whether the agriculturists would not look askance at the results. They might think thus: We have certain resources at our disposal. If we consider the cost of cultivation and the total value of the yield, then the net profit does not excite our enthusiasm?—I have not found any feeling of that sort among the people. Almost everywhere I have found that if you could convince the people that what you want them to do will give them the results you promise, then they are only too ready to take it in hand.

3168. Do these Taluka Associations consist of actual cultivators?—Yes, actual cultivators.

3169. Or do they consist only of those who are always in the forefront, the headman and men of his type?—Many of these Taluka Associations have a membership of 200 or 300, including certain co-operative societies. There are a few leaders among them, but a considerable number of them, about nine-tenths, are actual cultivators from the villages.

3170. Given better farming and better business, do you think it would make people more inclined to adopt progressive methods?—It certainly would.

3171. I would like you to tell me (you have been long enough in India) whether you have observed any change for the better?—I do not think that there has been. I am speaking now about the Deccan villages which I know best: I do not know Gujarat or other areas so well as I know the Deccan. I do not think the conditions of living in the Deccan villages have materially improved or materially changed. A certain number of luxuries are in use now which were not in use when I first knew the Deccan, but in the Deccan generally I do not think the standard of life is materially higher than it was 20 years ago. I came here 19 years ago next month.

3172. Taking this criterion of economic progress, I have been very interested in your study of the changes which have taken place in the rural population. You think there are certain areas of economic decay in the Bombay Presidency?—There are certain regions of decay. There have been certain regions in which there has been a distinct going back. I think the last census showed two or three areas in which society was almost breaking up. One was on the edge of the Kanara forests. There is a big area which is on the mend now, but at the last census (1921) its condition was extremely deplorable. Then the other one, the most depressing area which I have ever seen, is the talukdari area of Dhandhuka in Ahmedabad district. That is an area on the edge of Kathiawar. That was one of the most depressing areas I ever visited.

3173. What is your explanation of this shortage of agricultural labour? Is it due to the fact that the land cannot support so large a population, the methods of cultivation being what they are and quality of the land being what it is, so that the population is too much for the land to bear, and therefore a portion of the population is thrown off into the industrial areas? Does this give us any explanation of the shortage of agricultural labour?—I think it does, but only to a limited extent. I do not think you can say that the passage of cultivators into industrial life accounts completely for the shortage of agricultural labour. I think you have also to take into account the tendency I spoke of yesterday for the people to prefer to cultivate their own land even if it means their income is reduced.

3174. Have you noticed any marked change in the double-cropped areas? That would be a good thing to note. The people in the areas now get two crops instead of one?—You will notice in the report that I have utilised that as a method for determining agricultural advance, and I could not find on that basis any very material change between 1911 and 1922.

3175. You think that the possibilities of extending irrigation are limited in the Bombay Presidency proper?—I think there is no doubt whatever about that. In the Deccan we have got 3·6 per cent. of the crop area under irrigation now, and if we utilise every source available that I can think of, and every source which the Irrigation Commission have marked out, we shall have 7·25 per cent. of that area under irrigation. In other words we shall always have more than 90 per cent. of our crop area dry. In Gujarat the proportion will be higher.

3176. Coming to the last criterion, No. 8,* with regard to changes in the purchasing power of the population, I was wondering whether there were not too many assumptions made to make it a good index?—I entirely agree with you. But this chapter was put forward in an extremely tentative manner. You will see I have mentioned that. But it represents what I was really after. I wanted to find out whether the people had the power to purchase more or not. I made a number of assumptions, and I think there is urgent need for an economic inquiry to find out how far these assumptions should be modified in accordance with facts. They were the best assumptions I could think of at the time. They were merely an attempt to formulate a method of finding the changes in the purchasing power.

3177. You have made a reference to a committee about the Marketing of Mangoes. I am wondering whether it is not time for the Presidency to cry a halt, and carry out the recommendations of the different committees which have already reported, because we have already a stock of knowledge, and what we have to achieve is to embody that knowledge in practice?—In every one of these committees we are carrying out a considerable proportion of what has been recommended. For instance, we had a committee about the Damage by Wild Animals. The whole of their recommendations have been very carefully gone into by Government. Government have said they can have nothing to do with certain of the recommendations, but as to certain other recommendations they have given us money to carry them out, and we are now

---

* The reference is to pages 37 to 45 of "The Economic Progress of the Rural Area of the Bombay Presidency, 1911—1922," by Dr. Mann, published by the Bombay Government Press for official use only.

progressing well in the direction of protecting the crops against wild animals. We have spent a good deal in certain cases recommended by that Committee, *e.g.*, on shooting parties. Government have also agreed to give gun licenses very much more widely than before, but I can say a very large increase has taken place in the issue of gun licenses. I do not think we have let things stay in the stage of report; we are attempting to carry out a considerable number of the recommendations.

3178. *Sir Chunilal Mehta:* Would you mind telling us how many research officers are working under you, or have worked under you for the last five years?—I cannot tell you about the previous years, but at page 60 of the memorandum presented to the Commission you will find a list of the men in the Imperial and Provincial Services who are working in the department. About half of these are distinctly research workers and about half are propaganda officers.

3179. Many of these officers in the research branch are Indian officers?—Most of them, yes.

3180. In fact you have very few European officers who are working in the research branch?—Yes. Dr. Burns, when this was written, was definitely in research work, and to a certain extent Mr. Bruen also. Others are Indian officers.

3181. You have been associated with these gentlemen for a number of years; they have been working under your general direction: have you had any reason to feel that these research officers were not satisfactory, or that they could not do even higher kind of research work if they get the opportunity?—I do not think there is any reason to suppose that many of these men who have been working here could not do almost any class of research that we asked them to do. I have had one or two fine examples lately. The Central Cotton Committee gave me money three years ago to do a very complicated physiological problem on the shedding of cotton bolls. I put one of my Indian officers in charge, and he has done exceedingly good work. I reckon he has done as good physiological work as is being done in India at the present moment.

3182. You say they can do any kind of research work that you put them to. Do you suggest they cannot initiate research?—No, I want to make myself perfectly clear. There are two questions involved. I get a man to do certain work. Then when I have got him to do that work, I get him to initiate within those limits the line of work he thinks most suitable. Whether I get a European or an Indian officer or any officer, I have got to tell him in the wider sense what I want him to do. I definitely initiate the work to be done and our officers, Indian or European, are told definitely the lines along which they should work. That I think is one of the functions of the head of the department, to indicate the general lines of inquiry. But within that limit, our officers, European and Indian, are allowed to choose their own lines of investigation.

3183. Research work has been going on in the Surat farm for a number of years. It was almost entirely manned by Indian officers?—Yes: it has been. But until recently they worked under the general direction of a European Deputy Director.

3184. Mr. Himbury, who I believe was the representative of the British Cotton-growing Association, pays an annual visit I think?—He has paid two visits lately, one in 1922 and one last year.

3185. He paid a visit in 1922 and I believe he had some encouraging things to say about the work of the officers in the Surat farm?—He commended it very highly: he said it was one of the best stations he had ever seen.

3186. He was not taken round either by you or any other high officers of the department; in fact he said that the work that was done there could compare favourably with work done in America?—Yes.

3187. Do you think that in the matter of agriculture, research has got to be accommodated to local conditions and resources of the people, and more than in any other department you require local knowledge and sympathy with

the people?—I do entirely; I feel that any research we undertake should be initiated in the fields of the cultivator, that is to say, before I can say what I am going to spend my time on, I want to know what are the problems which are actually required to be solved by the people who are cultivating.

3188. It is not essential that all these officers should come from the cultivating classes; as a matter of fact these officers you have mentioned do not all belong to the cultivating classes?—No, I do not think in any sense it is necessary. On the other hand, provided I can get a man of equal scientific training, I would prefer he belonged to the cultivating class. But it is more essential that he should be a scientific man than that he should belong to any particular class.

3189. Government have up to now owing to financial reasons no definite plan of giving endowments for scholars to go to Europe for training in research, but if a system could be devised by which a certain number of officers after they have been at work for some years in the department could be sent to Western countries or to America for further studies, that would give the broad outlook that you require in the head of a research department?—I should welcome any systematic training of the men in that way very much indeed.

3190. Will you tell me whether you require co-ordination between the work of the Provincial Departments of Agriculture and the Central Department of Agriculture? In the first place, is there any real overlapping of research or of experiments in the Central Institute at Pusa and in your own department here?—I have never found any serious overlapping between the two.

3191. Would you consider that the local conditions of each Province require their own methods of investigation and that even in one Province conditions differ so much from time to time even in one division, that you require special studies of particular tracts?—Yes.

3192. Therefore local research is essential?—It is essential. I do not see how you can get on without it.

3193. What is the association that you would like between the Provinces and the Government of India?—First I think there is a certain amount of research work which can be done better by a central body than we can do it here, and that work ought to be done by a central body; that is to say, work which is of a general character and which would apply everywhere. If that could be done by a central body we ought to welcome that, but that of course will be a relatively small amount of the total. I suppose nine-tenths of the research work must be done locally and must be locally organised. Now, with regard to the relationship, I have put forward the idea of a Central Board which would have a supply of money and which could, like the Central Cotton Committee, hand money out for local investigations. I think in principle that is right, provided, as I said yesterday, such a Central Board was not based on local contributions but had funds of its own independent of local contributions. I think there is room for such a board which might hand out a portion of its funds to local experiments and local research. I think it would on the whole be better for this money to be allotted to provincial and local departments without conditions; that is to say, if here we are spending 15 lakhs, the Central Board might give us 10 lakhs and say: "Spend this on research. Give us a programme, but in any case here is 10 lakhs which the Central Government will hand over to you for research." I think we could spend it; I think it would enable us to go ahead much faster than we at present do. I think the determination of what should be done with that ten lakhs should be left to the local department, in other words, the Provincial Government.

3194. If the Central Government lay down the programme, is not that one of the conditions?—Only in this sense. The 10 lakhs would be allotted to the Bombay Government for this year or for the next three years. That being done, a programme will be laid before the Central Government by the Provincial Government, saying "This is how we propose to spend it, and we are prepared to receive suggestions as to how that programme might be modified."

3195. *Sir James MacKenna:* You do not desire then that any programmes should be specified by the Central Board before the money is allotted?—That is a point on which in my own mind I am not entirely clear. I have always felt that unless the Central Board is a body composed of the representatives of the Provinces it cannot really understand what is the relative importance of problems in any particular area. Hence I should like the discretion as to how that money should be spent to be entirely with the Local Government. The Central Board may give anything in the nature of suggestions but not directions.

3196. *Sir Chunilal Mehta:* If you had had, as you mention, 5 lakhs or 10 lakhs more than Government had been able to supply you with during the last 5 years, you would have been able to use it to the greatest advantage. You know exactly where you want to spend it, but you simply have not got the money?—Certainly, I could spend very profitably a much larger amount at present, on research schemes.

3197. You do not really require any direction as to how profitably to utilise that money?—I do not think so. I would be quite prepared to put forward a programme every item of which I believe would have valuable results.

3198. You mentioned that the Central Cotton Committee placed at your disposal Rs. 65,000. In their report does that Committee mention how much they collected and how much they distributed?—In the Annual Report which I was looking at this morning they are curiously silent quite the amount of money they collect and what they have done with it.

3199. But you know how much money they have collected?—Yes. I do know they have collected during the past 10 years 10 lakhs of rupees approximately each year. They have now put aside nearly 20 lakhs of rupees.

3200. The legitimate share of Bombay would be very much larger than what she got and it would be of very great value to you?—It would be exceedingly so, but I think there is something to be said for the Central Cotton Committee, because they have merely capitalised this in order to spread their work on the present scale over a long period.

3201. How?—They have had researches amounting to 10 or 12 lakhs during the last few years. At present it only amounts to 6 lakhs. They have already research schemes on hand which will cost 8 to 10 lakhs a year, and they are going to use up that capital in order to finance the schemes which they have in hand.

3202. Ministers are somewhat sensitive as to approaching other bodies for finance or for directions as to how they are to spend it, and obviously you will have to consider very carefully because the Minister will have to obtain the advice of the Director of Agriculture on any such scheme of association that may be put forward?—Certainly.

3203. You will have to consider matters in detail, particularly as to the amount of money that should be given to the Provinces and the amount that should be left to the Central Board?—The actual amount to be given to each Province might be left to the Central Board, but the allocation to purposes within the Province I think ought to be left to the Province itself, subject to suggestion and advice which any Central Board may like to make.

3204. To pass on to your suggestions about propaganda, Dr. Hyder was perfectly correct in suggesting that that is really what we want to give our attention to now?—I agree.

3205. There are certain things ascertained by research which we want to propagate widely among the people?—Yes.

3206. In this Province we have conceived the idea of Taluka Development Association for the purpose and they have worked well?—Yes.

3207. They happen to deal only with two activities of the village: one is agriculture and the second is co-operation. As you said, about 200 to 300 is the membership of each association. That is almost entirely composed of cultivators?—Yes.

3208. What outside stimulus or direction do the Taluka Development Associations get now?—They get stimulus from, I think you may say, three

sources. In the first place, in each district we have got the District Agricultural Overseers one of whose duties it is to pay regular visits to all these associations and give stimulus to them. Secondly, they are stimulated by the District and Taluka Local Boards who give them a subsidy as a result of which they are kept up to the mark to a certain extent. Thirdly, they must make regular reports to Divisional Boards, which again acts as a stimulus.

3209. Do you say that there is sufficient internal stimulus in the associations given by the agriculturists themselves and that they will be able to stand on their own feet in a short time?—Yes, the internal stimulus in the better Taluka Development Associations is very strong.

3210. At any rate in this Province you have only two officers of the Agricultural Department doing propaganda work in each district under the Deputy Director of Agriculture?—Only two graduate officers, though we have subordinates.

3211. They are paid about Rs. 150?—They are paid on an average from Rs. 140 to Rs. 150. These people must have some association with whom they must deal. It is impossible for these officers to approach individual cultivators. There must be some kind of organisation with whom they must deal?—Yes.

3212. That was the genesis of the Taluka Development Associations?—Yes.

3213. They are getting at present a maximum of Rs. 1,000 a year from Government. If they were provided with a larger amount, say Rs. 5,000, they would be able to do much greater work?—They would be able to do a tremendous lot of more work if they were given Rs. 5,000 instead of Rs. 1,000 and they would be able to employ better men.

3214. We have got at present a Provincial Board, Divisional Boards and Taluka Associations. Do you feel that you require bodies smaller than the last in order to get at the local problems of the people in the villages?—If we had a group of twenty villages instead of two hundred villages we could certainly go ahead much faster and get very much more local interest than we can at present.

3215. There ought to be some stimulus for these smaller bodies?—This stimulus will be provided by the Taluka Development Associations.

3216. But under that directing body you want some paid executive officer who is a really capable, and sound man, to guide these smaller bodies?—Quite so, that is what I should like.

3217. You consider that the most beneficent results can be obtained by sending out a man with real missionary spirit who is prepared to spend practically the whole of his life in the village?—That is the idea.

3218. You have noticed that educated men, the brains of the village, do not like to remain in the village for any long time?—That is the case.

3219. Therefore some men of self-sacrifice who make it their life mission to work for the uplift of the rural people and live in the villages whose example and advice will be followed because they have no axe to grind and who will not be accused of taking sides in the village factions which exist everywhere are needed to do this work?—That is really what we need.

3220. The central body you are thinking of may be entrusted with the function of finding out such men and it would be better if they were non-officials?—It is only non-official men that can do this.

3221. Do you lay much stress upon this method of propaganda which in your opinion is likely to envisage the problem of agriculturists as a whole both as men and as agriculturists?—Yes, I do. That is the sort of men who can make the village a self-constituted unit not only in one direction but in all directions.

3222. Have you considered carrying out your wishes by any alternative method?—After much thought and after being in close touch with a good many villages I cannot conceive of any other method which will deal with the question.

3223. *The Raja of Parlakimedi:* Where would you start agricultural education in the ordinary course of study?—We have got agricultural bias schools and we have got the point at which education in agriculture can profitably be introduced, namely, as soon as the boy becomes literate, and that I take it is about the end of the 4th standard. I would not do it before that except to create an atmosphere for agricultural education. But at the age of 10 or 11 you can give a distinct agricultural bias.

3224. For practical study you will have to have a garden?—Yes, certainly; that is one of the conditions.

3225. As regards research how would you like to have it spread throughout the whole Presidency? I have tried to describe the method which we have adopted, in the note before you. We have research officers in connection with every problem that is of importance. This work is under the direct control of the Director subject to a periodical examination of the results and progress by a committee of experts. I think I have described that on the first page of this memorandum.

3226. I want you to tell us how you will make the results of the research reach the ryots generally?—In this Province, and I think rightly, we have two Government officers in each district. In each district we try to form Taluka Development Associations consisting of groups of 100 to 200 villages. Each of these Taluka Associations has to submit a programme each year as to what it intends to do. The programme is usually inspired by the officers of the Agricultural Department and then they employ their own man who spends his time in pushing this programme and carrying these items of improvement to the people.

3227. Is there any status specified for membership to these associations?—No, nothing. The minimum subscription is Re. 1 per annum. If that is paid everybody has a right to membership in the association. But we have got a variety of members. We have got patrons, permanent life members, or special life members, ordinary life associates and so on.

3228. Are you carrying on research work on all crops, such as sugarcane, paddy and other food crops?—We are doing research work on a considerable number of crops. We are doing experiments in *jowari*, for example, and we are trying to breed types of *jowari* better than we have now; we have succeeded in increasing the yield of one of the main varieties by about 20 per cent. Several experiments have been carried on with *bajri* but it has proved a very difficult proposition. We have got five special stations for research in rice. We have got two special stations for research in sugarcane and a number of places where we are doing special research in cotton. We have carried on a greater amount of research work in cotton than in anything else. We have done a certain amount of work on oil-seeds and other problems; we have got two special stations for fruit and so on.

3229. In carrying on research work do you pay attention to yield?—We consider three questions: one is the question of yield, which is most important; secondly the quality; and thirdly disease.

3230. What are the common diseases by which paddy is attacked in these parts?—Paddy is wonderfully free from disease. There are numbers of insects which attack it, however.

3231. Have you got grasshopper?—Yes; some time ago the rice crop was practically ruined in Belgaum, but we have got rid of that trouble now. Rats are bad in some areas.

3232. Have you got the netting system for grasshoppers?—We have not only got it but used it in Belgaum and cleared the insect out of the neighbourhood by using it.

3233. Have you got stem-borers?—That is a problem of very great importance in rice. We have not the one they are talking about in South India, but we have a stem-borer.

3234. As regards manure necessary for sugarcane, have you carried out experiments to prove comparatively which is more efficacious?—We have done more extensive experiments on manures and sugarcane than on anything else.

It was started by Mr. Morrison 30 years ago. We have had an extraordinarily complete series of manurial tests for sugarcane.

3235. Which manure do you prefer: gingelly or ground-nut cakes?—Gingelly is good manure but it does not give materially better results than the other. The value of the manure depends upon the proportion of nitrogen it contains. Ground-nut also contains 6 per cent. of nitrogen and both give about the same result.

3236. I think it depends on the soil?—Yes, it does.

3237. To a question by the Chairman you said that some boys after a time drop out and leave the Loni school. What is the percentage of students who thus leave the school?—About 10 per cent.

3238. What do you attribute it to?—We require a certain standard of work in these schools. We expect them to go out early in the morning and work three or four hours at least on the farm and then do half a day's class work as well. They prefer to go to the ordinary day school where nothing like that standard is required. Some of the boys get homesick and so on, but it is generally due to the fact that they do not like the way in which the work is carried on.

3239. Can you not make the method of work easier in order that students might stick on?—I do not think I particularly want them to. I am not anxious to keep those students who want to leave the school. We get more applications for admission than our accommodation will permit us to accept.

3240. Do landlords take an interest in the study of agriculture in this part of India?—A very large number of boys at school and also students at the University are sons of landlords. Most of our landlords are small landlords, not big ones, but a very considerable number of students at the Agricultural College, for instance, are the sons of landlords.

3241. As regards Fragmentation, what extent would you fix as a limit for the economic cultivation of paddy?—That is an exceedingly difficult question, because the answer to it might be different, for instance, in an area using sown paddy from the answer in an area using transplanted paddy.

3242. Do you think that one acre of land can be fixed as a comfortable limit?—An acre of land? No. An acre of land means with us produce worth Rs. 100 in case of rice.

3243. In Madras it is like that?—Even if a man has no rent to pay that is not enough. That of course is not a living wage. If a man is to depend entirely on his paddy he must have at least 3 acres.

3244. Some holdings are very much smaller than an acre; would it not be better to fix it at one acre?—An acre would be a much better unit than many of them have now. There is one point in connection with that I would like to make, and that is I am not quite sure whether the attempt to get an economic holding (by which I mean a holding on which a man can completely support himself) is a practicable or desirable end. The tendency in the villages now is for people to be partially cultivators and partially labourers; some of the best cultivators I know are people who maintain themselves partly on their land and partly by their labour. I do not think there is anything against that.

3245. You can have rotation of crops, paddy and pulse, and so on. Altogether a man might be able to make Rs. 200 an acre?—The second crop with us does not give anything like the yield of the paddy. The paddy may give Rs. 100, but the second crop would give only Rs. 20 to Rs. 25, so that even with a second crop the total produce of an acre of land would not be worth more than Rs. 125.

3246. As regards cattle problems, are they under your supervision?—Yes, except diseases of cattle.

3247. Has your attention been drawn to the fact that cattle suffer a great deal while they are being transported from place to place in railway carriages? Are you aware that there are no proper arrangements for that?—The arrangements at present are very unsatisfactory. They are put into some

of these railway wagons covered with iron sheets, which must be as hot as a furnace.

3248. Is there no proper ventilation?—They generally keep the side doors open, but the animals are tortured in the hot weather in the course of long journeys.

3249. Have you approached the railway authorities on the question of improving the conditions?—I have never personally approached them on this question.

3250. As regards marketing, you mentioned yesterday that a sort of clique of five persons exists in the market, and each seller must go to them?—That is to say, to one or the other of them.

3251. Have they a sort of monopoly of the market, or taken a lease?—They occupy no official position. It is simply an arrangement of the *dalals* who represent the sellers. The buyers say: "We will only accept produce through one of these five men."

3252. How can these men keep the producers out of access to the public? Do they not allow the producer to go to the market?—He goes to the market, but unless he approaches the buyer through one of these *adtis*, he cannot get a buyer. He may stand with his cart of potatoes in the market, but nobody will approach him to buy during the whole of the day.

3253. *Sir James MacKenna:* I want to go into the question of the Central Research Board a little. Did I gather rightly from your answer to Sir Chunilal Mehta that you would regard this as a central board of agricultural finance rather than a central board of agricultural research?—I have taken up that position from the beginning. I do not think that research can be directed by any central body. I have taken up that position very clearly in this note.

3254. Then, what is your attitude towards the Indian Central Cotton Committee, which is a centralised organisation dealing with a particular crop?—I am prepared to consider an *ad hoc* committee dealing with particular subjects, as in the case of the Central Cotton Committee, but I do not think it would be at all possible to have any central board directing research.

3255. Let me put a hypothetical scheme before you, which has been suggested. A scheme for research and investigation in a particular crop originates in a Province; such scheme would be presented and recommended by the Local Government to a central body controlling finance. If the central board accepted this scheme, having reference to what was being done in other Provinces, a portion of the finance, say 20 per cent., would be guaranteed for a period of five or ten years, the details and all the rest being left to the Provincial Government. What do you think of that?—I am afraid that would not work. That is an entirely different thing from even the Central Cotton Committee system, because that would give the central body a controlling and directing power in connection with research which, I am sure, the Provinces would never tolerate.

3256. Are you quite correct? I understood that was practically the procedure with the Central Cotton Committee. You put up a scheme to them and they said "carry on"?—The Central Cotton Committee will take up schemes and finance them, but they will not give 20 per cent. of the finance of anything. If a scheme is taken up by the Central Cotton Committee, it is taken up altogether, that is to say, it is either a Central Cotton scheme or it is a Government of Bombay scheme.

3257. You admit the possibility of having research done by a Central body in any particular crop?—In the case of an individual subject or individual crop a system of that sort would be possible.

3258. You have no objection to a central organisation investigating a definite crop like cotton or rice?—No; I have no objection. I have been thinking about it carefully since yesterday, and I think it would be still better if your central board of agricultural finance would place a certain amount of money for the investigation of any particular crop at the disposal of the Provincial Government.

3259. Without any consideration of the details of the scheme or anything else?—Yes.

3260. Simply financing?—Yes.

3261. *Professor Gangulee:* Would they not be entitled to make any suggestions as regards methods of investigations?—They might very well make suggestions, and when the schemes were finally decided upon, they might very well suggest modifications.

3262. *Sir James MacKenna:* We have the analogy of other countries, where you have got local and centralised research side by side working harmoniously? Do you see any objection to that in India beyond provincial jealousies?—No, I do not think there is any objection and I think it would work here. I think you are referring to the United States in particular?

3263. Yes?—I think it would work here, provided the initiation of the work was provincial. In other words, provided we shall not be, as we have so often been in the past, investigating things which have no interest to the people who are actually cultivating the land.

3264. You are not very far away from the scheme I put before you?—I think I am a good long way, because I do not think any question of paying 20 per cent. towards the cost of a particular piece of research would be admissible under any circumstances.

3265. 100 per cent. makes a difference, then?—If the Local Government were to go to the central body and say "We want a lakh of rupees for this particular work; will you give it to us?" and the central body agreed, I think it would be possible. But I, as Director of Agriculture, could not admit for one moment that in connection with any research which I am conducting, say for cotton breeding at Surat, a central body should come to me and say "We will pay 20 per cent. of the expense, provided we get a voice in the direction." I do not think that would be admissible.

3266. That was not the intention. After the scheme has been accepted in principle by the central body and financed, the details would be the care of the Province. It will be practically a partnership between the Local and Central Government?—As soon as you get the 20 per cent., it gives control.

3267. The fact of the matter is, you are a hard-hearted decentraliser! But you admit the Central Cotton Committee has been a very strong factor in the co-ordination and development of cotton research?—I do; I think the Central Cotton Committee has done exceedingly good work. I am a member of that Committee, but we have had a very big fight on that Committee on this very point. There were proposals in the early days of the Committee to centralise cotton work, which I resisted as a member of the Committee all the time.

3268. Do you get any information from the Central Cotton Committee (you being a member of it) as to what is being done for cotton in other Provinces which is not available in their reports?—I do not get it as a member of the Committee, but as a member of the research sub-committee I do. By chance, I happen to be a member of the research sub-committee, and I come to know what is being done in various Provinces in connection with all their research schemes.

3269. What are your best improved varieties of cotton grown in the largest areas?—We have three. We have the so-called 1027 Surat. That was originally selected by a man called Kulkarni. It was kept going by mass selection only until 1918. Then we went in for single plant selection from single selfed plants. Since we did that it has really become popular.

3270. Was not that one of Professor Gammie's cottons?—I do not think so.

3271. Are there any others?—Another one is Dharwar No. 1, which is improved Kumpta, which was selected by Mr. Kotur, who is my Cotton Breeder. Then there is the Gadag No. 1, which is Upland American. Each of these is now grown on half a million acres.

3272. *Sir James MacKenna:* How do you arrange for the training of your teachers in the agricultural bias schools?—We train about 5 or 6 at each of our three vocational agricultural schools. At Loni, we train 6, for the Marathi-speaking areas. At Devihosur in the Southern Division, we train 4 for the Kanarese areas, and so on.

3273. What about readers for these agricultural bias schools? Have you much difficulty about suitable readers?—Yes, we have. We are now using the ordinary reader, and we are using Dr. Clouston's *Lessons on Indian Agriculture*, translated into Marathi. As far as Gujarati and Kanarese are concerned, the translations are only manuscript at present.

3274. When was the school at Loni opened?—The school was originally opened in 1911 in Kirkee. Then we transferred it to Loni in 1914.

3275. The progress and development have been very slow?—It has been slow.

3276. Is it expensive? -It is expensive, and the progress has been slow.

3277. The fact that you are able to train teachers for these agricultural bias schools is an important factor?—Of course it is. If we had not these schools I do not know how we should have trained the teachers.

3278. How do you account for that type of school being a failure in Madras and Bengal?—I think, perhaps, there was not enough enthusiasm behind it, and secondly, because the boys are admitted to Government service, for minor appointments in the Agricultural Department and elsewhere. I made it an absolute rule, when we started the school at Loni, that no boy from that school should be admitted to Government service.

3279. *Professor Gangulee:* What sort of appointment could they get in Government service?—The boys who attend the schools are from 15 to 16 years of age, and they leave the school when they are about 18, and then they may be appointed as *Kamgars*, non-graduate fieldmen, and so on. I set my face against it at Loni from the beginning, with the result that we get a different class of boys altogether. Most of our boys are now sons of substantial village *patels* and cultivators.

3280. *Sir James MacKenna:* I was interested in your statement to the Chairman, when you gave it as your opinion that the product of your college is quite comparable with similar products of an English Agricultural College. Is that due to the fact that the preliminary science teaching in the schools of the Bombay Presidency is fairly good?—I think it is fairly good. I do not think it is as good as the school training given at home; but I think it is fairly good.

3281. You have had a great deal of experience of students from Burma?—Yes.

3282. Would you apply the same terms of appreciation to them?—They were a rather variable lot. The best of them were very good: in fact I think the best of them were rather better than most of our men. They stood quite as high as the best of our men.

3283. As to the training of Indians for the higher grades of the service, what would you do with them after they take a degree in agriculture?—I would prefer putting them into our ordinary graduate service.

3284. The Provincial Service?—Not Provincial, but into the Subordinate Service. Then they would distinguish themselves or they would not. If they distinguish themselves I should send them abroad for a couple of years' training in the special line in which they are going to work. I would then bring them back and put them into the Provincial Service.

3285. Is it not rather a slow process?—Yes, it is but I would make sure. I think the best way of training a man is by bringing him into real contact with the hard facts.

3286. That, of course, would mean that in most cases a man would be nearly 30 before he got into the upper grades of the service?—I agree, and I think

that is what ought to be. Of course, it is a very different thing when we are dealing with Indians who belong to the country and Englishmen. In England, I never expected to get to a top position or a position of superiority until I was over 30.

3287. They all want to start at the top of the tree out here, I gather?—My men on the whole are very content to adopt that sort of policy and to join the department in the ordinary subordinate grade. I would much prefer that a man joins the department in the ordinary subordinate grades. Then they would work for 4 or 5 years, and then if they distinguish themselves, they would demand or at any rate want to get a chance. They would be sent abroad to England or America, for study in a special subject.

3288. Of course in that matter of training the personal link between pupil and teacher is very important?—It is of very great importance.

3289. You are not I take it in favour of teaching facilities for higher grades of Agricultural Service, a Central College specifically for this purpose?—I think my experience of men who have merely had college training, whether it be in India or in England, has been that they are very much less effective. I have had men who have been here, and who have gone to Europe straight away and then come back after two years with an additional English degree, but I have generally seen that they are not nearly as valuable to me as the men who have been trained under the more effective system I have had, and have been 10 years with me, perhaps, after graduation from my own college.

3290. Do you think Pusa could develop post-graduate training for that purpose?—I do not think for that purpose except in special subjects. In some matters I would send a man on to Pusa, instead of abroad, where Pusa was particularly well developed. For instance, when Mr. Howard was at Pusa, I would certainly have sent a man there who wanted to do plant breeding, quite as readily to Pusa as to any other place in the world.

3291. You do not think that is the line of development that should be pursued for post-graduate courses?—I do not think so.

3292. You would rather have the training you suggest completed by a selective course in England or America?—In England or America or India, if you can find anything of sufficiently high quality.

3293. You gave it as your opinion rather emphatically that we do not get first class men for the Agricultural Department over here. You have been in the Agricultural Department for as long as I have been. How do you reconcile your statement with the fact that so many of our old officers are now holding the most important posts in Europe in agricultural science?—I think I was quite right yesterday. We have had some good men in the Indian Agricultural Department. We have also had some extremely inferior men selected by the same people at home. I think we have had two or three men who would have obtained, if they had never come to India, the very highest positions in Europe; but I do not think we have had more and at the same time we have had a considerable number of very second rate men. It is rather a delicate matter and rather difficult to speak about, but I think that is the position.

3294. Would it be more correct to say that it has been possible to attract the best type of men, but not to keep them?—You and I know of about 8, as a rough figure; men of first class ability who have come to India but have gone back to Europe. I think we have got them by chance.

3295. For which many thanks?—Yes; but we have also got by the same method of recruitment, some men who are very inferior.

3296. *Professor Gangulee:* So many important points have been raised both in the memorandum presented before us and also in your replies that I feel tempted to go over some of the questions which have already been replied to. First, let me ask you whether for the purpose of agricultural research you have now adequate facilities at Poona?--I think, I can say we have.

We could do with a good deal more but I think for the lines which we have undertaken as being our special lines of research, we have fairly adequate means.

3297. Both in laboratories and farms?—I think so, I want to be perfectly understood; I am not one of those who go in for very high class facilities and equipment, I think there are many cases in which a man is ruined by his laboratory: I mean he gets far too good facilities, and hence he is never able to work under anything but the best conditions.

3298. Can you go on for ten years more without adding to the existing facilities?—I think we must gradually increase them, but I do not think I can say to you that the existing facilities are inadequate or unsatisfactory.

3299. And you have a corps of experts in these laboratories?—Yes, we have.

3300. You agree that with this combination of research work with teaching facilities, it has been possible for you to develop this corps of experts?—These are the conditions under which they have been developed.

3301. Under this arrangement you have been able to develop this post-graduate teaching?—Otherwise we could not have done it.

3302. Can we say that you have developed a sort of research atmosphere in the Agricultural College?—That was one of my chief aims. Ever since Sir Henry Lawrence brought me to Poona, I have tried to develop in the college a research atmosphere. Every man who was teaching in the college was expected to be engaged also in some research.

3303. Without any interference with his teaching work?—I have always said that the teaching work must be his primary duty. But teaching work in no institution I know takes up the whole time of a man. I expected that every man who was on the teaching staff should also do some research work.

3304. Can you tell me of any particular line of research which is important for this Presidency which you have not been able to start?—A good many.

3305. Any line which would at once benefit agriculture from the cultivator's point of view?—For instance, I have felt very often the need of a better Plant Physiologist, than I have got. This is a line which has recently come to the front, but there is a large number of problems which can be dealt with by a Plant Physiologist.

3306. For instance the study of the water requirements of plant?—That is one side. Then the question of the shedding of cotton bolls which we are now studying is completely a physiological question.

3307. So you want a Plant Physiologist. Have you developed in all other important lines of research?—There are yet a number of lines in which we have not developed.

3308. Plant pathological investigations?—That has not been developed as yet as much as I should like. We have got men but I am not satisfied with their quality.

3309. You have made a reference to the proposed All-India Research Board. In connection with that Board you say: "Our research work is hardly dependent in any way on that at Pusa, nor would it be possible, I think, without general injury to the work, to have it in any way directed from the Central Government, either by an All-India Research Board or otherwise." Can you explain to us the nature of the general injury you are afraid of?—The feeling I have is that we must have independence in regard to research in our own Province. If we are to be directed from outside we shall suffer and the work will suffer.

3310. Perhaps the crux of the whole trouble lies in the word "direction." What do you actually mean by "direction"?—They cannot dictate the nature of your problem. A Central Board can say "We want you to carry on work on these lines." They can merely make suggestions.

3311. In scientific work, are not suggestions welcome? Suppose you are carrying on plant pathological investigation. Certainly you would like to

have some suggestions from Mr. Shaw, who is working at Pusa?—We value that very much.

3312. That is not direction?—That is not the point. The point arises this way: if anybody comes to us and says "I will give you a lakh, but you will have to investigate this problem."

3313. And you fear that problem may not exist in a great extent in your Presidency?—It may be of importance, but it may not be of primary importance. I should say "I want that lakh of rupees, but to us it would be far more important to investigate something else." I want to have the right to say that is the thing to be done and not the other thing, which is relatively a minor matter.

3314. That is what you mean by direction?—Yes.

3315. As the situation is at present, do you find any difficulty in exchanging your experience with scientific workers in different parts of India and also with Pusa? Is there co-ordination?—The exchange of experience is not so close as I should like.

3316. Why is it so? Has it got worse since the Reforms?—I do not think it has got worse; I do not think it ever was very close. I have always felt that the Indian Board of Agriculture should be very much less an administrative board and very much more a board of consultation on work. I feel there should be an annual or biennial consultation between all workers in particular fields.

3317. But I believe you admit you have had a great deal of co-operation from Pusa?—We have had a good deal of help from Pusa.

3318. As regards administration, you criticise the Central Board idea and you suggest the formation of *ad hoc* committees for co-ordination. Do you not consider that such numerous committees under a Central Board would lead to a complicated organisation?—I do not think there is very much complication about it. The men who are now working on cotton have such a committee. I would like to have such a committee. I would like to have a committee of workers on tobacco, and so on.

3319. You will have a committee for each crop?—I do not want to have a committee for each crop. I would not classify them by crops, but groups of crops. I should like to have a committee for each important group.

3320. As regards your suggestion as to what the Government of India might undertake, do you not think that the Imperial Institute at Pusa, as it is now organised, can undertake items (1), (2), (4) and (5)?—I think it can undertake all these. No. (3) is the only thing about which there is any controversy.

3321. I have therefore left out No. (3). These items could be undertaken by the Government of India under the existing organisation?—That is perfectly true.

3322. Let me turn back to the research work of the Province. In answer to a question by Sir Henry Lawrence you have admitted the importance of research in *juar* and *bajra* which form the staple food crops of the Presidency. Has the production of these crops increased considerably during the last ten years?—I do not think I can say it has.

3323. Is there any prospect of increase?—I think there is a very great prospect. We have evolved a type of *juar* in Surat which gives 20 per cent. increase in yield over an area of at least 250,000 acres.

3324. The limiting factor in *juar* is the quality of seed?—That is one of the limiting factors, and there is the water-logging of the land. We have definitely found a method of meeting that, which, as far as my experiments indicate, will give an increase in yield again of 25 per cent. It has only been just begun. Come back after ten years and I venture to say that I will show you an increase of 30 per cent.

3325. For the last ten years has there been an appreciable increase?—No increase that I can put down in percentages.

3326. Is the occurrence of smut in *juar* universal?—Absolutely universal. I should say it takes about one anna from the rupee in the crop all over.

3327. It is a tremendous loss?—Yes.

3328. Has there been any special enquiry into this epidemic?—Yes, very exhaustive. There are several types of the epidemic, and we have been able to deal with all but one, and that a minor one.

3329. Have you enquired whether this particular epidemic has come from other Provinces?—I think this particular disease is universal wherever *juar* is grown.

3330. Have you made any atttempt to control it?—Yes, we are now distributing sulphate of copper. Last year we distributed enough to cover 650,000 acres. It costs about 1 anna per acre.

3331. Have you been able to breed any resisting varieties?—No, because in that particular case it can be dealt with so easily by the other method, but in certain cases we are working very hard to breed resisting varieties, *e.g.*, in the case of wheat in the Deccan.

3332. What proportion of the total expenditure do you allot to research and what proportion to demonstration and propaganda work?—I was asked this question the other day by my own Government. It is very difficult to divide it, but I should say about one-third of the whole expenditure goes to research. Do not take that as accurate, it is simply a guess.

3333. Could you give us an idea of what ought to be the proportion?—I should say that is probably the right proportion.

3334. Coming to the very important question of demonstration and propaganda you say "The essential difference between the Agricultural Departments in the East and in the West is that the latter have arisen to meet the spontaneous demands of the cultivators of the soil." Is that your experience of Western countries?—I think the work of the Board of Agriculture in England has risen out of the people themselves. The first work of this sort in England was done by the Royal Agricultural Society which was founded in the forties by the people themselves.

3335. Did not the initiative come from the landowners?—But the people were interested in agriculture. Out of that gradually the Board of Agriculture has developed. That is my reading of the history of things in England.

3336. In answer to Sir Thomas Middleton you said that you carry out demonstration work on the cultivators' own land?—Yes; we do.

3337. Could you give us further details of the arrangements which you make with the cultivator, and the procedure you employ for the conduct of demonstration?—As a rule the demonstrations depend on one single factor of improvement. Let me, for instance, take the simple case of potato cultivators in the northern part of the Poona district. We found that one disease was ruining the *kharif* crop. We found that all that was necessary was to dust the crop with a mixture of lime and sulphur. We arranged with the people that as soon as this disease began they should send a message to us and we could take our duster and dust these crops. We also have a man of our own belonging to the Taluka Development Association working in the same tract and if he saw this disease in any field he would ask the owner whether he would like the plants to be treated. By that means in two or three years we dusted 30 or 40 acres in various parts of that tract. Now we have got over the trouble: the people come to us as soon as the disease appears, and the dusters and material are in the hands of the Taluka Development Association.

3338. You have cited a case of an epidemic, but, supposing you have a better variety of seed, and you want to demonstrate the efficacy of that seed to the cultivators, how would you proceed? You come to me as a farmer. You say "Here is a better seed: will you try this on your land?" What conditions would you impose on me and what sort of arrangement would you have with me?—Generally, in the first instance, the arrangement is mutual.

If the man agrees to grow our seed we guarantee him against loss; that is to say, we say that if the seed fails we will reimburse him to the extent of what he would have got if he had used his own seed.

3339. Have you had to reimburse him ever in that way?—Only once in my experience.

3340. All the demonstrations have been so successful?—Yes. There has never, except on one occasion, been any demand on us to pay for a loss. On the other hand we tell the man that if the experiment is found successful he has to sell us the produce back again taking only what he wants for his own seed, so that we have conditions on both sides.

3341. The agricultural operations are carried on by the cultivator himself? —Yes; by himself and by his own methods.

3342. Under the supervision of your department?—We definitely and deliberately concentrate on one point; we only insist that he should use our seed. The agricultural operations are carried on by himself.

3343. During the harvest season, in order to bring out the difference between the selected seed and the non-selected seed, do you make arrangements to show the improvement to the farmers of the neighbourhood?—Yes. We generally have the crop cut in the presence of our demonstrator and a determination of the relative yield of the improvement and the ordinary seeds is made.

3344. What I am trying to find out is, before whom do you give the demonstrations? Before the individual cultivator on whose land the demonstrations were carried on?—Wherever we have a plot like that we have a special day set apart and bring the people in the neighbourhood round to see it.

3345. Do you have any system of keeping accurate cost accounts of these demonstrations?—We do not have any accurate cost accounts because as a rule it is not needed. We are not comparing the whole system of cultivation here and the whole system of cultivation there; we are simply comparing the investment of Rs. 5 in our seed with the investment of the same amount in another seed. Hence we get a simple relationship by taking the weight of the crop.

3346. No cost accounts are taken?—No, of course, there are other cases when we are comparing methods of cultivation where we have to and do keep cost accounts.

3347. Do you agree with me that the improvement of agriculture and the application of scientific methods to farming depend on the interest shown by the landowners? Is there any indication of such interest evinced by landowners in this Province in your demonstration work and experiments?—I think the larger peasants are much more helpful than the landlords. This applies not merely here but also in Sind. It is the larger peasants who are our mainstay.

3348. In Bengal, cultivators are prejudiced against *sirkar's* experiments. Do you have any change of attitude in that respect among the cultivators here?—I do not think very much change is required, because I do not believe the cultivators here are very much prejudiced. If a man sees a good thing he is on to it. But he must be thoroughly convinced it is good. If he is, it does not matter who brings it before him.

3349. The peasant complains that the *sirkar's* methods are expensive and so he is prejudiced against them? As the Chairman said, he suspects a top-dressing of rupees: that is what I am getting at?—That applies in Government demonstration farms and that is why in demonstration plots I devote myself to one point only; I do not take the method of cultivation as a whole but only the particular improvement I am trying to bring about.

3350. If considerable interest among farmers is aroused by these demonstrations and propaganda, it must reflect itself in their attitude towards agricultural education of their children?—Yes.

3351. Is there any definite indication in that direction? Do they take more interest in the agricultural bias schools than they used to?—I cannot say that. Those schools are too new to make such comparisons. They have only been going three years.

3352. You cannot say definitely that as a result of this demonstration work and propaganda we have been able to create a demand for agricultural education?—I cannot say that, but the boys who fill the Loni and other vocational schools are the sons of men who have come into contact with our demonstration work.

3353. With regard to the introduction of better methods, you refer in your memorandum to the attempts by an Indian State (Rajpipla). There has been an official order to the cultivators prohibiting the use of any other seed than that recommended, and you say the result has been marvellous. Do you think the Provincial Governments might exercise compulsion in that way?—I am very doubtful whether I should recommend the Bombay Government to do it, but if I had a large private estate (and I look on the Chief of such a State as Rajpipla as running his private estate) I should insist on it.

3354. But you do not think the time has come for the Bombay Government to do so?—It has not come yet. Whether it will come in the future is a doubtful matter.

3355. Judging from the experience gained in our rural bias schools, are you of opinion there is likely to be a sound basis for a comprehensive structure of rural education?—I think it is very probable they will do what they were intended to do, namely, make agricultural and rural life the centre of their thoughts. They are intended to saturate ordinary primary rural education with the agricultural outlook and keep the boys thinking on rural lines. That provides a sound basis.

3356. Are you satisfied with the teachers you have got for that work?—No, I will not say I am satisfied. Some have done exceedingly well and some have done badly. On the whole I think quite half of them are doing well.

3357. In the event of these schools becoming more popular you will require more teachers?—Yes.

3358. Have you any facilities for training them?—We are at the present time training 20 teachers a year. It is hoped to open 20 additional schools a year. That is a very small number, and both the Director of Public Instruction and myself are in perfect agreement that the next step we have to take is to provide a training college for rural teachers. That is a matter which he will put up, not I.

3359. You lay very great stress on non-official efforts in these directions?—Quite.

3360. Are there any agricultural bias schools organised by voluntary, non-official organisations?—All these schools which have been converted to this type, or nearly all of them, are Local Board schools. We have not any private rural education.

3361. Who controls these schools?—The education committee of the Local Board.

3362. That is chiefly a non-official body?—Yes.

3363. What is the attitude of the Education Department towards these schools?—They are enthusiastic.

3364. Do you find they are willing to co-operate with you?—Very much so. In fact, they are being run by the Education Department and not by me; they are definitely Education Department schools. I am there as adviser, and I have in my department an Inspector of Agricultural Schools who reports to me; I send those reports on, with my comments, to the Education Department.

3365. Does that sort of co-operation exist also, in regard to schools of the Loni type?—The Loni type are under my control, but I work them in consultation with the Education Department.

3366. In answer to a question put to you by the Chairman, you said you were in despair about adult education. Can you explain the method of adult education that has been tried?—It has nearly always been in the nature of a night school for elementary reading, writing and arithmetic, leavened by interesting subjects like co-operation.

3367. Were definite courses given, or was the effort spasmodic?—It was a definite course. I would rather, however, you asked the Director of Public Instruction about this.

3368. The reason I emphasise the need of adult education is this, Lord Reay's Committee's Report says that before the children of the agricultural classes can be induced to go to the schools, the adults must be convinced that the instructors have information worth securing?—Quite.

3369. Therefore, in order to feed your agricultural bias schools or to make the Loni type a success you ought to have a scheme for adult education in operation?—So far as the agricultural bias schools are concerned, I do not think the remark you have quoted applies. So far as the Loni type goes I think it is absolutely true, but I think the people have got evidence that the teachers in the Loni schools have something to tell them.

3370. I notice that in dealing with the question of the welfare of the rural population you emphasise, and rightly, that the problem of rural development is the main object of our investigations?—Yes.

3371. And you refer to the Taluka Development Associations?—Yes.

3372. Do you consider that the taluka might be taken as a unit of organisation?—I think, for two reasons, it is the best unit of organisation we have. In the first place, I think so because I want the unit of organisation to be as small as possible.

3373. How many villages does the taluka cover?—100 to 200. I want it to be as small as possible consistent with getting enough good men to run the association. The taluka is the smallest unit I can find which contains enough driving power to run such an organisation.

3374. You, I think, organised a number of Agricultural Associations, but they failed; did not they?—Most of them have not been successful.

3375. Why did they fail?—Very largely, I think, because there was not enough outside stimulus.

3376. Is outside stimulus provided for the Taluka Development Associations?—There you get very much more than before, because we get the Government subsidy.

3377. Do you get more non-official support in the Taluka Development Associations?—That is increasing. Another reason for their success is that they have been utilised not merely for technical agricultural improvement but also for co-operative propaganda.

3378. Do you not think that one of the fundamental causes of the failure of organisations of this sort is lack of rural leadership?—I do, most emphatically. The biggest thing the co-operative movement has done in our Presidency has been to create a certain amount of rural leadership.

3379. You have very rightly pointed out the necessity for looking at rural problems as a whole. Do you emphasise this in the training of your students at the Agricultural College?—It is one of those matters you cannot introduce in the curriculum. It depends on the atmosphere of the college, which either reflects this or does not. In my time I always tried to make the atmosphere of the college reflect the idea of an improved rural life.

3380. Have subjects like rural sociology and rural economics any place in your curricula?—Rural economics is one of our most important subjects. I do not know how you are to teach rural sociology; it is an indefinite subject which it is extraordinarily difficult to teach. At present I think it is more a matter of atmosphere than of a definite curriculum.

3381. Can we then look to your Agricultural College for the training of rural leaders?—I think we ought to.

3382. Do you know of any voluntary organisation that is working for this training of rural leaders in this Province?—Yes, I do. I think the Bombay Central Co-operative Institute is doing something in that direction. I think that the Servants of India Society has led to that to a certain extent.

3383. Training men to look on the problem as a whole, in all its aspects?—Yes. One of the leading members of the Servants of India Society, Mr. Thakar, has been exceedingly successful in the Bhil districts of the Panch Mahals.

3384. Do you think that there is some immediate prospect of organising such societies in rural India as you propose in your note?—I most certainly think that it is a possibility. Of course, it is not going to be done without a great deal of labour, but I think it is quite possible. It may come in a form somewhat different from the one which I have indicated.

3385. Without any impetus from officials?—I do not think we want very much official stimulus. I think all that we shall want from the official side will be a Government subsidy towards the work, but I think that the organisation must be non-official.

3386. In answer to a question by the Chairman, you said that the roads have deteriorated under the management of District Boards?—Yes, I said that was my opinion.

3387. On page 31 of the memorandum you say the various Local Boards have now undertaken a vigorous policy of road construction and improvement. Am I to understand then that there has been a change of heart on the subject?—What I have said there, which, by the way, is not my own, applies to certain of the District Local Boards.

3388. Do you think that the organisations brought into existence by the Local Self-Government Act, such as our District Boards, Local Boards, Village Unions, and so on, are sufficiently organised and equipped for the puprose of giving effect to a definite policy of rural reconstruction?—I think they can help and can give effect to it very largely. One of our District Local Boards has definitely come forward with an offer to take all the Taluka Development Associations under its wing and to give in one district Rs. 5,000 a year towards Taluka Development Associations. To my mind that is a sign of progress.

3389. You have made a reference to the different angles from which Departments such as Irrigation, Veterinary, Forestry and in some cases, Educational, in the same Province look at this problem. Have you any suggestion for remedying this lack of co-ordination? I am not referring to the different sections of the Agricultural Department?—As I said yesterday, to my mind the first step to be taken is to put all these departments under one Minister. Then when they have been put under one Minister, if I were in charge of one of them, I should suggest to that Minister that he should call the heads of these departments together periodically in order to discuss any matters which may have arisen between them.

3390. You propose here a Central Agricultural Board merely for research work, but, as opposed to that idea, do you not think that a Central Rural Development Board might bring about the necessary organisation for giving effect to a comprehensive plan for rural reconstruction, linking up the agricultural, veterinary, forestry and other branches?—I fancy as far as that is concerned that the differences are very much greater in this matter than they are even in matters of research, and it would be extraordinarily difficult to attempt to work rural development in India through any Central Board. I should be delighted to get a Central Board of Finance for Rural Development, but I do not think it could organise rural development in the Provinces; it is decidedly a very local matter.

3391. You do not think that would be a method of overcoming the difficulties arising from the different angles of vision of which you spoke?—I am not very confident of progress in that direction.

3392. On the whole, you are rather afraid of over-centralisation, are you not?—Yes, I certainly am. Agricultural and rural development is, after all, essentially a local matter, and we have got to look at it primarily from the local point of view.

3393. But if you are to have a comprehensive plan, do you not think that some sort of centralisation might be necessary for direction and guidance?—Let us have what we have had in the past, a biennial Board of Agriculture or a biennial Board meeting in which men can discuss their problems together and get ideas one from the other. In the earlier days of the department we used to have at these boards, as Sir James MacKenna knows very well, a perpetual committee on methods of getting into contact with cultivators. I was chairman of that committee at several Board meetings, and four reports were published by it. They are the result of consultation between men who are actually doing the work; I do not think you can centralise more than that.

3394. Supposing we formulate a definite comprehensive policy for the whole of India; do you not think that if you go in for excessive de-centralisation you may miss the aim?—I do not quite understand what you mean by a definite rural policy for the whole of India.

3395. I mean a policy laid down on broad lines with regard to irrigation, rural health, rural education and so on. Supposing we adopt a systematic plan, in order to give effect to that system, do you not think that a central organisation might be more effective than excessive de-centralisation?—I should like to have central consultation, but I do not think you can do more. I know Sind and I know the Deccan, and I cannot conceive of any board that could apply one and the same system to Sind and the Deccan. I think the two things are so different that only a man who is intimately acquainted with them can devise a system suitable to them.

3396. The system, of course, would have to be modified according to the special needs of each Province, but cannot the broad outlines be charted out for the whole of India?—I do not think you want a board for that.

3397. To give effect to a policy of rural reconstruction?—I do not know what you mean by giving effect to it. Giving effect to it is a matter which must rest with the Local Government. What I think you can get is a consultation of people who are in touch with the problems arranged for by the Central Government.

3398. *Mr. Calvert:* I do not quite understand the organisation of the Taluka Development Association. Are the members appointed by anyone?—The members of the association consist of everybody who is prepared to pay the subscription, including any societies or bodies who will pay the subscription. Then, just as in a co-operative society, you have a general meeting which appoints the committee, and that committee reports to the general meeting which takes place twice a year. I mean the organisation is precisely similar to that of a co-operative society.

3399. Are these Taluka Development Associations registered?—We do not compel registration, but all except two I think are registered as co-operative societies.

3400. You say you do not usually recommend any improvement unless you are confident it will give an increased net return of 15 or 20 per cent?—Yes.

3401. Is not that less than the margin of outturn of good and bad seasons?—Very much so; the difference of margin in even our most certain crops is bigger than 15 to 20 per cent; but we can always compare one year with another and one plot with another in the same year.

3402. It is really over a series of years you see the advantage?—We never recommend anything unless we have got the results for two or three years.

3403. In discussing marketing you say that practically all your marketable produce has no real trouble in finding a market?—Yes.

3404. By that I suppose you really mean that supply has not yet outrun demand?—That is practically what I do mean.

3405. But it might happen, if you pushed some special product such as fruit, that you might have difficulty in finding a market for it?—I can quite foresee that might easily happen. There are two or three cases in which it does happen at present; there are times when there is a glut of mangoes or a glut of figs; prices go down to nil or the material is unsaleable; but those are only seasonal products, and that sort of thing does not happen to any great extent.

3406. That is one big factor practically determining expansion in certain directions: you might experience a slowly increasing market for fruit or something of that kind, but you are not likely to find a rapidly increasing market?—No, I agree with you there.

3407. What exactly is the effect of Bombay on the cultivation of the hinterland; does it lead to intensive cultivation?—There you have an extremely peculiar state of things which I have found not merely in Bombay but round other big towns as well. This is a matter I have never spoken about in public, but I think it is so. Immediately round the big towns you have market-gardening; that is intensive cultivation. Then beyond that you have an area of depression from 30 to 50 miles wide which suffers agriculturally as the result of the development of the big town. Then beyond that you get into the normal country.

3408. If you had improved marketing communications, such as light tramways and that sort of thing, would not that extend the area of intensive cultivation?—I certainly think so; it would extend the intensive cultivation of the market-garden area.

3409. One would suppose that by extending the marketing facilities of Bombay you would get better cultivation over a wider area?—Yes, and as a matter of fact that has happened and is happening. The B. B. and C. I. Railway, for instance, is a line which brings in from 50 miles away produce which elsewhere would not go for more than 10 miles.

3410. Actually conditions of transport are fairly good?—On the whole, yes. I mean I complained yesterday of certain classes of roads, especially village roads; but the facilities for traffic are on the whole not very bad.

3411. Round the big towns?—Round the big towns.

3412. I should like to know what is being done for the improvement of grasslands. About half India is under grass of sorts?—The problem of grasslands, particularly in the trap area, is one of the biggest problems which is before us, and up to the present practically nobody has thought anything about it. Under a grant from the Sassoon David Trustees we have had now for the last 5 years definite investigations into the improvement of this range land which occurs in the Deccan, and the results are very promising. I have now three research men on that subject. The line of development which seems most promising is that of either partial enclosure or rotational grassing. That so far has tended to give us nearly 50 per cent. increase of fodder from the same area.

3413. That is on the present grasses?—That is on the present grasses.

3414. Are you trying to introduce any new grasses from overseas?—We have tried to introduce new grasses and some of them have been successful; for instance that grass which you saw at the College the other day where you have deep soils has been an improvement wherever you see it; the re-seeding of a large scale of this range area has not been a very promising line of work.

The Commission then adjourned till 10 a.m., on Monday, the 25th October, 1926.

Monday, October 25th, 1926.

POONA.

PRESENT:

The MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.
Sir THOMAS MIDDLETON, K.B.E., C.B.
Rai Bahadur Sir GANGA RAM, Kt., C.I.E., M.V.O.
Sir JAMES MACKENNA, Kt., C.I.E., I.C.S.
Mr. H. CALVERT, C.I.E., I.C.S.
Raja Sri KRISHNA CHANDRA GAJAPATI NARAYANA DEO of Parlakimedi.
Professor N. GANGULEE.
Dr. L. K. HYDER.
Mr. B. S. KAMAT.

The Hon'ble Sir CHUNILAL V. MEHTA. } (*Co-opted Members.*)
Dewan Bahadur A. U. MALJI. }

Mr. J. A. MADAN, I.C.S. } (*Joint Secretaries.*)
Mr. F. W. H. SMITH. }

Dr. HAROLD H. MANN.

Further Oral Evidence.

3415. *Mr. Calvert:* You have not explained what you are doing for your grasslands. Have you any funds given to you?—We have got some funds given by the Sir Sassoon David Trustees for the investigation of the improvement of grasslands. As a result of that, the matter was placed in the hands of our Economic Botanist. As a result of five years' work, we have come to certain clear-cut conclusions. The first of these is that the grasslands of the Deccan could produce probably 50 per cent more than they are producing at present.

3416. Is that the ordinary waste land?—Yes. Two methods have been very successful. One is the method of temporary enclosure and the other is the method of rotational grazing, and we are trying now, in one or two of the test villages, to find out how far we can get the people to adopt one or the other of these systems.

3417. May I know whether you are trying to introduce any exotic grasses?—Most of these exotic grasses are suited for irrigation areas only. The Rhodes grass we have tried with considerable success. We have had good results also with Napier Fodder grass; South African Elephant grass has done exceedingly well. Guinea grass is being very well grown, and among others Lucerne is extending everywhere.

3418. Is it irrigated Lucerne?—Almost entirely. We have just introduced dry Lucerne into the southern part of the Presidency, which is about the only suitable place for it.

3419. *The Chairman:* Have you tried wild white clover at all?—No, we have not. We have tried Egyptian clover, *berseem*, which has done very well as a winter crop, but there the trouble is the question of seed. So far we have not succeeded in getting our own seed, and it has become almost impossible to import seed on a large scale.

3420. *Sir Henry Lawrence:* Have you had any difficulty in getting *berseem* seed from Egypt?—No difficulty, except that of cost.

3421. There is no prohibition or unwillingness on the part of the Egyptian authorities to let you have it?—No, not so far.

3422. *Mr. Calvert:* There is tremendous scope for the improvement of grass on the so-called waste?—There are tremendous possibilities.

3423. The next point is with regard to the phrase "shortage of labour" which occurs in your written statement. Elsewhere you have stated that there is an enormous amount of spare time for the workers, who are compelled to remain in the villages?—Yes; and the two things appear inconsistent at first sight. They are not actually inconsistent. There is an enormous amount of spare time, but at certain seasons of the year there is a shortage of labour.

3424. So it is a seasonal shortage?—Yes, not a general shortage.

3425. To what extent is even that seasonal shortage due to shortage of labourers, and to what extent to shortage of labour power owing to inefficiency, to ill-health and to disease? How far is it an actual shortage of numbers?—I think it is probably due most largely to what you call shortage of labour power, not to a shortage of individuals.

3426. Due to inefficiency?—Inefficiency due very largely to ill-health, as well as the tendency to work only a limited number of hours.

3427. You think things like disease and diet have something to do with the seasonal shortage of labour power?—Very much to do with it, especially in certain tracts. In the Konkan, for instance, when I was investigating a village there, I was mystified, and I am to a certain extent mystified still, as to the reason why in an area where crops are absolutely certain the people are more miserable than even in the famine tracts. I have come to the conclusion that it is to a very considerable extent a matter of unhealthiness. I found, for instance, a spleen rate of 42 per cent among the children. A spleen rate like that means that malaria is a very big factor in the labour power of villages down there. Of course, there are other factors, but that is one.

3428. Then "shortage of labour" is really a very loose phrase, which obviously requires defining?—I agree with you; it requires defining more closely.

3429. With regard to propaganda, might I ask your opinion on the comparative advantages of concentration as against dispersion in propaganda, by which I mean concentration on a few whole villages to adopt your advice as against trying to induce scattered individuals over a large area to follow it?—I have always advocated concentration; not concentration to the extent you mention, of getting whole villages to adopt improved methods, but by concentrating on limited areas rather than spreading effort thinly over large areas. That has been one of the reasons why we adopted the taluka development system. It really means, for the time at any rate, we want to concentrate on a limited area.

3430. You have not tried here any co-operative better-farming societies?—No.

3431. In your Annual Report you mention that it is your recognised policy to organise the rural community on co-operative lines?—Yes. We are only just at the beginning. In the village which I want you to go and see next Sunday, we have got a scheme to try to organise the whole village on co-operative lines. It is only in its infancy yet, and I feel that one has got to win the confidence of the people in the village before you can do that.

3432. Can you give me any rough idea of the percentage areas of crops under your new and improved seeds or methods?—I can give you that in one or two cases. Of course, our biggest is cotton, and I think, leaving out Sind, in the Presidency alone, we have about a million and a half acres under improved cotton. That does not mean to say that we are distributing seed for that area each year, but it means that the natural spread of our seed has covered at least one and a half million acres.

3433. *Sir Henry Lawrence:* Will it be about 30 per cent?—About 30 per cent, yes.

3434. *Mr. Calvert:* It is 1½ millions out of 5 millions. What about other crops like millets?—We are in a much earlier stage with millets. We have only taken up their improvement within the last five or six years, and there the proportion is very small as yet. Of course, the extension of those crops is very rapid. Once you ge tthe stuff, you can extend it rapidly.

3435. Practically, taking the Presidency proper as a whole, you are affecting 30 per cent or 40 per cent of the crop area?—Possibly something like that. In the case of ground-nut, of course, our improved seed is practically all over the area. The old Indian seed has gone; you only find it as a curiosity.

3436. Ground-nut, I suppose, is only 1·5 per cent of the total?—It is over half a million acres this year. I suppose there is about 500,000 acres under improved seed.

3437. You think that further progress depends on increased staff?—Increased investigation first and multiplication of that material.

3438. And propaganda?—Yes. In the case of rice in the North Konkan, of which we have made a speciality, we are now providing new seed for 10,000 acres each year, and that is enough in the following year to extend to 100,000 acres.

3439. You stated that the cultivator's own plot is the best basis for propaganda. What exactly is the method?—Take the case of East Khandesh. I am trying to push a moderate amount of artificial manure there, concentrated manure, as fertiliser for cotton. Hitherto it has not been used. Now we are using oil-cake, sulphate of ammonia or a mixture of the two. I have got this year a special man on that job in East Khandesh, who has arranged about 60 different plots. The people cultivate the cotton exactly as they were doing before, with the single exception that our man is there and applies the quantity of manure required.

3440. Using the cultivator's own bullocks and his own plough?—Yes, and his own men to do the work.

3441. It is just general direction?—Yes, and the supply of the one material which represents the subject matter for demonstration in that area.

3442. Could you give us any idea as to the best method of ensuring a supply of pure seed, adequate to supply the demand? Your department cannot cover the whole ground?—We cannot cover the whole ground. There are two cases in that respect. There is one case, where if you give out seed it remains pure, and it will spread itself. Such a case is wheat. The amount of cross-fertilisation and deterioration in wheat is so small that, supposing we can give out seed for 10,000 acres a year more or less, the job is finished. In the case of cotton, on the other hand, you have got a material which cross-fertilises to the extent of 6 per cent and it means that unless we can replace fresh seeds every 5 years in an area, it very quickly deteriorates. Now, for the future, in each of our big areas we have definitely taken as our limit 100,000 acres a year for each type; *i.e.*, something between one-fifth and one-tenth of the total area. We supply by depôts all over these areas seed for that amount at the market rate. What we supply we guarantee. We leave the ordinary commercial channels to go beyond that. We get that seed for the 100,000 acres from actual selling of plants on our farm each year. We grow that for the next two years on our farm. By that time we have got enough to plant out 500 acres. We plant out between 500 and 1,000 acres in one selected group of villages, which we rogue with extreme care. Then we buy the whole of the seed from that and plant it out in a number of groups of villages, which we rogue with less care, and for easy marketing we arrange either to buy the seed or get co-operative societies to buy.

3443. Do you think it will be quite sufficient to maintain your now type of seed pure?—Not entirely, but it is all that I have been able to do at present. In the south of the Presidency, Dharwar, where our seed has earned a great

name, people are urging me all the time to increase the reserve seed area, and I have just consented, in the case of Gadag No. 1, Upland American, to increase the area from 5,000 acres to 7,500 acres, provided the people will pay for an extra man for roguing.

3444. Do you get any help from the big landlords in the matter of supplying seed to their tenants?—Not to a great extent. Big landlords, however, are not a big factor with us.

3445. About keeping this seed in the villages free from deterioration due to weather, what is the best method?—We have not attempted very much more than the ordinary cultivator's methods. Most of their methods are good. The great difficulty is deterioration due to weather, weevils, rats and insects.

3446. You are apt to put the weevil inside the bin?—We tested the loss through insects in one part of Gujarat. The loss through insects in the case of grain in Gujarat is anything between 5 and 10 per cent., but we have not done very much in that direction up to the present.

3447. Have you worked out at all your germination percentages?—Yes, in a number of cases with ordinary village seed. I have supplied the Commission with copies of several bulletins which give an examination of the results of seed supply to two or three typical districts.

3448. Is it surprisingly low?—Sometimes it is low. Ordinary cereals are fairly high. Other crops are very low. But I was, on the whole, very pleased with the germination percentages, which were higher than I anticipated. With cereals it was 75 to 80 per cent.; with leguminous plants it was very much lower, 40 to 50 per cent.

3449. Sometimes with cultivators' seed you only get 25 per cent.?—I have never come across cases like that. They are quite exceptional.

3450. They get back six grains from one with wheat on shallow soils sometimes?—I cannot remember just now, but I am certain that with wheat we have got very few cases like that.

3451. What is the lower outturn of wheat on these shallow soils? Will it be 4 maunds?—4 to 6 maunds, grown dry.

3452. Will the seed be 30 seers to a maund?—30 seers to a maund. The people, as a rule use a high seed rate.

3453. That is a very low return, practically nothing at all?—Yes; it is very small, but I do not think it is the fault of the seed. It is the fault of our dry weather conditions. If you see our wheat crops in the *rabi* season, sometimes they are extremely poor. I think it is a climatic matter rather than due to the seed.

3454. In the case of your agricultural shows, do you get whatever concessions you require from the railway companies?—The railway companies hitherto, on this matter, have been fairly liberal. For instance, for this year's show at Poona, their concessions have been very liberal, and they have allowed all the things to be returned free. So far as passengers are concerned, they have given a concession rate of 1¼ or 1½ single fare for the return journey.

3455. Are they giving any concessions for the smaller district shows?—We have not very many district shows. We rather go in for very small shows, which only attract people who have not to perform any long railway journeys. We have not taken the trouble to approach the railway companies in that connection.

3456. You are not in favour of Government using pressure to bring about the adoption of your advice?—I do not think it is possible. We use moral suasion and whatever influence we have. We get the influence of the Revenue Department, and of all the departments we can. I think the time has not yet arrived when we can do anything more than use moral suasion.

3457. Are not there two Indian States in which force is used?—Yes, and it has been extremely successful. In the Rajpipla State the cotton was absolutely rubbish 7 or 8 years ago. It is now as good as any Gujarat cotton,

and that is entirely due to compulsion. I think the Chota Udaipur State is introducing it this year, and the Baroda Stat eis thinking about it for certain areas.

3458. It is not altogether impossible?—No, it is merely a question of expediency.

3459. *Sir Henry Lawrence :* To what is the improvement in Rajpipla due?—To the introduction of improved seed. There was a definite State Order there that nobody was to plant any seed except that obtained from the State, and the State purchased from us wholesale, and then insisted that that seed only should be sown.

3460. What was done to the man who did plant the old seed?—I do not know exactly whether the man was hauled up and prosecuted. Perhaps the Hon'ble Sir Chunilal knows.

Dewan Bahadur A. Malji : There was, I know, a threat of prosecution. They held a general meeting of all the leading cultivators, over which the Dewan of the State presided. It was promulgated there that His Highness wished that only the Surat farm seed should be sown, and if people caused any other seeds to be sown they would be liable to prosecution. So far I have not heard of any case where there was any actual prosecution.

3461. *Mr. Calvert :* The experiment is worth watching?—Yes.

3462. Is it your experience that the knowledge which is demonstrated to the larger owner actually filters down to the smaller man?—I do not think so, to a very large extent. I think among at any rate the ryotwari cultivators, there is not much which filters from the top downwards. I think it is spread from outwards, but I do not think it spreads from the larger to the smaller very much.

3463. With regard to subsidiary industries, do you advocate that Government should pioneer with factories for utilising agricultural products such as cotton seed for taking off the second lint for felt, for crushing it, and extracting oil and so on?—I think it is worth considering. Especially in the case of some of these new things, where you have got products which are not used, and which we know can be used profitably, I am in favour of Government pioneering efforts. Cotton seed is certainly one which might very well be considered.

3464. We import from Europe straw boards?—Yes, which might be made here from our own materials.

3465. Would you say that Government should pioneer that in default of private enterprise?—I would rather Government subsidised private enterprise.

3466. *Sir Chunilal Mehta :* By subsidiary industries, what is it that you mean? Do you consider a factory, for instance, for pressing of cotton seed or similar factories a subsidiary industry, or is your idea of a subsidiary industry one which will occupy the spare time of the cultivator during the day at home? You know he sometimes spends only half the day on the field, and sometimes he has some two or three months without agricultural work?—I am glad you have raised the point, because it seems to me there is a good deal of confusion of thought on this. There are two entirely distinct things before us. There is on the one hand a subsidiary occupation for the farmer; that is to say, something to occupy his spare time. For instance, within that definition come in the adoption of the spinning wheel, family weaving, and other things which can be done easily or with comparative ease by a person who is not a professional at any particular job. In the Agricultural Show at Poona you have got a definite number of such subsidiary occupations to occupy the spare time of the cultivator. Then there is the other conception, of an actual capitalistic industry, if I may use the term, which is to utilise agricultural products. Now, this, as a rule, must be considered entirely independently of the other; and the cultivators, if they come into it, will come in as labourers and not otherwise? When I talk about subsidiary occupations, I mean the first. Mr. Calvert is referring to the second. There is room for both, but the ideas must be kept quite separate.

3467. *Mr. Calvert:* A large number of the workers in industrial concerns work so many months in them and so many on their own land?—Many, in fact, most; but they work in industrial concerns as labourers. A man who works in Bombay at spinning and weaving could not go back and do spinning as a spare time occupation on his own holding. He is a labourer, so far as the industry is concerned, and he is a cultivator so far as his farm is concerned.

3468. *Dr. Hyder:* Seeing that there is seasonal unemployment of agricultural labour from time to time, would you not prefer that the cultivators should take up some cottage industry, at which they could work in their houses?—I should have preferred it if it was possible. To my mind, it is only possible with a limited number of simple classes of work. The actual cottage industry is a thing which requires an apprenticeship, and it is a thing for the expert worker and not for the man who is 80 per cent. a cultivator.

3469. *Professor Gangulee:* Do you recommend that the Government should subsidise such spare time occupations?—I do not think there is any necessity for a Government subsidy for spare time work. Mr. Calvert was referring to local industries for the utilisation of agricultural produce, naturally with the same labour, but they would come in there to work in the industry as labourers.

3470. *Mr. Calvert:* Employing agricultural labour?—Yes, but working in the industry as labourers.

3471. I would not stress the distinction so much. You know that toy-making in Germany is a subsidiary occupation of the actual cultivator?—Yes, and hence in the Agricultural Show, in the section for which I am responsible, toy-making has been one of those things which I have included as a subsidiary occupation, and I think it is sufficiently simple for a man to do in his spare time. Weaving is my best example, simple weaving like weaving of tapes, the same thing which we have at the Agricultural Show. We can teach a boy in our schools to do it within six months; but the complicated weaving which the professional weaver is expected to do is entirely beyond the possibility of the cultivator and cannot be made a cottage industry.

3472. *Dr. Hyder:* With regard to toy-making, in the Black Forest area, you do not have cultivators. The forest element predominates there?—The Black Forest and the Bavarian Alps are the great toy-making regions.

3473. *Sir Chunilal Mehta:* When you talk about Government subsidy or assistance, take this question of weaving these tapes. With regard to Government assistance for the kinds of subsidiary industries that you mention, take the case of the Government Peripatetic Weaving Schools, of which we have 9 in this Presidency. They teach the cultivator and they also teach the professional weaver?—Yes, but those of them that I have come in contact with are teaching simple weaving which can be taught to the cultivator within six months.

3474. That is one portion of the 9 schools; the other portion is teaching the higher kind of weaving to the professionals. So that you would not rule out Government assistance or Government subsidy for either of these kinds of industry?—Not in the least. But the point I understood Mr. Calvert to make was rather to put up the necessary capital for the establishment of some of these industries.

3475. *Mr. Calvert:* The great thing is that you have got to find out some means of occupying the family labour all the year round?—Certainly.

3476. I am trying to prove possible methods of getting that labour occupied. If private enterprise will not take the matter up, would you advocate a Government subsidy?—Yes.

3477. Take the simple case, which I think the cultivator can make, of *papier mache* and rice paper. They both are done by the actual cultivator. Would you advocate Government financial help to introduce those?—Yes.

3478. If private enterprise was lacking the Government should step in and give the thing a start?—Yes.

3479. Then there is a very important question pertaining to riparian lands. There you have large areas of this land lying useless for agriculture. Would you advocate that the reclamation of that land should be undertaken even at a loss? By a loss, I mean if it failed to pay 6 per cent.?—Most certainly I would, and that for two reasons. It seems to me that this sort of thing is necessary in order to protect the existing land from getting worse. Where erosion has taken place it nearly always extends unless you stop it. We have not the big areas which you have at the foot of the Himalayas in Northern India, but we have it on the banks of most of our big rivers like the Krishna. All that eroded area is lying absolutely useless.

3480. And that area is enormous?—It is enormous, and extends every year.

3481. Which is the department in charge of it at present? Does it fall in between them?—At present it falls in between the Forest Department and the Revenue Department. The Forest Department are not doing anything with it and the Revenue Department have no interest in afforesting it.

3482. Could you suggest any department which should undertake their reclamation?—It is difficult to suggest. But it ought to be somebody's duty.

3483. It is of sufficient importance to be someone's job?—It is.

3484. *Dr. Hyder:* I suppose you refer to the Eastern Deccan through which the Krishna and other rivers flow. May I ask you whether it is possible to afforest these areas considering the geological formation of their banks? Are they not hard rock?—No. As a rule there are little patches of hard rock, but here and there we get quite soft soil going down to 18 or 20 feet. On the line between Hotgi and Bijapur, which crosses the Krishna, there is a lot of land 18 to 20 feet deep.

3485. I was wondering whether you have land similar to what we have in the United Provinces along the course of the Jumna and the Ganges. We have got vast areas of which we can make no use. Have you similar areas here?—We have areas of a similar character, but they are not of course of anything like the same extent as in the United Provinces.

3486. *Mr. Calvert:* Now, some questions about education. To what extent does demand for child labour influence the parent in not sending or keeping boys at school?—To a considerable extent. They look upon the ordinary primary education we have in the villages in many cases as nothing more than a creche, that is to say, a place where the women send their small children to get them out of the way for a certain part of the day. When the boy or even the girl gets to the age of eight they are taken away from the school and sent to herd sheep or cattle.

3487. We have been told that the Education Department consider they have surmounted that difficulty by putting the holidays in the busy season?—They may have surmounted it to a limited extent, but it is only to a very limited extent.

3488. We are also told that very few children are required for herding animals?—A good many go out and do it.

3489. Are you in favour of the Education Department recruiting District Inspectors from your Agricultural College?—I think it would be a very good idea if they did so. It seems to me it is a field in which a man who has got the rural outlook during his education would be able to see the real problems of his area better than a man who is simply a townsman trained in an arts college.

3490. As far as mental discipline is concerned you regard your degree as being as good as any B.A.?—I feel very strongly. I feel in mental training it is not a matter of the subject, but of the method.

3491. As regards the question of school gardens, is it your experience that these school gardens are successful in outlying areas?—So far as the agricultural bias schools are concerned on the whole they are successful. I mean, the boys do take an interest in them.

3492. And the teachers?—And the teachers too, sometimes. I do not want to draw too rosy a picture, because a certain section of the agricultural bias teachers and schools are not very successful, but in the good ones both boys and teachers do take an interest. I was at a place fifty miles north of Poona the other day where there was a great gathering of the boys' parents, who were very interested in what the boys were doing.

3493. Do you think the boys' parents take any interest in school gardens?—Where the teacher is a good man they do.

3494. That is what you want to encourage?—Yes, most certainly.

3495. *Sir Chunilal Mehta :* Do the boys at the agricultural bias schools pay higher fees than other boys?—No.

3496. *Mr. Calvert :* In order to get the rural teachers interested in rural problems, would you advocate that during the vacations they should go to schools of rural economy and be taught about land tenure and agricultural method and so on?—We have never tried anything of that sort. If you had an inspiring teacher it would be very valuable and interesting.

3497. So many teachers are completely ignorant even of the crops grown in their villages?—I know they are. These village teachers have so often been taken from people who do not know the difference between a *juar* plant and *bajri* plant. That is one of our major problems.

3498. About the question of staff, do you think there is sufficient encouragement for your staff to study abroad?—I do not think there is. I think we have been a little too chary in sending men abroad.

3499. Would you advise Government to be a little more generous in their terms to encourage men to study outside India?—I certainly think so. We have generally, as I said before, sent one man abroad each year. I think we might have more, and I think Government might encourage it. We might look upon it as a regular thing to have a regular percentage of our staff on study leave abroad.

3500. Then, there are two statements in the memorandum which I find it difficult to reconcile. It is stated in the memorandum that there is a shortage of capital for agriculture; and at the same time in the memorandum we have been told that the people are in debt. Does not that mean that they have got the available capital but they misuse it? They have got the credit?—The people have had a very large amount of credit, but it has been used to a very considerable extent in directions which were not beneficial.

3501. On what did they spend more, on ceremonies or land improvements?—In the past certainly, on ceremonies.

3502. It is not so much shortage of capital as misdirection of capital?—It has been that in the past, but at the present time most of our agriculturists are involved to the full extent of their credit or nearly so. That is to say, there is shortage of capital because more capital cannot be got. What capital they had credit to get is already absorbed and absorbed in directions which have not been of any agricultural value. In most of the areas the only thing which can increase the amount of capital in those areas is some change which increases the credit of the cultivator.

3503. Credit for productive purposes?—Credit for any purpose. For instance, the advent of co-operation in the Deccan dry tracts increased the credit, and hence increased the indebtedness, and in that case we are sorry it did, because we have not had a corresponding increase in the credit worthiness of the country. On the other hand, in the irrigation tracts the advent of irrigation increased their credit value immensely and in many cases to good account.

3504. I should like to take you now to your special investigations on the economic side for which I myself am very much indebted to you. We have been given some figures in this memorandum* which I have been trying to understand. I gather that you have about 2 million holdings. About the net cropped area I am quite unable to undertsand the facts, because on page 8 it is given as 27 millions, but on page 11 it is given as 22 millions?—One of these is obviously a misprint. The actual net cropped area for 1924-25 in the Presidency was 27 millions.

3505. Now, taking out the figures from page 10, the percentages of holdings work out at 48 per cent. under 5 acres, 40 per cent. under 25 acres, 11 per cent. under 100 and 1 per cent. under 500 and less than 1 per cent. over 500 acres?—That is about it.

3506. Now, distributing the 27 million acres among those holdings, we get 2·4 per cent. of the land held in holdings under 5 acres, 11 per cent. of the land in holdings under 25 acres, 12 per cent. of the land in holdings under 100 acres, 60 per cent. of the land in holdings up to 500 acres and 13·8 per cent. in holdings over 500 acres. That is roughly correct?—Yes, roughly.

3507. I have taken conventional multiples. If that is so, it gives this result. 88 per cent. holdings are of not more than 25 acres; but these comprise only 13·8 per cent. of the cultivated area. The number of holdings is 1,760,000. And you have 12 per cent. of the holdings comprising nearly 86 per cent. of the area presumably let out to tenants. The number of holdings of this class is 240,000?—Yes.

3508. *Dr. Hyder:* We are told these figures do not represent the units of cultivation?—No, I have made that quite clear.

3509. *Mr. Calvert:* I think you have said somewhere that you think the cultivating units are a little higher than the ownership holdings?—In villages that is so. For 140 holdings we have 112 cultivating units.

3510. That is rather unusual. That practically means that your non-owning tenant class is very small?—Very small. I am speaking now of the strictly ryotwari areas such as we have in the Deccan, and I think that is correct. The completely non-owning cultivator is present only in very small numbers.

3511. Therefore the 22 million acres which is owned by 12 per cent. of the owners is presumably all rented out to the petty owners?—I do not say all, but a very large proportion of it is.

3512. You cannot have more than 240,000 landless tenants, otherwise your cultivating units become higher than the others. It is simple arithmetic?—I do not quite follow it.

3513. 12 per cent. of the owners possess 86 per cent. of the area, *i.e.*, 22 million acres. The rest, 5 million acres, is distributed among 88 per cent. of the owners. Do your investigations indicate that cropping varies with the size of the cultivators' holdings?—No. I do not think I can say so. I think the larger holdings (I am speaking of the Deccan, where my investigations have been carried out) are cropped in exactly the same way as the smaller ones.

3514. We can take it the percentages for staple crops apply to these holdings?—I think so.

3515. If we want to visualise what we mean by a Bombay holding, we can take it that with 12½ acres a man would put down 7 to 8 acres of millet, 2 of wheat or rice, and so on?—Generally speaking that would be so.

3516. The 22 million acres owned by the bigger owners as against the 5 million owned by the smaller suggests that tenancy problems present an important question in Bombay?—Yes.

3517. Do your economic investigations suggest that the tenant who does not own the land puts into it less energy than the cultivating owner?—I certainly feel that is the case in certain of the areas I have investigated. I have

---

* Not printed: Memorandum by the Bombay Government for the Commission.

never asked myself that question, but in certain areas it is distinctly the case. In fact men have come to me and said "This land does not belong to us, and we are not going to bother to do more than get our one crop from it."

3518. Your tenant cannot grow sugarcane on land rented for one year?—Certainly not. To grow sugarcane he demands at least a lease of 5, 6, 7 or even 10 years.

3519. He would be chary of heavily manuring land rented for a short term?—Certainly.

3520. Am I right in thinking that you have in Bombay the population divided into these classes: (1) Landless labourer; (2) ownerless tenant; (3) small owner who takes a little extra land as a tenant; (4) owner cultivating his own land; (5) owner cultivating a part of his land and letting the rest out on rent; (6) non-cultivating owner, who is only a rent receiver?—Yes.

3520a. Take the case of the owner who takes a little land on rent. Could you tell us at what stage or acreage he stops taking more land?—I should say the bulk of our peasant owners limit it to what they can cultivate with one pair of bullocks. That is the normal limit of their cultivation.

3521. Your arithmetical average for a pair of bullocks is 18 acres. Do you in this country use male buffaloes or cows?—It is rare. I have never seen male buffaloes in use in the Konkan, because it is a rice district and the buffaloes can work better on wet land. In other places they generally use bullocks.

3522. The small owner can therefore take extra land up to the limit of one yoke?—Yes, and hence a man will cultivate as a rule an area of between 12 and 20 acres. I am leaving out the rice districts and irrigated tracts.

3523. Then, when your owner is giving out land on rent he is giving out only what is beyond his one yoke of oxen?—Yes.

3524. About the non-cultivating owner, or the rent receiver, can you suggest any method by which he can be induced to farm on a larger scale?—I have tried to think out that problem.

3525. Something of the home farm idea?—I am almost hopeless about that.

3526. We have been discussing averages, and in an average there is always a larger number below the average than above?—That is the tendency.

3527. Therefore if you have an average of 18 acres you must have a far larger proportion cultivating less than 18 acres than cultivating more?—Yes.

3528. Does not that mean an enormous loss of bullock power?—Yes. Probably we may take 18 acres but it varies according to districts and the character of the soil.

3529. *Sir Thomas Middleton:* Are you dividing the total number of bullocks into the area?

Mr. Calvert: Allowing for a yoke of bullocks.

3530. *Sir Thomas Middleton:* Do you allow anything for bullocks which are old and past work, and so on?

Mr. Calvert: That makes the figures still higher. That is why I asked about cows and male buffaloes.

3531. *Dr. Hyder:* 18 is not the general average?—It is the figure Mr. Calvert got out.

3532. *Mr. Calvert:* The actual cultivating unit is going to be between 8 and 15 acres?—I said between 12 and 20, but if you include the areas with smaller units like the rice and irrigated districts it will probably be, as you say, between 8 and 15.

3533. *Sir Ganga Ram:* You never use camels?—Only in Sind: not in the Presidency. There may be some areas in Upper Gujarat, but I have never seen it.

3534. *Dr. Hyder:* With regard to the unit of cultivation, does this vary in different parts of the country? In the Eastern Deccan the average size is larger than in other parts?—That is the case.

3535. Am I correct in thinking that the figures you have given are only arithmetical, and that there is great disparity in practice?—Precisely. I am glad you insisted on that, because in these economic studies averages are most misleading.

3536. *Mr. Calvert:* We have been given the group of 5 to 25 acres, but we ought to have been given groups for 5 to 10 and 10 to 15, because 10 to 15 will be the biggest group?—Yes. I am afraid that cannot be helped. These are the figures supplied to me by the Revenue Department and I am dependent on them for these figures. They use this system of grouping.

3537. Your 10 to 15 group is obviously the biggest?—Obviously.

3538. We have no figures at all for cultivating units?—Not at present. I was talking to Mr. Anderson the other day, and he told me the Land Records Department is now attempting to collect statistics as to cultivating units, but it is only in its infancy.

3539. *Mr. Kamat:* Before I come to the activities of your department and your answer to the Questionnaire, I should like to ask you a few general questions bearing on the improvement of agriculture. If the improvement of agriculture is to receive any momentum at all, do you not think the intelligentsia of the country must take much more interest in agriculture than they do at present?—I certainly feel very strongly that they ought to do so. In England we consider that the townsmen are very much divorced from agriculture, but I do not think they are nearly as much divorced as they are in Western India.

3540. The intelligentsia here are divorced from agriculture. Is not that a great factor?—It is a very important factor.

3541. And yet, do you not think that since the Reforms there has been an awakening of interest in agriculture among the representatives of the people?—Perhaps a little. I do not think it has gone very far yet.

3542. *Dr. Hyder:* I do not think the intelligentsia have any land to stand upon to enable them to take an interest in it?—That is true.

3543. *Mr. Kamat:* Have the people's representatives in the legislatures ever turned down any of your constructive proposals?—I do not think they have, though once or twice they very nearly did so.

3544. Did they not take interest in agricultural matters and safeguard the interests of the cultivator by raising questions of grievances in regard to forests and irrigation?—They always have been ready to raise questions like that.

3545. *Dr. Hyder:* They do take an interest: but only from the layman's point of view?—Very often I am afraid they put their finger on the wrong point, because their knowledge of agriculture is extremely limited.

3546. *Mr. Kamat:* It has been suggested in certain quarters that perhaps an "agrarian party" in the Central and Provincial Legislatures would have a very great influence in favour of agricultural reform?—Of course, I ought not to express an opinion on that, but I have been anxious to get an "agrarian party" in the Councils for a long time.

3547. It has been suggested that in the Central Government, the Honourable Member in charge of Agriculture is overburdened with other portfolios, and it would help agriculture if he were relieved of some of them. He has at present to look after Education and Health?—Our Minister of Agriculture has three subjects: Agriculture, Forests and Excise.

3548. You are speaking of the Provincial Minister. I am referring to the Member of the Executive Council in the Government of India?—I am afraid I have not thought very deeply about it.

3549. Then, coming to the question of an effective agency for carrying on the various agricultural reforms which you have been advocating here, and which have been suggested to us at Simla, we have been told by the Agricultural Adviser to the Government of India that it would be desirable to have an All-India organisation. I am not concerned with the details now, but it

is suggested that there should be an All-India organisation to give a sort of fillip to the question of agricultural reform. On the other hand, you have suggested what you have called a Servants of Rural India Society. Now, which would be better in your opinion, an All-India organisation representative of the Chiefs and Sirdars and Provincial Departments of Agriculture and various public citizens, or a rural society as you suggest?—I want both. It does not seem to me that they fill the same field at all. I do want to get a continual stimulus from the Central Government. Exactly in what form that should be I am not quite clear, but however enthusiastic and energetic we are we do want to get a stimulus from the Government of India. At the same time I do not think any central body could do the same work as the society that I suggest. That is absolutely a different thing. Something of that sort is necessary if we are going to get the material which we have already in hand actually into practice.

3550. It has been suggested that the All-India organisation should be a very comprehensive body and that it should have sub-committees for research and other matters and also an executive committee and a secretary. You have also suggested a Central Research Board. Then again we have an organisation like the Central Cotton Committee. I should like to know how these different bodies will work, and whether you would like to amalgamate them as far as their energies are concerned and pool their resources?—I should like to have an Indian Board of Agriculture rather of a different character than hitherto, an Indian Board of Agriculture which would meet once or twice a year, which would have an executive committee and control of considerable funds which it could utilise either itself or by grants to various Provincial Governments for what purpose they deemed advisable. If we were pushing very hard a scheme for rural development through a Servants of Rural India Society, I think they might easily give a grant to the Local Government for development purposes. They might also give grants for research purposes.

3551. But what I want to know is this: If such an All-India organisation comes into existence would you still retain the Central Cotton Committee and the Central Research Board you suggested the other day, or would you abolish these two organisations and have one comprehensive central body. Would there be any purpose left for the other two?—I have not thought out clearly how the Indian Central Cotton Committee will fit in with a scheme of this sort. We had better leave that out of consideration. The Central Cotton Committee is a special board supported by the trade itself on a cess it levies on its own products. It is not subsidised by the Government of India at all, but it acts on an authority given by an Act of the Government of India.

3552. Would you retain these separate bodies for separate crops?—I would let them be Committees of an All-India Central Board or be independent, according to their own wish and according to the extent to which they were prepared to support themselves from the trade itself.

3553. Coming to the Provinces, you have at present an existing organisation in the shape of your Provincial Boards, your Divisional Boards and your Taluka Associations?—Yes.

3554. Would you descend still lower, inasmuch as the Taluka Associations have to take care of the interests of 100 to 200 villages?—I would very much like to go lower. I want to be quite clear. We have adopted at present as the smallest unit the taluka with a group of 100 to 200 villages because that is the smallest unit we can get at present in which we can get effective work and effective control.

3555. If we go below that?—If we go below that our power to carry the thing on gets too limited; but I would much rather have a group of 20 villages than 200 if we could get sufficient local energy and capacity to run it.

3556. With regard to your proposal for a Servants of Rural India Society, have you had any experience of small bodies of this character doing village social service or village reconstruction?—There have not been hitherto societies that have done similar work except where a society like the Servants

of India Society has sent a man like Mr. Thakar to make investigations in the Panch Mahals. But, on the other hand, there has been a good deal of enquiry by other bodies preparatory to such work. The Central Co-operative Institute has made a number of such inquiries with a view to developing something of this sort in various areas.

3557. In Bengal there are co-operative societies, we are told, which have done rural reconstruction work on a co-operative basis. Do you know whether they have proved a success or failure?—I cannot tell because I do not know. But my idea runs on very similar lines. If I was one of these Servants of Rural India I should certainly, in developing a village or group of villages, use the co-operative movement to the absolute limit, and I think that limit is a very large one.

3558. Do you think that the public spirit that will be required for running such societies will be found in all the Provinces including the backward ones?—My knowledge of most of the Provinces is imperfect. I know Bombay and to a certain extent Bengal and Assam. I do not know about the other Provinces.

3559. As the problem to be tackled is a vast one, are we on quite sure ground in assuming that this sort of public spirit you see in Poona and Bombay is universal, and that there is enough of it even in the backward Provinces to make the scheme a success?—I am afraid this is a matter on which I cannot offer any advice.

3560. Coming to your answers, I believe you have emphasised that so far as the problem in Bombay, and particularly in the Deccan, is concerned there are certain special features, one of which is the precariousness of the rainfall. From your investigations of rainfall during the last 60 years, you find that nearly one-third of the area of the Presidency is liable to famine?—That is the figure we arrived at while preparing the last edition of the Statistical Atlas.

3561. In all questions therefore of the welfare of the cultivator, is not the precariousness of rainfall the dominant factor which upsets a good many of our calculations?—Most emphatically it is, and therefore I have put in a special note on this question, because it is the precariousness of the crop, not the amount of it, which really makes agriculture an uneconomic industry in some areas.

3562. From the study which you carried on in the Deccan villages and the observations you have made there I think you told Mr. Calvert that the cultivator is badly off because he spends so much money on certain ceremonies? You have stated that the majority of the cultivators are on the deficit side. Is not this deficit due more to the precariousness of the rainfall than on the money he spends on any ceremony?—This is a very difficult question to decide. It is very difficult to say how much is due to one thing and how much to the other. From the most recent figures that I have given in this note I have shown that the case of a certain village where I carried on investigations after an interval of 10 years, during which two famines took place, the indebtedness was lower than before. That of course is due to transfer of property.

3563. *Mr. Calvert:* A man cannot borrow without credit and a man's credit is not increased by the precariousness of the rainfall and bad harvests?—That seems to be obvious.

3564. *Mr. Kamat:* Where there is a bad year every four years is not then the indebtedness due to the precarious condition of the rainfall rather than to the expenditure on ceremonies? If you admit that this tract is subject to this precariousness of the rainfall more than any other tract in the country, and also there are very few good years in a given decade, does it not stand to reason that the indebtedness is more due to the precariousness of the rainfall than to bad habit?—I do not think it follows. In the village that you are going to visit on Sunday, the indebtedness in the year 1917 was Rs. 29,000. There came a famine in 1918, and at once the indebtedness increased to Rs. 43,000. I went there 10 years later and now I find the indebtedness has come down to Rs. 20,000. What has happened is that they have borrowed up

to the limit of their credit during the famine. They have not been able to maintain themselves under these conditions and they have parted with their lands. The result is that the present indebtedness is rather less after the famine than it was before the famine. This rather controverts the point which you are trying to make.

3565. *Dr. Hyder:* They have changed their status?—Yes.

3566. Since they have parted with their lands, it means that they have come down from being agriculturists to landless labourers? That is to say, we are creating a proletariat on the land?—We tend to have that in famine areas, or at any rate to have a large number of people with insufficient land to maintain themselves completely.

3567. *Mr. Kamat:* Your answer comes to this. Having parted with their lands, owing to indebtedness, they have become landless labourers?—They have become landless labourers or partially so. That is what my new study shows very clearly, namely, the number of actual landholders has not decreased appreciably but the number of people who depend partially on the land and partially on labour has increased.

3568. I should like to know why you consider the specialised vocational schools of the Loni type so indispensable in your system of education? Are they indispensable?—I think they are extremely valuable; nothing is indispensable. I look upon them as a valuable means of propaganda as well as education. If I turn out 150 boys every year, out of these 100 will go back to their land with a knowledge of beter methods than people in the neighbouring villages ever knew before. Each of these boys will be a centre of education in improved methods of agriculture in their respective areas. That is what is actually happening.

3569. At present these schools are very few but you aim at having one such school for each district?—That is the declared policy of the Government.

3570. Even if you establish one such school for each district and turn out 50 boys a year from each, in a population of a million, 50 is a small number for propaganda purposes?—I do not think you can say that. You may as well say that the Agricultural Department is helpless because the number of boys turned out in a year is almost as large as the whole propaganda staff of the Agricultural Department. It seems to me if I can turn out 100 boys every year who will go out as propagandists, I turn out an extraordinarily valuable number. In ten years time I shall have 1,000 centres of propaganda work in the Presidency.

3571. Considering the expenditure you incur on these schools, do you think that such expenditure is commensurate with the value of the propagandist work the boys will do?—We get very good value for the Rs. 520 that we spend on each boy. If we spent Rs. 500 on the salary of a propagandist we should get less value out of it.

3572. We are told that in the Punjab there are no such schools as these, and that they are a luxury and are white elephants to maintain. You consider, however, they have great propaganda value?—I think so. I do not want them to be considered as in any way comparable with the Punjab schools. We have got the Punjab type of schools and value them as much as this type of school but they are for an entirely different purpose.

3573. You have told the Commission something about the marketing system and about the *adtis* and *dalals*. So far as the *dalals* are concerned, do you think they could ever be eliminated from any marketing system?—No. I think you are bound as a rule to have one middleman between the man who is selling and the man who is buying.

3574. Even in England?—Yes.

3575. Is there any system where there is no middleman?—Not that I know of, except on a very small scale. A farmer who brings his grain into the market in my own home town at times goes to the man who grinds it into flour and deals directly with him. But generally he deals with the purchaser through a man who is a broker or an agent who is paid on commission.

3576. It is not a question of eliminating the middleman but of raising his standard of business ethics?—And if possible to make the brokers a body whose profit will go to the growers instead of to an individual. You can make the co-operative societies take the place of middleman, for instance.

3577. You said something about the *adti* system here. Are you aware that in the *gul* market in Poona these *adtis* are a great help to the cultivators?—I think if they were no help they would not exist. They are a decided help; they enable you to put the sale of your goods in the hands of a man who is an expert in selling.

3578. And who helps the cultivator with advances of money and in other ways?—Yes.

3579. There again the question is to raise the business standard of the *adtis* rather than eliminate them?—There is no need for two middlemen. We might have a body which might act as both, as in the case of co-operative societies. I think the co-operative societies might give all the advice which is required by the seller and at the same time be a *dalal* who is paid commission by the buyer.

3580. *Mr. Calvert:* You mentioned that these people made advances of money. Do they charge interest on it?—Yes, of course.

3581. *Mr. Kamat:* With regard to subsidiary occupations, do you agree that, especially in a tract which is so precarious as you say this is, subsidiary occupations must be encouraged much more than they are being at present by your department?—Yes.

3582. Has the Government considered appointing a Superintendent of Subsidiary Occupations and propagating a knowledge of these things?—No, and I doubt whether that would be the right way of approaching the question.

3583. What in your opinion is the right method? Would you simply make out a list of possible occupations, without demonstrating to the cultivator what is a business proposition and what is not in his particular area?—I think probably some organisation which would work in connection with our local development authorities would be the best way, but I have not worked it out thoroughly.

3584. What I am driving at is this. At present this question of subsidiary occupations is no man's business?—I agree.

3585. The department considers it as no man's business?—Our department and the Co-operative Department are both deeply interested in it, but it is no special department's business and probably ought not to be.

3586. If some agency specifically to look after this is to be appointed it should work under your department?—It should work under both the Agricultural and the Co-operative Departments.

3587. You told Mr. Calvert that you were more in favour of promoting secondary occupations than cottage industries?—Yes.

3588. You would not rule out cottage industries which were dependent on agricultural produce, would you?—Not in the least.

3589. You know that in Ratnagiri mango pulp industry is carried on. Are you in favour of Government subsidising that industry?—Certainly, but that would not be a cottage industry; that would be a capitalist industry which would utilise cultivators as labourers.

3590. Even for that would you advocate that Government should subsidise that industry in the initial stages?—In order to introduce it, yes. It will have to stand on its own legs after a limited period.

3591. I should like to ask you one general question. You have advocated research, agricultural education, co-operation, measures against fragmentation of holdings, rural reconstruction and so on for the prosperity of the cultivators. What is the relative importance of these? Which do you consider as the most important on which you should concentrate your labours?—I do not think you can separate these and concentrate your attention either on some or others. You will have to look at the rural problem as a whole.

In certain parts the co-operative movement has served as a means of starting a real rural development. That has been the case in Sind, where the emphasis on co-operative credit societies has given a fillip to the whole rural movement. In other parts the co-operative movement has not done so. In certain parts of the Eastern Deccan it has perhaps hindered such a movement. You have to treat each tract on its own merits and keep the whole problem before your eyes. My idea is not simply the technical improvement of agriculture but the development of the country side.

3592. Are you in favour of carrying on these economic surveys such as you have done in different parts of the Presidency?—I should very much like it to be done, but I am doubtful whether it can be done by Government agency.

3593. The Economic Enquiry Committee has recommended such surveys and detailed enquiries, probably by a Government agency; that is, through village *patels*, *patwaris* and other officers?—I think it would be of very little value if it were done in that way. What I should like to have would be a definite non-official board of inquiry like the one they have in the Punjab. Such a body could do the work, but if your try to put it in the hands of the Collector and other officials down to the *patwaris* I think it would be a failure.

3594. Therefore if these surveys are to be made they should be made by a non-official agency?—I do not think I could have done my investigations if I had been there simply under orders of Government.

3595. I want to ask one or two questions with reference to the economic progress of rural areas which you have mentioned in the note you have placed in our hands. Some of the statements in it are extremely interesting. With reference to irrigation schemes, for instance, you state that although Government are carrying on large schemes the total area irrigated has not increased?—That is what was really the case in 1921-22. The total area under irrigation in 1921-22 was not materially greater than in 1911.

3596. What steps are being taken by Government or your department to deal with the question of dry farming in particular?—I have explained this in my note on precarious tracts. The question of dry farming is of supreme importance in the tracts which have precarious rainfall.

3597. I want to know the staff engaged to deal with this problem of dry farming in the precarious tracts?—There are two methods. One is to improve the land, so that the rain shall be better utilised than at present. One side of the question is engineering and the other agricultural. So far as engineering is concerned Government gave me a land development officer 4 years ago, who was an engineer, and two or three men who were simply preparing plans for bunding. After they worked for two years the general result was so satisfactory and the problem came to the front so much more prominently that Government then enlarged the scheme and took out of my hands and made it a special department under a Special Superintending Engineer. That is as far as the engineering side of it is concerned. On the agricultural side they have given me a Soil Physicist who has been for the last 5 years investigating the possibilities of retaining water in the soil, after the land is levelled and bunded. His results have been remarkably successful. Previously methods of increasing the crop by modifying the methods of cultivation of the soil have not been markedly successful in the Deccan, but now we have a prospect of increasing the crop by 33 per cent.

3598. So the problem in Bombay is not spending lakhs on irrigation only, but on other forms of land engineering?—I think so. I think both come in, but there are far more immediate possibilities in the methods of land improvement and extension of dry farming than in big irrigation schemes.

3599. *Sir Gagna Ram:* Does not dry farming require a special kind of seed?—There are certain seeds which do better under the dry farming system, but so far we have used the ordinary seed of the agriculturist and get 33 per cent. increased yield. The Americans have got a farm in which they try to develop seeds to suit dry farming, and we have that in view also. If we can do that we may get still better results.

3600. *Mr. Kamat:* Can you make a rough guess at how much you have added to the wealth of the Presidency by improved methods of cultivation and improved varieties of cotton, ground-nuts, rice, etc., during the last 5 or 10 years?—Only very roughly. In 1921-22 the total value of direct agricultural production in the Bombay Presidency was about 176 crores for the year. Our improvements up to the present have brought in an additional 2 to 3 crores, which means an increase of 1½ to 2 per cent. That, however, is the merest guess.

3601. Roughly, about 3 crores have been added owing to improvements introduced by your department?—Yes.

3602. *Sir Ganga Ram:* May not some of the improvements be ascribed to the higher world price of cotton?—I do not think that will make very much difference. It is the difference between the price of the old low grade cotton and the price of our improved cotton, which does not depend on the absolute value of the cotton itself.

3603. *Mr. Kamat:* You have said the production per acre in this Presidency has not materially gone up either in quantity or perhaps in money value?—Simply because I do not count 1½ per cent. as being a very material increase. It may be 1½ to 2 per cent. at present.

3604. From your studies, or from the statistics which you have collected in this book, you think that the purchasing power of the cultivator has gone up only by about 3·9 per cent.?—Something like that, and that varies very much with the area. In some, it has gone up materially, in others it has gone up to a very small extent.

3605. That is to say, in 10 years, he has advanced only by 4 per cent. in his prosperity?—About that, taking the Presidency as a whole.

3606. Does that include the prosperity which you have brought about by your improvements in method and supply of better seed, or is it by a natural process of better prices?—This includes, as far as I can make it out, the total increase in the purchasing power. Of course, as I said to Dr. Hyder, these figures are based on three or four assumptions which I think want a good deal of checking before they can be taken as valid. I do not insist on them to any great extent.

3607. You have stated in one of these memoranda in some place that the tendency to grow commercial crops is slightly on the increase?—Yes. You will find it on page 11 of the printed memorandum.*

3608. Whereas, in this report which you have compiled, I think you have said in some place that the tendency to grow food crops is stationary, and there has not been a material change so far, at least till the year 1922?—Up to 1921-22 I found no material change. There has been a distinct increase in the marketable crops since that time.

3609. So that the change in favour of cotton or ground-nut is of recent origin?—I think it is chiefly of recent origin.

3610. It has only taken place in the last three or four years?—If you take these figures on page 11, there is a slight increase even by 1919-20. But it is, I think, a change which is going on increasingly rapidly. I feel that the figures which I gave in the booklet were probably not as accurate as those which I have given in this memorandum.

3611. Do you think, in coming years, this tendency for growing cotton and ground-nuts will be prejudicial to the growth of foodstuffs?—I think we are a long way off from that stage yet. I think that foodstuffs are certainly grown to the full extent that it is necessary in order to supply the needs of the people.

3612. For the present, there is no fear that cotton, or ground-nut, or other commercial crops are encroaching too much on the necessary area for foodstuffs?—There is no such fear at present.

---

* Not printed: Memorandum by the Bombay Government for the Commission.

3613. Speaking about research, you have advocated a research fund in the Bombay Presidency. Then again, there are proposals before us that there should be a central fund for all the Provinces. Do you think the Provinces can raise these big research funds?—I do not know whether it will be a very big fund. It must be as big as each can afford. The only point that I make here is that it should be a definite, permanent charge on the revenues, to secure continuity of work, just as there is a Development Fund in England, which is in the hands of Commissioners, and which is practically independent of the annual budget.

3614. With reference to veterinary work in the Bombay Presidency, do you not think the Institute at Muktesar is too far off to be of any benefit to the Province?—I would not like to say that. I am going shortly to speak, *in camera*, about Pusa. I think Pusa has been very useful, though it has been a long way off, and I think Muktesar has also been useful, though it is long way off. I think that the work done at Muktesar and Pusa is essential. But in addition to that, we do want a research institute nearer home.

3615. You think it possible to have a research institute in the Bombay Presidency, attached to the Veterinary College?—I do not see why not.

3616. We were told that Muktesar manufactured sera, and that it is being done on such a big scale now that it brings in a large revenue, and the Institute is self-supporting. If you also manufacture sera here in the Bombay Presidency, will it not help you to make the whole scheme as much self-supporting as possible? Can you manufacture it?—There is not bound to be any difficulty, I take it, in our manufacture of serum.

3617. It would be possible in the Province?—Yes.

3618. In a laboratory attached to the Veterinary College?—That is the best place possibly; whether it is possible in Bombay or not I cannot say. There should be no difficulty in the manufacture, which should be carried on wherever the most suitable place may be.

3619. You would like to have a veterinary research institute and manufacture all the serum within the Province?—I was not thinking of the manufacture of serum. That is a detail. I would certainly like to have a veterinary research institute in the Province.

3620. *Dewan Bahadur Malji:* As Director of Agriculture your research station is in Poona. Do you not find the area is too large for your attention, the whole of the Presidency?—I certainly do find it so, as it is organised at present. I find it more than I can really cope with.

3621. The conditions also are very varying?—I do not mind the varying conditions. It increases my efficiency to have to deal with a number of varying conditions, I think.

3622. It is not possible to give that much attention to the varying needs, at any rate?—I do not agree with you there. I think, if you give me efficient local officers, there is a certain amount of benefit from general single direction throughout the whole Province.

3623. The next thing to which I invite your attention is the various needs of the different districts in the area. Would you say that the staff under you is by any means sufficient, regard being had to the needs of the various districts?—No. I have always said, whether you look at the work as a matter of research or propaganda or education, I could do with a very large increase of staff.

3624. Is not one Overseer per district the ordinary rule?—There are now two for each district.

3625. Do you expect that one Overseer can look after the needs of even one taluka satisfactorily?—I have already said that our local staff is very much smaller than it ought to be.

3626. Do you not think that the country-side is then almost in a neglected condition?—No, I cannot say that. We are trying to work on other lines, and our extension of Taluka Development Associations is very largely intended to replace direct Government agency.

3627. With regard to the Taluka Associations, when they were started was it not intended that they should be registered under the Co-operative Societies Act?—No. The matter was never mentioned at the time. That matter came up afterwards.

3628. We are more or less concerned with the co-operative as well as the development side?—I do not mind what you call the agency in a taluka to develop that taluka. But what I do want is an agency which is neither co-operative nor agricultural, but which has definitely for its purpose the development of that taluka. I would prefer that that organisation, whatever you call it, be registered under the Co-operative Societies Act. But I want one body and not two, and I do not care in the least what you call it, provided its definite purpose is not supervision but development.

3629. You do not mind if along with development, there is supervision?—No. I look upon that as part of the development.

3630. Some of these Taluka Development Associations have not yet been registered under any Act?—Yes; I think that is quite at their own option. It seems to me, if only I could get a body of men, my big difficulty is to get the men, who will work for the development of the area, I am ready to accept them on their own conditions.

3631. The existence of these bodies as corporate bodies would be more or less doubtful in that case, without registration?—As a matter of fact, Government's interest is only in regard to one year. They give an annual subsidy. If the society disappeared at the end of the year, Government have only paid one year's subscription.

3632. Has your attention been drawn to section 4 of the Indian Companies Act, wherein any body of persons, more than 20 in number, would have to be a corporate body, who could either sue or be sued?—I hope these will never sue and be sued.

3633. All the same, if there are misappropriations, the matter is one which may require your notice?—That is a minor matter.

3634. Would you not insist that such institutions should be registered under any of the Acts?—I am so anxious to get the work done that I would take any body, registered or not, as long as it will do the work.

3635. As a matter of fact, I understand some of these institutions were suspended on the sole ground that they were not registered? The annual grant of Rs. 1,000 or so was suspended for some time, because the institutions declined to register?—That has all been altered since.

3636. With regard to these Development Associations, your idea is to develop the business side of agriculture in the taluka area, side by side with the technical?—I want to develop everything in that area. It is not one side or the other side. Each taluka will be different.

3637. With the help of how many people?—All the people I can get.

3638. At present, admission is not restricted to members of co-operative societies?—No.

3639. Any man can come in, provided he pays the usual fees?—Certainly.

3640. With that qualification how is the concentration to take place? Will you put down some lines of action?—The programme of every Taluka Development Association must be approved by the Divisional Board. If the Divisional Board did not want to approve of it, they would go down and discuss the matter, find out a programme which suits that taluka, and which has the approval of the Divisional Board.

3641. I agree that these Development Associations will lead to much better results in future, provided they are looked after; but if you leave everything to non-official agency, do you think they will prospor?—I do not leave everything to non-official agency.

3642. Do you wish they should have some driving force from the Agricultural Department?—I have mentioned to the Chairman that there were three outside stimuli upon which to a certain extent I rely; the first one is

the District Agricultural Overseer of the Agricultural Department; the second one the local Co-operative Officer, and the third is the Divisional Board. I want all these stimuli at present, but I am hoping and looking forward to the time when there will be much more internal stimulus than you will ever get from outside. Then I shall feel that we have really got somewhere.

3643. There are potentialities for import and export business later on in these Taluka Associations. Do you foresee that when you look to the question of marketing?—Of course I foresee that; that is part of development.

3644. Then their activities would extend far beyond the regions within the control of these associations?—Perfectly so.

3645. I would question you with regard to the educational side of agriculture. So far as agricultural education is concerned, is there anything worth the name in Gujarat? Just as you have a school at Loni, have you got a counterpart of it in Gujarat?—There are schools at Godhra and Surat.

3646. Do they at all bear comparison with Loni?—The Godhra school has done very good work, but not so important as Loni.

3647. With the one school at Godhra, such as it is, do you find the results are successful?—Any way, it has been commended on every hand. The boys go back to their own land. The local Collector is very well pleased with it. As far as the boys are concerned, they certainly do what we expect them to do.

3648. Do you not think that many more such schools are necessary?—I do.

3649. In the village elementary and primary schools, has not the present trend of education brought about only writers? In the case of schools without an agricultural bias, is not that true?—I would rather not commit myself to a statement like that.

3650. Do you think, without any large increase of these bias schools, we can do anything much better?—That implies criticism of the present system of education which I do not like to go into. The present system has done good work. Many of our graduates are products of the present system of education, although it may be improved. The agricultural bias schools are moving in that direction.

3651. As regards the curriculum of the bias schools, do you find that the curriculum is the same everywhere?—The curriculum of the bias schools was developed by the Director of Public Instruction and myself working together, and it is supposed to be similar in all parts of the Presidency.

3652. So far as the crop experiments on Government farms are concerned, do you think people would be very much more induced to look to the various changes and benefits, provided they are allowed to look into the accounts side of the business? What I mean is, do not people wish to be convinced that agriculture, such as is carried on, is from a business point of view a profitable concern?—We tried to do that by demonstrating the improvements on their own land.

3653. But, are accounts given as to the expenditure incurred and the proceeds realised?—In every case, we give an account of the special expenditure as a result of that improvement and the special return which has arisen from it. That is all that we need.

3654. With reference to propaganda work, do you not think it worth our while to carry on such propaganda in rotation for each taluka?—I again do not quite understand what you are driving at.

3655. What I am driving at is to point out that in each taluka, if the propagandist work is proved to be convincing for accepting new and improved methods of agriculture, people are not apathetic in taking up improved methods, provided they are satisfied that there is more benefit to be earned thereby. Have you found their attitude in any way defiant?—No. I think I have put down as clearly as I could and repeatedly that I do not find the people object. I do not find the people conservative.

3656. Then, why are they not taking to the improved methods at once?—But they are. I think, as soon as we can convince the people that what we have got is a good thing, the people are extraordinarily ready to take it up.

3657. That is exactly what I say. As to crop experiments, formerly the District Officers, the Sub-Divisional Officers used to conduct them for the villages. That has been discontinued, has it not been?—All the local officers did in the way of crop experiments was to do crop measuring experiments, in order to determine the yield per acre. They have never done any other experiments.

3658. Has that been discontinued?—That has not been discontinued, but it has been placed in the hands of my department.

3659. Does your department do it every year in each district?—Not in each district every year, but it does a certain number of such experiments each year.

3660. In some parts of the agricultural districts in Gujerat, I particularly refer to Pardi in Surat district, what is the position? Is the country in any way advanced, or is it going back?—It is one of the tracts which, in the last 25 years, has been declining.

3661. And the same is the case with reference to the Matar taluka in the Kaira district?—In Matar taluka there has been a similar decline, which is noted in the Census Report.

3662. Have any steps been taken to find out the causes?—I think, Dewan Bahadur, you are a responsible member of the Co-operative Institute, which has recently made an investigation in the Pardi taluka.

3663. Do you not think that there is much to be done by the Agricultural Department, provided sufficient assistance is rendered to them?—A very great deal.

3664. The country which was once garden land is now grassland more or less?—But that is very largely the ordinary result of the existence of Bombay. Bombay wanted grass; this was an area where water was a difficulty and where a large amount of grass would grow. Most of the land was held by large landowners who did not want to cultivate themselves; it paid them better to get the grass from it and export it to Bombay than to let it out to cultivators.

3665. Your attention has not been directed to the indebtedness in Pardi?—I have not looked at it.

3666. Most of the lands, as you have found in the Deccan, are transferred to the *sowcars*. Is that not so?—Yes.

3667. As regards agricultural labour, may I know whether if the labour is not organised, the results would be very dangerous in some of the parts where the cultivation is not actually carried on by landholders themselves?—I do not quite follow you.

3668. You have told us that in various places, there are some who are landless cultivators, there are others who own land, and there are others who partly own land and partly labour on the land. Now, where there are landholders who do not cultivate themselves, they rely practically upon the labour to be had in the villages. There is great discontent between them and the labouring classes. Have you found out any means of reconciling them?—No, I have not. I am afraid that in most of these cases the interest of the landlords when they are non-resident rent-receivers is so absolutely opposite to that of the people who are the actual cultivators, that it is very difficult, if not impossible, to reconcile them.

3669. Some day, as in the case of the organisation of industrial labour, agricultural labour organisation will, from your point of view, be necessary?—I think it is certain to come.

3670. With reference to general education, do you not find that there are some lessons necessary which may lead to agricultural pursuits later on?—Yes, and at the present time I may tell you that the Director of Public

Instruction and I have taken in hand the ordinary 4th class reader with the idea of adapting it much more to rural conditions than at present.

3671. The second thing to which I request your attention is with regard to the indebtedness of the agriculturists. Do you not find that they are taking very much less advantage of the insolvency laws? Do you know that the agriculturists, as a rule, do not go to the Insolvency Court?—No, they do not.

3672. And, in that way, the indebtedness always remains?—Yes. In other words our cultivators are extraordinarily honest; that is another way of putting the same thing.

3673. Even if they cannot pay, they still go on?—Yes.

3674. In reference to the distribution of seeds, do you keep large stocks of seeds other than cotton?—Only when we have got definitely improved seeds, then we do keep as large stocks as we possibly can. For instance, we keep large stocks of rice seed in the North Konkan; we keep large stocks of cotton in practically all our areas; we are now keeping large stocks of wheat in Sind, and we have, at one time or another, kept large stocks of wheat in the Panch Mahals.

3675. Is the Sind wheat suitable to Gujarat?—No.

3676. This year you know perhaps there is a great demand for seed in Gujarat?—Yes.

3677. And most of the lands which were to be sown with other crops will now require to be sown with wheat seed, and no wheat seed can be made available by the Government?—No, because we have not got enough stocks.

3678. *Dr. Hyder:* Why is there a demand for it this year?—There is a certain demand, as a result of the character of the monsoon.

3679. *Dewar Bahadur Malji:* Can you make arrangements to supply requisitions for seed to agriculturists under the responsibility of the District Central Banks?—If the District Central Banks approach us, we can obtain for them large stocks of such seed and the seed most suited to that particular area.

3680. Do you not think that would be a satisfactory arrangement?—Yes, absolutely.

3681. As regards sale societies, in Dharwar have the people now commenced to run the show themselves?—Cotton sale societies. Take the ones at Hubli and Gadag. They are absolutely self-controlled bodies.

3682. Is attention so often necessary from the department now?—No, I do not think so. We have our definite, defined functions in connection with those societies which we do. Beyond that we do not interfere.

3683. In the matter of wholesale sales societies, do you not think a Government subsidy in the form of giving them competent men for the purpose of grading is very essential?—Government are doing the grading, and I think it is better and commands much more public confidence if Government continue to do the grading rather than that Government should subsidise a society to do its grading. I feel that grading is a thing which should be done, if possible, by an independent body.

3684. Have you any idea of helping Development Associations in that direction? When they go to sell the produce of their taluka through their agency, would not some such help be necessary?—Where the quantity of a particular material is large enough to justify grading, then I am prepared to put the matter up to Government in order to establish a definite grading by stem.

3685. You know the conditions of Gujarat. In the Panch Mahals, the Bhils generally look upon their cattle as their wealth?—Yes.

3686. They invest in cattle as soon as they have got any money and they commence to sell the cattle as soon as they are short of funds?—Yes.

3687. With that sort of thing, and with no other property, do you not think cattle insurance should be resorted to by such Provinces?—I think cattle insurance is a thing which ought to exist in all countries and in this

country as well as others, but until we get rinderpest and other diseases checked so that the premium is reduced to a reasonable amount cattle insurance cannot be done.

3688. I can understand it may result in losses. At the same time, should not the losses be made up partly by Government in the initial stages of this matter?—I do not believe in Government coming in in things like that. I think Government could do much better in checking the disease which now raises the premium to impossible limits.

3689. Then practically agriculture in that part of the country is not quite an assured business, because you cannot rely upon any property in the first place, and secondly they practically sell off the animals just like uttering currency notes, so that there is no guarantee of the money being repaid?—Yes.

3690. The experiment that is carried on at present by the Provincial Bank rests merely on the *morale* of the society there. How far can that be depended upon?—I do not follow.

3691. The people of this Bhil tract move to any other village, in case they find themselves heavily involved or oppressed by *sowcars* or societies, because between the societies and the *sowcars* there is a great deal of trouble. The society cannot take up the whole business themselves, and they cannot give up the *sowcars*. Then there is a tussle. If the people go out to the Indian States, and there is no insurance, there will be no securities that we can expect from this type of people. Do you not think some insurance should be devised?—I do not think you can insure any product which requires a premium of 10 per cent., and that is the position in the case of cattle at present.

3692. What is the total Government agricultural revenue of the Bombay Presidency?—That I cannot tell you.

3693. How much per cent. is spent upon agricultural experiments?—That I cannot tell you.

3694. You have seen the houses in the rural areas?—Yes.

3695. Are they sufficiently spacious for the requirements of agriculturists?—I think the housing is bad, but I do not think rural housing is a thing which I should concentrate on as the thing which is the worst.

3696. Do you think the time has arrived when Government should consider the propriety of extending the building sites area?—You mean whether the *gauthan* should be increased in the villages?

3697. Yes?—My experience is that the *gauthan* is generally sufficient.

3698. The *gauthan* and the cultivator live in the same place?—Yes.

3699. Is that not quite incompatible with sanitation?—You mean when the cow lives in the same house as the cultivator?

3700. They keep all their animals there?—It is the system, and I do not think there is necessarily anything insanitary about it.

3701. Would you advocate, with reference to those Development Associations, that some of the sales of their commodities should be exempt from payment of local taxation?—I am all against this sort of thing. It seems to me that when you try to run a movement by means of exemption from taxes you are on a rotten basis.

3702. Then, how will they meet the local competition?—If they cannot meet local competition on a commercial basis they have got to go down.

3703. Do they not do it in other countries?—I do not know what they do in other countries, but I think it will be an entirely wrong policy to base the co-operative movement in India on exemption from local taxation.

3704. *Sir Thomas Middleton :* In describing the ideal organisation of research that you would wish to see, you advocated a Central Board with funds which it should allot to different Provinces?—That is my ideal.

3705. And you strongly deprecated the idea of sending in any programme. Now, on what principle should the central body allot funds if they see no programme?—I think the amount that should be allotted, say, to the

Bombay Government would be settled in consultation with them. The Local Government would write to that Board and say "We can profitably spend 10 lakhs of rupees on research work, will you make us this grant?"

3706. And presumably every other Province in India would do the same thing?—Yes.

3707. How is the body who is responsible for allotting the funds to decide? Their fund presumably will be limited?—The difficulty would come in the first instance, but the difficulty would not last long, because they would get annual reports, and when the reports come in they will be able to know which Presidency deserves the most.

3708. Do you not think it is a particularly valuable exercise for an agricultural officer to be required to frame a programme?—I do, and in fact he *must* frame a programme.

3709. Then why should he not submit it to the Central Board?—I may be an inveterate decentraliser, but we in the Provinces feel that we are the best judges as to the way of spending money in the Province. I feel what might happen, and has happened, is the central body sitting at the other end of India would have two schemes before it. We know which is the more important for us, but they looking at it from another point of view would ask us to spend money on the scheme which is not the more important for us.

3710. Two schemes from one authority or from different authorities?—No. Supposing there are two problems in connection with rice. We know which is the more important to us. But if it was left to the central authority funds would probably be allotted to the other one because it happens to be the most important to Bengal. That sort of thing has happened. I am not speaking from imagination.

3711. Presumably the authority that has made that allocation to Bengal has good reasons for doing so?—To Bengal, and not to Bombay. Probably that might be the most important thing for Bengal.

3712. I see your point. With reference to training, you indicated that you preferred a system of apprenticeship after passing through the three years' course in college to a system of post-graduate studies?—I do very much, and I have a lot of experience of both.

3713. Have you not got two classes to think of? You have specialists like the Plant Physiologist you have referred to, and you have also got men who are employed in the general agricultural work of the Province? Do you think that the case of a specialist could be sufficiently met by the three years' general course of study that makes up the agricultural degree?—I do not. What I have in mind is this. Take the breeding of cotton. I have some extraordinarily efficient Cotton Breeders. I take a man from the college who has done very well in connection with botanical work, and I place him under one of my expert Cotton Breeders for a period of three or four years. Then, if he is well reported on at the end of three or five years as being a man who is developing the necessary capacity, I send him abroad for one or two years for special training under a man of the first water.

3714. The general view is that that kind of training in technique ought to be gained, while the worker is young?—The trouble is that if you do, you waste such a lot of money. I cannot pick out a man who is going to be a good Cotton Breeder. Out of every six men selected from the college for that work only one is successful. I would like to try him for four or five years under the experts of my own department before I spent a lot of money in sending him abroad.

3715. I do not object to your testing him as a Cotton Breeder. What I suggest is that before he takes up that specialised work he ought to have some more training in science than is provided by a three years' course. You have got six subjects in that course, which makes it heavy task for an ordinary student?—I agree. The men who come straight from the University, even if they happen to be the best, are of very little use to me for years. Their outlook is wrong and it has got to be corrected.

3716. Whether they are of much use largely depends upon the particular job they are intended for?—No, because one of the big difficulties I have is to get the men to have an agricultural outlook. A man comes to me from the college with a botanical outlook; botany is his principal subject. He looks at it as a botanical problem and not as an agricultural problem, and until he comes to have an agricultural outlook he is not of much use to me.

3717. Under such a course of study as you prescribe the student will not have learned more than the elements of physiology?—Exactly, and therefore I apprentice him to my best man. I have a good Plant Physiologist doing high plant physiology at Surat.

3718. You talked of the Loni students finding employment as substantial village *patels*. Do you mean as headman of the cultivators?—It is not a question of not finding employment as substantial village *patels*. I said that the students were the sons of substantial village *patels* and that they went back after training to cultivate their own land.

3719. I thought you said that they were finding employment as *patels*?—No.

3720. You said that copper sulphate has come to be very extensively used for dressing *jowar* for smut. Have you in fact heard any complaints about it?—There has been no serious complaint about it. They are now using it on over half a million acres.

3721. It is an agent that one ought to use with considerable care. I wanted to know whether you had received any complaints about its effects in retarding germination?—No, I have not.

3722. *Sir Ganga Ram:* What use do you make of the immense amount of molasses which is produced in this country?—As a matter of fact the amount of molasses we have is small because we are making *gul* and not sugar. There is no sugar manufacture in the Bombay Presidency except in one factory.

3723. Do you not get some percentage of molasses?—Practically none. There are some refuse drippings from *gul* but the amount is very small and that is used as fodder.

3724. In what shape?—The animals on the farm come and eat it.

3725. Do you know of *molassine* in England?—Yes, very well.

3726. It used to be made of wood pulp and molasses?—It is made of various things.

3727. An engineer was exhibiting a machine for making cattle food from molasses at the Cambridge Agricultural Show in 1922?—I saw it.

3728. Have you done anything towards popularising that?—We have already done that. I have already issued a leaflet recommending them to mix other things with the molasses.

3729. You want machinery for that. If you do it with machinery you can keep it for years?—I do not know whether it will be worth while.

3730. It will be very useful in the famine periods?—But every bit of stuff is used up immediately. We have one big sugar factory here where they do make molasses and they tell me that the whole of their molasses is bought up for the manufacture of alcohol at Nasik.

3731. Have you any substitute for clover in this Province?—Yes.

3732. In the Punjab we have one substitute which has been highly commended by the Agricultural Department; it is called *senji*?—We have tried it, but it will not work here.

3733. Why?—I do not know why; we have tried it.

3734. It works well in the Punjab?—Our soil is entirely different and our climate is different.

3735. It is a leguminous crop and replaces the lost chemicals of the soil. It is good fodder and is given all over Punjab for milch cows?—I know that, and I am trying it in Sind. In the Presidency it has hitherto been a failure.

3736. Then, you have not got proper seed. Have you tried Canadian fencing for keeping out wild pigs?—We have tried various forms of fencing.

3737. The Canadian type is very cheap; it costs Rs. 1,500 a mile?—Ours costs about Rs. 1,700. There is not much difference. If you will give me an advertisement of it, I will try it.

3738. Could you give me, without infringing upon your secrecy, your five years' programme of research?—I am sending the Secretary a three years' programme which was put forward in 1924.

3739. Could you give me a copy of it?—I will send it to the Secretary.

3740. Because I think that with all your research enthusiasm I should say you must be overlapping things which are already known in other parts of the world. With reference to communications, in this Province are your irrigation channels and drainage channels properly bridged? In the Punjab there is great necessity of having bridges all over the Province wherever there is a drainage crossing. The necessity is felt more for such bridges than for metalled roads, because our carts can easily go on unmetalled roads?—I think you had better ask it of our irrigation officers.

3741. I want to know from you whether all village communications are bridged?—Not in many cases. There is no need for them, because they are only blocked a few days in the year; most of the time they are dry.

3742. We are attempting in the Punjab to bridge all our metalled and unmetalled roads so that a motor car can go anywhere?—We are a long way off that.

3743. When I was passing through Karachi I found a lot of trade in boiled rice. Does boiling make for preservation?—The rice is boiled simply in order to make it easy to remove the husk.

3744. Does it keep out some germs which spoil the rice?—I think it does tend to prevent damage by insects.

3745. Is it not tried here?—It is done in Sind. It is done with certain rices in the Konkan, but most of our rices would be spoiled by boiling and people will not boil it.

3746. Have you introduced indigenous proverbs in connection with the Agricultural Show?—I have collected a good many. I have got them both in English and the local language.

3747. What kind of tobacco do you grow?—We have laid ourselves out to grow tobacco for the local market.

3748. Have you any special kind of tobacco to mix with the other varieties? Our Gujarat tobacco has already a very good market of its own. It is a very good tobacco as it is.

3749. In the Punjab we have *hajra*, which if mixed with other kinds makes them very palatable?—I will talk to the people in Gujarat about it.

3750. I will get you some seed?—Thank you very much. We should be very pleased to grow it.

3751. What are the wages of agricultural labour here?—They vary from about 6 annas to about 14 annas per day now.

3752. So much as that? Where do they get 14 annas?—In the sugarcane tract.

3753. For unskilled labour?—Yes, for ordinary agricultural labour.

3754. Can you tell us what percentage of the total area is left uncultivated because the holdings are too small and uneconomic to cultivate?—I am afraid I cannot give you such figures.

3755. Will you make a note of it?—I will make a note, but I think such figures will be impossible to get.

3756. Not even approximately?—I will try and get some figures for you.

3757. *Sir Henry Lawrence:* You told us that landholders are exempt from taxation on any improvements they introduce in their land. Does that encourage the application of capital to land?—I think it does.

3758. Is there any considerable amount of capital being employed in the improvement of land?—I think there is a very considerable amount now.

You will find in almost every village some people building embankments, some digging wells, some doing other things.

3759. We are told that District Boards have allowed their roads to deteriorate?—I think that is the case.

3760. What particular areas have you in view?—The matter has arisen so frequently that it may be taken as a fairly general statement.

3761. Have the roads been transferred to the District Boards within the last few years on a large scale?—So I understand.

3762. And it is urged in their defence by certain District Boards that they are transferring the expenditure from the maintenance of the larger roads to the improvement of village roads. Do you think it is correct?—That is very likely. I cannot say one way or the other definitely, but I think it is very likely.

3763. It is a matter within the discretion of the District Boards whether they will improve village roads or spend the money on the maintenance of larger roads. You would not dispute their discretion in the matter?—I certainly would not.

3764. Have you issued any manual on cattle-breeding to indicate to cattle owners the proper principles for the improvement of their cattle?—I have a bulletin of that kind which has just been drawn up by Mr. Bruen in my office. We have not issued one, but it is ready for issue.

3765. Will you let us have a copy of it?—I will.

3766. I think you said that nothing has been done for improving the subsidiary industries?—Yes.

3767. Are you acquainted with the work done for handlooms?—Yes, I am. So far as weaving for weavers is concerned, they have several peripatetic schools and one for weaving for farmers.

3768. That is not under your control, but under a separate officer?—Yes, I only inspect it and report.

3769. Under what officer is it?—Under the Director of Industries.

3770. *The Raja of Parlakimedi:* Do you mean to approach the railway authorities for better facilities for cattle when they are transported?—I certainly will be pleased to do it.

3771. Will you do it?—I will do it.

3772. For a place which gets about 15 inches of rain and has got light black cotton soil which is the best variety of cotton seed suitable?—It altogether depends on how the rains come in the course of the season. We have such land in Gujarat where we grow 1,027 Broach cotton. We have similar land in the Southern Division here where we grow Upland American cotton. It will depend on the temperature and how the rains come through the season. If you give these particulars I will be able to let you know which is the most suitable variety.

3773. In answer to Mr. Kamat's question you said that a good percentage of your boys go back to their land?—Yes.

3774. Do the landowners' boys go back to agriculture?—Yes. A very large proportion of our students, both in schools and colleges, are actually landowners and many of those go back to the land, but not many landlords.

3775. When you speak of landowners you mean people who possess land on lease?—No, people who own small parcels of land.

3776. In their own possession?—Yes.

3777. *Sir James MacKenna:* On Saturday you made some statement about central research, which I think you have modified later on. With reference to that subject, I take it that you do accept the principle of central research?—I certainly do. I should be very very sorry indeed if central research were abandoned altogether.

3778. As an organisation to assist the Provinces in carrying out research?—Most assuredly.

3779. If there were adequate provincial representation in this central organisation, which I think is almost certain to be the case, do you not think you could allow provincial programmes to be submitted to this Central Board? I will take a concrete case. We have common to Assam, Madras, Burma, Bengal and Bombay the rice problem. Do you not think that many of the problems from these Provinces with regard to rice could conveniently be dealt with by men who have been working for years probably on similar problems in their own Provinces?—I certainly think it should and I think it ought to be. I should be delighted to have a committee of specialists on rice to examine the work which has been done in Bombay.

3780. Of course it should be centrally organised?—Yes, I should welcome an inspecting committee of that kind.

3781. Or a consultative committee?—Or a consultative committee which would make suggestions for future work.

3782. In all your long examination there is one very important function of the department which has not been touched upon, and I would like your opinion on it. Do you think the utility of the Board of Agriculture is all it was in the earlier days and how do you think it could be improved or extended?—I am almost the only member who has attended the meetings of the Board of Agriculture from the year 1904 onwards and I certainly think that in recent years it has not been of the utility it was in the early years. In the early days we all sat down round a table and thrashed out our problems in the light of the experience of each one of us. In recent years the tendency has been to discuss administrative problems and pass resolutions as to what Government should do. Now, I think the Board of Agriculture would be of much more use if it were a consultative committee of specialists rather than simply a body which makes recommendations to Government for administrative changes. I also feel that at present it has got somewhat unwieldy in size and the men are not probably most suited to the purpose I have in view. I think if we can make it a body more like what it was in the beginning, that is to say, a body sitting round a table thrashing out actual problems, each man giving his own experience, and deciding not what Government should do but what we should do, it would be much more useful.

3783. Are you in favour of reviving the sectional meetings which originated some years ago but which I understand have been abandoned?—I should most certainly recommend the revival of the sectional meetings; but I would not revive them so much as a meeting of botanists and a meeting of chemists. I would revive them rather as meetings of officers working on rice, or officers working on some other subject.

3784. These sectional meetings would be of great assistance to the central research organisation?—I think very useful.

3785. *Professor Gangulee:* During the course of your evidence you stated that if you utilise the rainfall in tracts without irrigation, a larger area of land can be brought into cultivation. Have you tried any experiments in dry farming?—Yes, and we have recently intensified it to a considerable extent. Until 5 years ago experiments in dry farming were more or less casual with us; I mean they were not of major importance; but during recent years we have had a special officer whose principal duty has been to devise methods for the retention of water by soils in these tracts and hence devise the best methods of using dry farming in our own tract.

3786. Have you tried to use the method of subsoil packing?—We have not, because, as a rule, we have not got subsoil in those tracts; that is the trouble.

3787. Have you tried to find out drought-resisting varieties of crops?—Yes; we are trying in almost all our most important crops.

3788. Is anything by way of crop insurance possible in those areas?—At one time I was very sanguine about crop insurance. In these precarious tracts I personally would not undertake farming unless I could get some form of insurance: the chance of loss is so great. When I was in England I made enquiries at Lloyds as to whether they would look at any proposal of this sort,

that they would pay damages in proportion to the reduction of the crop below 50 per cent., paying nothing if it was over 50 per cent. of normal, but paying graduated damages if it was below 50 per cent.; but they would not look at it.

3789. This is a matter to which attention must be given?—I think it is a matter of very great importance, if you are going to get men with business outlook going into agriculture in the drier tracts of this Presidency at any rate.

3790. You stated that Government should encourage professors and scholars to get study leave in foreign countries. With the development of central research stations in India, do you think it would be necessary still to send students abroad?—I would not like to say. I would like to send a man to the best centre in the world. It might be in India or outside it; I would not limit it to England, or the Continent or America. For certain purposes I would send a man to Brazil; for certain purposes to South Africa; and for certain purposes to Mr. Howard at Indore.

3791. Do you think you have developed research in India to such an extent that our boys can go to Pusa and Muktesar for training?—Not necessarily a station. I would send the man not to a place but to a man for training.

3792. I consider organisation in agriculture is most important. Research has made certain progress in India and I think the immediate need is better organisation. Therefore I am very much interested in the Taluka Development Associations. You started this movement in 1922 and I understand you have got 55 associations at present?—Yes. I think one or two more associations have been started since that figure was arrived at.

3793. They have had about three years' growth?—Yes.

3794. Has the initiative for the formation of these associations come from the people themselves?—In some cases the people themselves took the initiative and in other cases the Government official, the *mamlatdar*, took the initiative. There have been a certain number of cases where the initiative has been local.

3795. Supposing the people of a region are anxious to start a Taluka Association, what would be the procedure?—There are two methods. We generally arrange to have a meeting at a central place in the taluka and invite cultivators from all over. These meetings are sometimes organised by the Agricultural Department and sometimes by the local *mamlatdar*. Then if the idea takes on, we have a deputation generally consisting of one Government officer and some cultivators from the villages in the taluka in order to make the thing widely known and to see whether there is likely to be any local support. Then when we have got some idea as to the local support it is likely to have, we call a general meeting of all the people interested in the movement and inaugurate the association, appointing a committee and secretary, and adopting bye-laws.

3796. These organisers belong to the respective taluka?—As a rule the secretary belongs to the taluka. Having appointed a secretary and committee they then ask us to supply them with a propaganda officer.

3797. At present there are 55 secretaries?—About that.

3798. Do you at any stage train these organisers so that they may look at the rural problem as a whole?—At present nearly all our taluka association secretaries are co-operative society men and the training of the co-operative society secretaries is the function of the Central Co-operative Institute. We have not had special courses for these men yet, but the time is coming when I am prepared to arrange with the Co-operative Institute for special courses for these men.

3799. So that they may get an agricultural outlook?—That is the idea.

3800. How are these associations financed? Partly from Government and partly from local people?—They are financed in several ways. We try if

possible to get a capital fund; that is to say, we try to get people in the taluka and outside it to give us considerable sums down which are invested and on which we can get nearly 7 per cent.

3801. The organiser is a paid man?—Yes.

3802. How much does he generally get?—His pay and travelling allowance are supposed to be covered by the Government grant of Rs. 1,000 a year. The first method of finance is by getting a capital fund. The second is subscription from co-operative societies or individuals or villages as a whole. The third is the Government grant which is equal to the income from other sources all put together up to a limit of Rs. 1,000.

3803. Who checks the expenditure?—The account is submitted to the Divisional Board and they send it on to me with a recommendation as to the amount of Government grant which should be given. The Registrar and I go over it and then finally we decide what the grant shall be.

3804. So the Divisional Board is the immediate superior?—Yes, to which the Taluka Development Association reports.

3805. The accounts are submitted to them?—Yes.

3806. And they consult you?—When the programme is submitted to the Board the Deputy Director of Agriculture for that Division and the Assistant Registrar for the Division are members of that Board.

3807. I am very much interested with the record of work done by the Taluka Association of Pachora. That is a very extraordinary record in a short time?—It is a very good one; it is one of the best.

3808. Can I take it that the other associations also are equally good?—You can take it as typical. It is one of the best.

3809. Have there been any failures?—Particularly in the Konkan there have been many abject failures.

3810. Will you please give the reason why it has been a success in one place and a failure in another place?—Where they have not been a success it has usually been in landlord areas, where landlords have been away in towns and where the people have no permanent interest in the land. Where we have had to deal with peasant cultivators there has been greater success.

3811. *Mr. Calvert:* With regard to propaganda I gather that in Japan the Agricultural Department confined its assistance strictly to co-operative societies. If the people want help from the Agricultural Department they must organise themselves in societies first. You do not favour that?—I would not go so far as that, but I certainly would favour it as far as it is possible to go. We do give a definite preference to cultivators who are organised in co-operative societies for the supply of materials or for any other purpose.

3812. *Mr. Kamat:* You told Sir Henry Lawrence that all the roads under the District Local Boards are bad?—I did not say so. They have deteriorated; they are not so good as they were.

3813. If the means at the disposal of the District Local Boards are limited, would you prefer in the interest of the villagers spending the money on the village roads at the expense of the bigger roads?—I feel that the most emphatic need in our rural communications is the village roads.

3814. And therefore they are justified in spending the money on the village roads?—I should be content that the other roads should deteriorate slightly if we could only get better village roads.

3815. Do you think that there is any necessity to maintain the unwieldy Board of Agriculture? Do you not think it desirable to resolve the Board of Agriculture into committees of experts?—I think there is a function which the Board of Agriculture as we have hitherto known it can perform. I think it is a good plan for people to meet not as experts but as people devoted to the improvement of agriculture as a whole. I would make it a meeting of Directors and a few other officers who can definitely look on the agricultural problem not as experts but as a whole.

3816. As it is at present do you not think it is an unwieldy body and if it meets only once in two years it serves very little purpose?—It is at present an unwieldy body and I am afraid people take very little notice of its resolutions.

3817. As regards the sugar industry in the Deccan, you have specialised in sugarcane growing?—Yes.

3818. What do you think are the prospects of the sugar industry in this part of the country?—The sugar industry in the Deccan cannot of course be considered apart from the sugar industry in the world as a whole. The next five years are going to be a very hard time for the sugar industry everywhere. In the Deccan, I do not think we can produce sugar per lb. as cheap as they can in a number of other areas; hence, until the price of sugar goes up considerably beyond what it is at present, I think it is only an exceptional concern that can make sugar production in the Deccan a real commercial success.

3819. So that within a reasonable period you see no future for the industry in the Deccan unless under special circumstances?—I cannot foresee more than five years, but at the present time any attempt to establish any new sugar factory in the Deccan would be I think a most unwise proceeding because I do not think there is any likelihood of its being a commercial proposition within the next five or six years.

3820. As the canal schemes grow and as time comes for the sugar industry to be established, do you think that State aid can be given to it?—I think when the thing has a prospect of becoming a commercial proposition the question of State aid may be considered. At the present time it would be throwing money into the sea.

3821. At a later stage would you be in favour of the question of State aid being examined seriously?—I would most certainly. I am speaking of sugar-making, not *gul*-making.

3822. *The Chairman:* Would you favour the granting of some money reward to research workers for successful pieces of work?—No; I do not think so. I would be very much against that. It would seem to me to destroy the spirit of scientific progress. I feel rather strongly on that because I do not feel we shall get the work done if we do not arouse scientific enthusiasm independent of whether a man is going to get special commercial returns out of it.

3823. Have you any other reward in mind?—Of course, we as scientists have rewards which we would value perhaps more than anything in the world. For instance, there is nothing that any Government could give me which I should value so much as a Fellowship of the Royal Society. I mean there are things which we as scientific men would value more than anything that any Government can give and I think we had better stick to those.

3824. You do not contemplate the creation of any such reward in India?—I think a reward which is not universally recognised is not much good.

3825. You have subscribed to the importance of informing the intelligentsia on rural matters. Are you in favour of instituting a degree on rural matters?—Yes.

3826. Have you ever contemplated the institution of a degree of rural economics?—Not as such; but we have been (I speak now as a member of the Bombay University, as representing one of our big educational institutions) gradually developing recently the importance of economics in our University and the stage is now reached at which we are almost at the point when I can get a distinct section for a degree of rural economics. I think it would be an exceedingly wise thing to do.

3827. Rural economy in its widest sense?—Certainly, I do not mean merely historical classical economics as applied to agricultural products, but rural economics in its widest sense.

3828. When you institute that degree would you make it a qualification for public service other than in the Agricultural Department?—I would most emphatically. I think it would be a tremendous fillip to it if it were done.

3829. Has the question been actually mooted?—No, not in this part of India.

3830. Can you give the Commission any idea how such a movement can be set on foot?—At present I am reporting to the University within the next three months on the University school of economics and sociology, and one point I am going to insist upon in this is that in this post-graduate school the students must devote time and attention and staff if necessary to this outlook.

(Dr. Harold H. Mann gave further oral evidence on Thursday, the 28th October, 1926, see pages 266-270.)

सत्यमेव जयते

Dr. WILLIAM BURNS, D.Sc. (Edin.), Joint Director of Agriculture, Poona.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—(*a*) The existing organisation for research in the Bombay Department of Agriculture is as follows:—

The Director of Agriculture is himself the final referee in all research matters, and is the Chairman of all Research Committees. Under him at the College is a staff of semi-independent experts who perform teaching and research duties. For teaching purposes they are under the control of Principal, for research under the Director. These men are of Imperial or Provincial grade. Below them are Assistant Professors and Lecturers whose main work is teaching, but who are also expected to do some research and, in addition, certain graduate assistants who are entirely devoted to research. The Assistant Professors are gazetted officers; the others are not.

Elsewhere in the Presidency there are small research stations, each in charge of an agricultural graduate and with a staff partly graduate and partly non-graduate under him. These stations are mainly for the purposes of plant breeding and are of recent origin. No teaching whatever is connected with them. Of recent years the fact that so many of our problems are on the borders of several sciences has induced us to organise Research Committees from the personnel of the department. These Committees pool the experience of several kinds of experts and give their united guidance to the actual workers. Outside the official organisation proper, we have also been conducting, mainly by the Research Committee system, researches financed by the Sassoon David Trust. Our experience of research work is, therefore, considerable. I would make the following suggestions as regards the organisation in general:—

(1) The Director of Agriculture must necessarily be a Director of Research. This is one of the great advantages accruing from having a technical Director from the department itself as against a civilian Director. It is plain that although the Director may be a man conversant mainly with one science, he must have a working knowledge of all the sciences underlying agriculture and of agriculture itself. It is no easy matter to find a person of these qualifications; but it is essential if work is to be properly directed. It is also worth noticing that any subordinate officer placed in charge of a research section or of a research station—particularly the latter—must have an all-round acquaintance with the sciences underlying agriculture. If isolated, he will often have to deal with problems outside his own special science for which no immediate advice from any other person is forthcoming. It is essential, therefore, that research workers should have this broad training. The effect of this is to indicate that too early specialisation is undesirable. The present course for the degree of Bachelor of Agriculture of the Bombay University, which permits limited specialisation in the last year with possibilities of post-graduate work in any direction, appears to me suitable for the training of men who will do research. It is obvious, however, that the training previous to graduation is not sufficient. If a man is selected for research work, he must be carefully trained in research methods by a senior research officer, and he should be ruthlessly got rid of if after a reasonable period of probation he does not show signs of being a good research man. The best method of training him would doubtless be to associate him with a higher omcer in some piece of work actually in progress, to make him responsible for some small part of it, and let him understand the general scheme of the whole work. I have so far dealt with the top and bottom of the research scheme, *viz.*, the Director and the recruits; between them comes the body of junior and senior experts whose main work is investigation of various problems and production of new knowledge. It is obvious that these men must be organised into some kind of groups, either according to the science which

is their speciality, or according to the problem on which they are working. Their teaching duties and their administrative work should not be allowed to interfere with their research. I am personally of opinion that teaching and research mutually assist one another, provided that senior research workers are not overburdened with too great a number of teaching periods. Administrative work, however, has, in my experience and I think in the experience of most research workers, been an agent which increasingly wastes time that should be otherwise occupied. It is absolutely amazing how much time can be taken up with the mere routine of the office finance, of answering questions regarding personnel and pay and of dealing with matters which are not within the province of research at all. A really desperate effort is needed to prevent the accumulation of this kind of work and the consequent sterilisation of the research officer. It is not desirable that the senior expert of a research section or station should be merely a Director; he should be a prolific research worker. Where *all* the work is done by assistants, progress is slow and results are indefinite.

The degree of control between the Director and his staff and between senior members of staff and their subordinates is a matter which must be left more or less for local adjustment; but certain plain lines can be indicated.

Agricultural Research is obviously limited as to subject-matter; but so far as method of attack is concerned, there should be the greatest degree of freedom. It is also essential that results shall be produced within a reasonable time; and hence one of the functions of a Director and also of a senior research officer must be to see that work progresses at a reasonable speed. In planning research programmes we seldom allow a time of less than five years, when dealing with problems of living plants. But within this period it ought to be possible to show at least some definite results and possibly some very considerable results indeed. Again researches must be conducted economically. This does not mean in a miserly manner. It means deciding what extent is essential, and then getting the best while cutting out the absolutely non-essential. The planning of research programmes is, therefore, as important as the consequent carrying out of these programmes, and the most careful thought and repeated criticism should be made before actual expenditure is begun.

(2) As regards the financing of agricultural research, I think the time must come when keeping a nucleus of permanent workers, the best results can be got by putting up definite schemes to solve definite problems, each scheme being a self-contained unit as regards finance. This will include special apparatus, additional land, if necessary, and temporary personnel. The training of such temporary personnel would afford recruits for permanent posts in the department as they fell vacant.

(*b*) So far as skilled workers are concerned, I am of opinion that the majority of scientific workers need an under-study, who could replace them on a moment's notice and who would be available to start similar work in another centre. In the ordinary course of events, the man next below is such an under-study. But there are various cases in which it has been difficult to replace a specialist officer on account of the lack of such under-studies. In planning any research organisation we must look ahead and consider the training of men who will carry on work at the same time high standard as that at which it has been previously conducted. It is desirable that research workers should be encouraged to take study leave. This widens their outlook, freshens their intelligence, improves their technique, and increases their confidence. They also make valuable scientific friendships.

So far as field or laboratory facilities for study are concerned, I have little complaint to make. The only striking case that has come to my own knowledge is in connection with researches conducted by myself and my colleagues on the improvement of grasslands. The essential thing in such work is to be able to fence waste lands on a large scale and money has not been forthcoming for this. It is an apparently dead loss, but without it

we cannot get results that are either scientifically accurate or striking to the popular eye. I regard research into the scientific value of the indigenous theory and traditional methods of agriculture, as most important. It is the function of the research worker "not to destroy but to fulfil," and he can often help forward, by another stage, processes that have gone as far as they can go without scientific help.

QUESTION 2.—AGRICULTURAL EDUCATION.—(*i*) I think that there is no room in the Bombay Presidency proper for another College of Agriculture at the present moment; but I think it is likely that a College of Agriculture for Sind would be successful.

(*ii*) No remarks.

(*iii*) I would not say that all teachers in rural areas should be drawn from the agricultural classes; but certainly those, who have to teach agriculture or nature study, as for example, in the so-called agricultural bias classes in this Presidency, should be drawn from the agricultural bias These men having lived along with plants and animals have a ready-made store of knowledge and experience, which prevents them committing errors that a city-bred man is liable to.

(*iv*) The attendance at the College of Agriculture, Poona, is as numerous as one would expect.

(*v*) The main incentive which induces students to come to the College of Agriculture is the hope of Government service.

(*vi*) The students are not mainly drawn from the cultivating classes. About 25 per cent. are drawn from the cultivating classes.

(*vii*) At present no further modifications in the existing course of study in the Agricultural College, Poona, appear to be called for. The course has been twice modified since its inception and is at present fairly workable and meets the requirements.

(*viii*) School plots are desirable where there is a teacher of the agricultural class with a proper training who will himself work alongside his pupils. School farms are, I think, unmanageable except at the schools specially devoted to agriculture, such as our agricultural vernacular schools which are really vocational training centres.

(*ix*) The majority of students who have studied agriculture in the College of Agriculture, Poona, have entered into Government service in one department or another.

(*x*) I do not quite understand this question.

(*xi*) No remarks.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*d*) The most striking instance of the success of propaganda within my own experience is the introduction of the use of Bordeaux mixture against grape-vine mildew in Nasik. This work was taken up in 1910 and was carried on by the department assisted very largely by Mr. H. V. Gole, a prominent landowner and vineyard owner in Nasik, for four years. At the beginning the people were exceedingly suspicious of the new process. But it has now become thoroughly established as one of the routine practices of grape culture, there being a fair local trade in copper sulphate and spraying machines. Reasons for success are:—

(1) the effectiveness of the method,

(2) the relatively small cost of the treatment compared with enormous saving effected, and

(3) the hearty and disinterested co-operation of a local man.

QUESTION 4.—ADMINISTRATION.—(*a*) I have never been able to imagine any really effective means of co-ordination of the agricultural activities of the Governments in India, nor have I been able to see the usefulness of control of the Provincial Governments by the Government of India in the matter of agricultural research and propaganda.

(*b*) I do not think that the increase of the scientific staff of the Government of India is the best way to make expert scientific knowledge from one

Province available in another. I think it would be much better done by delegating an officer of one Province to spend some time along with his opposite number in another Province.

(*c*) (*iv*) *Meteorological Department.*—I think that there can be much closer co-operation between the Meteorological Department and Agricultural Department. I desire specially that parallel data should be collected both on the Meteorological and the Biological side as regards the relation of the growth of crop plants to the weather. This is very necessary for—

(1) determining the critical periods in a plant's life;

(2) enabling us to choose the best variety for a given set of meteorological conditions;

(3) enabling us to choose the best dates for certain agricultural operations; and

(4) working out the relationship between pests and diseases, especially in epidemic form, and the weather.

This work is only at its beginning even in other parts of the world, but it is essential here and will be of the greatest possible help to the plant breeder, the plant pathologist, and the agriculturist proper.

QUESTION 9.—SOILS.—(*a*) (*iii*) It has been our experience in pursuing our investigation of means for improving grasslands that the increase in vegetation that follows a rational system of grazing is one of the best means for preventing erosion. On the other hand, the reckless destruction of the vegetation due to unrestricted grazing is a direct invitation to erosion. The preveution of erosion is, therefore, one of the by-products of any system which makes for the best use of grazing lands.

(*b*) (*i*) The land at Kalas near Poona, which has been under the control of the Department of Agriculture since 1920, has markedly improved. This is due to the checking of grazing and the development of the field, possibly vegetable cover.

(*ii*) The land in the neighbourhood of the Bhamburda forest area has suffered more deterioration mainly due to the existing nullahs being still further cut back into the hills and widened in the plains, and also due to the exposure of rock by the washing away of the surface soil since the vegetation is not sufficient to hold it in place.

(*c*) No remarks.

QUESTION 11.—CROPS.—(*a*) (*i*) The improvement of existing crops by breeding offers immense opportunities since in so many cases the existing crop is unselected, consists of several strains and, therefore, offers a wealth of opportunity to the plant breeder. Obviously the first thing which the breeder must aim at is increased yield. Having got this, we must next attempt to get sub-races which are specially adapted to different tracts or which are resistant to the diseases which affect almost all cultivated crops. Hybridisation is only to be undertaken when there is a definite purpose to be fulfilled, as for example, combination of long staple with high ginning percentage, and should not be undertaken light-heartedly merely to see what will happen. In the case of certain crops, where the cultivation is exceedingly good, science can best help by investigating the possibility of isolating a new and better variety. Generally speaking, a race isolated from the crop already adapted to the soil is better than an introduced one. This does not necessarily always hold good; and trial of exotic varieties should certainly be part of the programme of research, although the main improvement should healthy throughout a long outbreak.

QUESTION 13.—CROP PROTECTION, INTERNAL AND EXTERNAL.—(*i*)* One is almost inclined to believe that we have got in India all the pests that we are likely to get. Certain diseases have not appeared perhaps due to the climatic conditions being unfavourable. In the Bombay Presidency, for example, wart disease and blight of potatoes have never made their appear-

* See Question 3999 on page 116.

ance, although potatoes are imported from Europe by the ship-load every year. The existing measures of fumigation for nursery stock seem to me sufficient.

(*ii*) Internal measures against infection can best be done by increasing propaganda for the use of well-approved remedial or prophylactic methods such as the steeping of *juar* seed in copper sulphate, the spraying of grape-vine and of betelnut palms against their respective mildews and the popularisation on a large scale of such operations as sweeping for grasshoppers.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*i*) *Fruit growing and Fruit preserving.*—There is little doubt that opportunities exist for the extension of fruit growing, particularly on areas commanded by canals. The real difficulty in connection with the extension of fruit areas is economic. In the first instance, most fruit trees with the exception of banana and papaya will not give a yield of any kind before the third year and in some cases before the fifth. It is, therefore, a long wait during which capital invested is giving no return except such as may be got from subordinate crops cultivated between the rows of fruit trees. Again, the marketing of fruit offers distinct difficulties, as this trade is very much in the hands of middlemen. Fruit-growing offers itself as a suitable subject for the development of co-operative sale societies associated with standardisation of the varieties planted and grading of the fruits when harvested.

As regards fruit preserving, the few firms which have in a small way started the canning of fruit and fruit juices have been able to keep their heads above water, but are handicapped by—

(1) the timidity and unpunctuality of investors;

(2) the difficulty of getting large concentrated areas of one type and fruit; and

(3) the necessity of importing tins.

QUESTION 23.—GENERAL EDUCATION.—Here as elsewhere we are faced with the problem of educating peasantry and still keeping them on the land. The agricultural bias classes in the elementary schools are a first step towards the solution of this problem. Here everything depends upon the teachers of these classes. They must be more than mere teachers of agricultural science or agricultural practice. They must in their own way exert such an influence as will enable the pupil to find his agricultural environment of the most interest and the one in which he will most readily spend the most of his life. There is no doubt that the mere spread of the ability to read would greatly help our agricultural propaganda. The ability to keep accounts undoubtedly assists in the prevention of debt, and if along with these essential things can go a scientific study of the soil, plants, animals, and the weather, then agricultural education in the elementary schools is certainly justified. But the difficulty as elsewhere will arise later on. When driven by ambition, either his own or that of the community, the educated boy is made to feel that he can do better than remain on the land and so joins the ranks of those who seek their bread in non-agricultural occupations. Undoubtedly the same remedy which has been useful elsewhere will also be useful here. I refer particularly to means for increasing the amenities of life in agricultural areas and for increasing both the wealth and self-respect of the agricultural worker.

QUESTION 26.—STATISTICS.—The only suggestion in this connection I have to make is that we require not only the collection but also the interpretation of statistics. I have indicated in my reply to question 4 (*c*) (*iv*) how this can be done in connection with meteorology and agriculture. It seems to me that we require in each department of agriculture a really expert statistician whose work would not be so much the actual compiling of figures as the studying of what these indicate. Such a man also if he has the necessary mathematical training can be of very great help to plant breeders and to those in charge of experimental work in plots with regard to the interpretation of their work.

Oral Evidence.

3831. *The Chairman :* Dr. Burns, you are Joint Director of Agriculture at Poona?—Yes.

3832. You have put in a very interesting précis of evidence for which the Commission is greatly obliged to you. I do not know whether you would care to supplement that by any statement at this stage?—I think not.

3833. Would you tell me at the outset, then, how you divide your responsibilities with Dr. Mann?—That is laid down in a Government Resolution according to which, roughly, he deals with research, the budget, publication, and one or two other matters, including such things as the Cotton Transport Act and relations with the Indian Central Cotton Committee. I am responsible for the rest. There are no watertight compartments, but that is a rough outline.

3834. Is the resolution to which you refer one dealing *ad hoc* with your appointment?—Yes.

3835. I have very few questions to ask you at this stage, as I think your written evidence is very clear. On page 100, dealing with the present course for the degree of B.Ag. of the Bombay University, you say, "It is obvious, however, that the training previous to graduation is not sufficient." Would you develop that a little?—There I am dealing with the question of the training of men for research. What I think is this. A man who has taken a degree of any kind has only passed the very first stage of his training, if he is to be a research officer. He must have further training, but not immediately on top of that. My feeling is that the period of tutelage should not be unnecessarily extended and, having taken his degree, he ought to have a certain amount of experience and then have further training after he has, so to speak, found his feet and done some real work.

3836. So the remark to which I have referred is no reflection on the teaching of the Bombay University?—No.

3837. On page 101 you say that a really desperate effort is needed to prevent the accumulation of administrative work in the hands of the responsible Directors and the consequent sterilisation of the research officer. Have you any plan to suggest whereby this may be avoided?—The only thing that occurs to me is this. In the case of an institution such as the College of Agriculture, I think it should be possible to centralise the greater part of clerical work in one office which could deal with it for the whole institution, instead of each officer having to deal with it separately.

3838. Would you require a secretary for that?—Yes.

3839. That would be a new appointment?—Yes.

3840. On page 101 you say, "As regards the financing of agricultural research, I think the time must come when keeping a nucleus of permanent workers, the best results can be got by putting up definite schemes to solve definite problems, each scheme being a self-contained unit as regards finance." Are you thinking there of the organisation of research according to crops?—It might be according to crops and it might be according to a definite problem such as drought, for instance, which affects all crops.

3841. You think the experience of organisation by crops suggests that that is an efficient basis of organisation?—My own experience of organisation by crops is not sufficient to enable me to say "Yes" or "No" to that question.

3842. You have not formed any views in that direction from what you have seen and heard of the work of the Indian Central Cotton Committee?—That, I think, is a very definite exception.

3843. On page 101 you say: "It is desirable that research workers should be encouraged to take study leave". At what stage in their career do you contemplate this study leave being given?—It is a little difficult to

define that accurately. My feeling is that after a man has entered into the real work of the department, and possibly developed into quite a brilliant worker, there will come a stage when he will get no further unless he has some stimulus of this kind. Exactly when such leave should be given is largely a matter partly for the individual and partly for the exigencies of the department; but I should say roughly not less than 5 or more than 10 years after he has started work.

3844. You do not believe in young research workers going abroad too early in their career?—I do not think they are psychologically ripe for it then.

3845. I am not quite clear what your own experience in the districts has been?—Not very much. My work until April of this year has been as Economic Botanist to the Government of Bombay and, since 1922, also Principal of the Agricultural College. I have only 6 months' experience as Joint Director, and so far as the districts are concerned my experience has been confined to occasional visits (not more than two months in the year) all over the Presidency for special jobs. My interest is therefore largely in certain special problems, and I have not much experience of the actual agricultural life of the villages.

3846. I quite understand. On page 104 under the heading of "Statistics", you say: "It seems to me that we require in each department of agriculture a really expert statistician whose work would not be so much the actual compiling of figures as the studying of what these indicate." What do you mean by "each department of agriculture"?—I meant each Provincial Department.

3847. You do not suggest a flock of statisticians in any one Province?—No!

The Chairman: There are a great many other questions I should like to ask you, but I will reserve them until I see what questions my colleagues desire to put.

3848. *Sir Thomas Middleton:* Does your duty include the supervision of the small research stations that are at present established in different parts of the Presidency?—No; that is definitely under Dr. Mann.

3849. With regard to the question of the training of the research worker, your own experience, I think, has been very largely in the direction of research, during the earlier years of your service, at any rate?—That is so.

3850. I have been looking at the course of study prescribed for your degree, and what occurs to me is that while it is an admirable course for general training in agriculture and allied sciences it does not afford enough time for the man who wishes to become a specialist in such a subject as bacteriology to get the technique that is essential for him. I put the point to Dr. Mann and he was disposed to take the contrary view, that the time was enough, but as you have been engaged specially in this department of the college I should like to have your opinion?—I can only say what I have already said in reply to the Chairman, that we do not look on the man as a finished product when he leaves, and I think he requires extra training, but I would rather have it after one or two years of additional work.

3851. It is from that point I wish to start. As for his being a finished product, of course he is not that until he has been a very long time in the service. What one finds in Great Britain, however, is that there are certain types of work that the student can tackle most effectively just after he has left the University. I am thinking now of the plan we adopt very largely in Britain of selecting Honours graduates and sending them for a special course possibly in one of our own laboratories or to Germany or America. Our experience is that that method of training has been of very great value in widening their outlook, and it is only after a young man has had such a post-graduate course that he would be taken on as a beginner in research work. You think he would do better to go straight away into harness and get his technique at a later stage?—I think so, because our conditions in this (as

in practically everything else) are special. If he is going to have a post-graduate training he must, apart from such opportunities as Pusa affords, go abroad. The majority of them prefer to go abroad, on account of the additional *cachet* attached to foreign training. That takes away their Indian outlook. A man is not getting into his mind the problems he has afterwards to solve; he is in a totally different setting and studies in a totally different environment.

3852. I follow that and I think your point is sound; but would it not break down if facilities were available within this country?—I am not at all sure about that. I am merely expressing an opinion based on facts with regard to men who have been abroad and men who have not.

3853. Perhaps you wish to suggest that it is more difficult for you to judge of future promise just after a student has graduated than it might be in our case in Britain?—I do not know that that is my point of view. My point of view is that the man requires to test himself and to be tested and to have the rawness of his studenthood taken off him, so to speak. Then, when he takes his further training he is a research worker and knows what he wants to get out of it; he can pick and choose. There is also the point that he has been for a very long time under tutelage in schools, at the arts or science college and at the agricultural college, and if I were he I know I should be deadly tired of training and anxious to get some work to do.

3854. I do not think your second point is so important, because really keen men are only too glad to get abroad to extend their experience?—Yes, but I suggest this is the way he should get his experience. The best way to do it is this form of apprenticeship to actual work.

3855. That may or may not be so, because it is quite conceivable that there may be people elsewhere who could train your young men better than anyone in the Bombay Presidency. When we found we could not train our students satisfactorily in Great Britain we sent them to Germany and elsewhere. It narrows down your opportunities if you use only your own officers for training your recruits?—That is so.

3856. With reference to your research committees, I see you have found those committees very useful?—They have worked.

3857. I understand from what you say in your memorandum that these committees are not committees in the ordinary formal sense, but are committees of persons who are interested in the problem, each of whom is there to contribute his own experience?—That is so.

3858. You say on page 102, "I do not think that the increase of the scientific staff of the Government of India is the best way to make expert scientific knowledge from one Province available in another". Obviously that is a view for which there is a good deal to be said, and I should like to hear you expand it a little. Is the position not conditioned by the amount of money available? It is sometimes necessary to accept an arrangement, which is not an ideal one, for financial reasons?—This raises the question of the organisation outside the Provincial Departments, which is a very big question. I admit there are questions in which more than one Province is interested. As I have said, I do not quite see how the arrangement is to be made whereby the Provinces are to co-operate. I do not know that I can say very much more at this stage.

3859. If an organisation were possible to enable them to do so, would you think such co-operation would or would not be desirable? Do you think Provinces are better left free to work out their own problems, or do you think that, assuming it were practicable, some form of central co-ordination would be in the interests of India?—My feeling is this. The Agricultural Departments have been organised, as you are aware, each within its own Province, and to a large extent they have kept their eyes on the questions within their own borders. They have been so extraordinarily busy within their own borders that they have hardly had time to look beyond them even

if they wanted to. It is only now that people are beginning to see there are questions which affect more than one Province. If there is to be co-operation, however, it seems to me it must come from the initiative of the Provinces which desire to co-operate and not be something imposed on them from above.

3860. Has not the main difficulty in developing research in the last 10 or 15 years been the finding of the right men? Has that been your experience here, that the finding of the right men has been the greatest difficulty?—No, I do not think I could say that has been either a difficulty or a great difficulty.

3861. You are fortunate, then. I had thought that by increasing the scientific staff of the Government of India one could economise the men who are available?—That indicates definitely a reduction of the number of experts in the Provinces.

3862. Not necessarily. It is quite conceivable that given the right men in a central position the number of men in the Provinces might be increased very rapidly. That increase depends, apart from financial considerations, on the personality of the men chosen for the central work?—That is so.

3863. Your own work was originally that of an Economic Botanist, I think?—Yes.

3864. I should like to get your view as to the relative value to you in this Presidency of methods of selection and methods of cross-breeding in getting the type of plant you want. In a general way, which have you found more useful in Bombay?—In the case of most crops we have so mixed a population here that selection gives us results, and hence hybridisation has only been undertaken in the case of a few crops at a late stage. Selection has been our most potent weapon.

3865. The field for selection was very large indeed?—Yes.

3866. Can you tell me whether the cotton distributed from Surat and round Dharwar were selections or crosses?—The 1027 is a selection.

3867. That is a Surat cotton?—Yes.

3868. What about Dharwar?—Both the Dharwar cottons are selections.

3869. I got the impression somehow that there was one hybrid, not of the Dharwar type which you were distributing in Bombay?—There is a set of cottons we are dealing with in Khandesh which are said originally to have been hybrids, but we are very doubtful about their origin.

3870. Dr. Mann made an estimate that the amount of cross-fertilisation would be about 6 per cent. of the crop. Have you any figures?—I can only take the figures which have been given in various publications, and which vary from 0 to 30 per cent.

3871. When dealing with education you made the point that everything depends on the teacher. The teacher is your difficulty?—Yes. That is inevitable.

3872. *Sir Chunilal Mehta:* You say on page 102, "The students are not mainly drawn from the cultivating classes." Is there any particular reason why this is so?—I think at the present moment it is largely due to the fact that the other classes are more literate than the cultivating classes and more easily able to take the preliminary year in the arts college.

3873. With reference to what you say under the heading of "Administration" on page 103, and about which you have been questioned by Sir Thomas Middleton, are you still of opinion that what you say there about the interchange of views between officers of different Provinces will give the best results?—That is my feeling.

3874. There is really no great difficulty in your scheme of delegating an officer of one Province to spend some time with his "opposite number" in another Province being carried out provided funds were available?—I think it could easily be arranged.

3875. You have worked especially on grasslands, have you not?—Yes.

3876. There is very great scope for improving the grasslands in this Presidency?—That is so.

3877. What was the result of your investigations and what are the difficulties you have found in propagating these improvements?—This work was undertaken largely on account of similar work which has been done in the U. S. A. on the improvement of range land in the big grazing areas particularly and in the drier parts such as Texas, Arizona and Nevada. Using practically their methods we have got practically their results, namely that the actual grassland at the present moment is carrying a very small amount of very poor pasture, because it is trampled over, and the good species do not get a chance. If we can keep animals off and prevent trampling, particularly in the early parts of the rain, there is no part of the Bombay Presidency in which good grass cannot be grown. I ought to mention one other factor and that is the amount of water which is retained in the soil; that is extraordinarily important. If we can by any means increase the amount of water held by these bad lands, the species change. It is not a matter of re-seeding at all; it is a matter of allowing the natural changes to take place if we can keep off cattle, prevent burning and trampling and allow the water to accumulate. The whole crux of the matter is fencing, and as that is expensive, some cheap substitute is essential. The one place where this improvement has been done without fencing is at a place near Nasik where for at least 30 years a large area of grassland has been most carefully kept by the co-operation of the villagers, and produces grass which can be seen for miles around as being a different thing on account of the change in the grass pasture.

3878. On page 104 you express your desire to increase the amenities of life in agricultural areas and to increase both the wealth and self-respect of the agricultural worker. Have you any proposals as to how that can be done?—I am afraid I can give no proposals, but I may possibly mention three simple facts that have come to my notice. One is that two of our students used regularly, even while they were students, to run a night school in one of the neighbouring villages. Another student of mine in his holidays used to teach his villagers football. At the time when the Indian Army School of Education was in Belgaum, their then Commandant, Colonel Radford, decided that it would be very good for the men studying under him to do a little of this work. They were non-commissioned officers who were afterwards to teach agriculture. In addition to preaching the gospel of better agriculture, they helped the villagers in many ways. For instance, they built a hall for the village; it was a rough thing made out of planks and corrugated iron; but, having built it, they used it to give lectures on sanitation and other subjects, and I believe they did a great deal of good. I have forgotten the name of the village, and the school is no longer there, but it was a case of constructive work which they took up largely as an experiment and kept on because they liked it.

3879. Have you had any experience of the Taluka Development Association doing anything of the nature that you suggest?—I have only got into touch with two so far, and they seem to be rather troubled as to what to do; their difficulty is to get a programme.

3880. Have you considered Dr. Mann's suggestion of going further down to a smaller area and taking up all this kind of work through the Servants of India?—The matter has only come to me through his evidence.

3881. You state here that you are in favour of rural bias schools?—I am.

3882. You consider they are doing a good deal of good?—I think it is too early to say whether they are doing good, but they contain the possibilities of a great deal of good.

3883. *The Raja of Parlakimedi:* How do you approach villages with a view to assisting them in the improvement of their crops, the protection of

their crops against disease, and so on?—That is rather a matter for the propagandist section with whose work I am not so familiar. Our work with them is first of all through the man on the spot, the Agricultural Overseer, who ought to know them personally and who very often does.

3884. But as to the crops which are under your charge, how is your message carried to the villagers?—By the ordinary propaganda machinery of the department; I do not try to do it direct.

3885. Do you have your suggestions translated into the vernacular so that they may be circulated among the villagers?—Certainly, our leaflets are in all the vernaculars, and the men who work in the districts of course speak the vernacular of their area.

3886. Does livestock come under your charge also?—Only indirectly in so far as mere administration is concerned, at this moment.

3887. Has it come to your attention that near big cities such as Bombay and Poona certain practices are resorted to during the lactation period when the calf leaves the cow which often have the effect of causing the cow to go dry for ever?—It has not come to my attention; it is outside my purview at this moment.

3888. *Sir James MacKenna:* As Economic Botanist to this Government for many years, have you found Pusa of any assistance to you in the earlier stages or later stages of your work?—Certain of the workers at Pusa have been of very great assistance to us in advising and in other ways. With regard to grassland, for example, Mr. Howard gave me some very excellent advice in connection with the putting together of the results. It meant I had to re-write the whole of the memoir, which I gladly did, but the result was justified by the remark which was afterwards sent to me by Clements in America, who is perhaps the foremost man on that subject, that the thing might have been done in his own laboratory. That was flattering and it was the result of Mr. Howard's advice.

3889. You think, as a provincial officer, that Pusa is of considerable help to the Provinces and its existence is justified?—I would not generalise about Pusa; I am only dealing with individuals in it.

3890. Did you find Prof. Gammie, another Imperial officer, of much help to you when you first came to India?—I was sent to study under him.

3891. *Professor Ganguleе:* With regard to research work, I understand that most of your work is concentrated on plant breeding, is it not?—The plant breeding work has been very largely outside my hands from the beginning. The two pieces of plant breeding work which were in my hands as Economic Botanist were the breeding of a drought resisting variety of *bajri*, and the breeding of a better race of castor.

3892. You are particularly interested in grasses, are you not?—That is one of the things I have been interested in.

3893. Have you undertaken an ecological survey of grasses of the Presidency?—Yes, of the Presidency itself.

3894. Confined to the Presidency?—Yes. We have not attempted breeding any grasses, though we have studied variations within species.

3895. Do you think that is a line of work which may profitably be followed up?—I do not see much possibility because of the difficulty of getting a large supply of seed at a cheap rate.

3896. Have you paid any attention to horticulture?—Before a Horticulturist was appointed, it was also one of my duties to look after that branch.

3897. You realise that the supply of seed is an important consideration from the cultivator's point of view?—Yes.

3898. Have you any seed testing laboratory?—Yes.

3899. Do you test all the seeds that are supplied to the cultivators?—No, we test such samples as are sent to us, and, on the whole, a good many samples, are sent, both from the Government and the public.

3900. There is no organisation for the maintenance of purity of seed?—Yes, there are the plant breeding stations; there is a section which is devoted entirely to that.

3901. And you have that section here?—In each plant breeding station.

3902. You test your seed before distribution to the cultivators?—Are we not confusing two things, one being purity and the other germination percentage?

3903. In seed testing we take into consideration both its germination and purity, and so on?—That is all actually done at the station where the breeding is done.

3904. A good deal of attention is devoted to this seed testing in England?—Yes, I have seen the Scottish laboratory: I have not seen any of the others.

3905. Do you suggest that the administration work is rather heavy?—I do.

3906. You think that is a handicap to research work?—Distinctly.

3907. Have you any suggestions as to how this handicap may be removed?—Only the suggestion I have already made; the centralisation wherever possible of that type of work in a special office.

3908. On page 101 you speak of "each scheme being a self-contained unit". It is not clear in my mind what you mean?—What I mean is this: assuming you have a staff which has its normal budget, but you desire to tackle a problem for which this particular staff and this particular budget is not big enough, then it seems to me one ought to put up to the Local Government a scheme in which more money and more men are asked for. It may not be for one year; probably it would be for five. Then one would have it specially sanctioned as a special grant for a special purpose; after the end was attained, then the additional workers would be disbanded and the additional land would be given back.

3909. You say, "It is the function of the research worker not to destroy but to fulfil". Will you amplify that?—The Questionnaire definitely asks about the scientific value of the indigenous theory and scientific methods of agriculture. I presume what is intended is to ask whether one is going to say, "This is all wrong and you must do something else", or whether we are going to find out what the value of this may be and why it should be so. I take the latter point of view. Since this practice has been evolved and since it has actually been in use, there must be something in it; it is our business to find out why it is in use, and, if possible, to improve upon it. The case I have in mind especially is the local practice here of opening up and exposing the roots of fruit trees, particularly orange, in order to force flowering at a particular time. That works, but it is very often exceedingly bad for the tree; it may be that science can come in and get the same result by using that method, but improving the way in which it is done.

3910. With regard to education, you said the main incentive which induces students to come to the College of Agriculture is the hope of Government service?—Yes.

3911. But I understand that about 20 per cent. of your boys have taken to farming themselves?—Yes.

3912. Is there still that tendency?—Yes, there is still the same tendency.

3913. With regard to demonstration and propaganda, you cite the instance of one prominent landowner who initiated some method of demonstration. Now supposing this local man were not in existence at Nasik, how would you introduce this particular demonstration?—I think we should have to find another person, that is all. It would be surprising if there were not one man in the village whom we could persuade.

3914. But, assuming that the landowners would not take any interest in your research?—I can hardly envisage such a state of things.

3915. You say there should be closer co-operation between the Meteorological Department and the Agricultural Department. Do you undertake the work of collecting meteorological data?—We merely record the ordinary things for our own use at a small station on the farm.

3916. Do you record rainfall?—We take rainfall and humidity.

3917. Do you record the radiation of the sun's rays?—No, we have not the instrument.

3918. Do you take soil temperature?—Yes.

3919. Do you attempt to correlate these factors to plant growth?—We have not got either the knowledge or the staff yet; that is where we want the meteorological people to help.

3920. Independently of a meteorological department on your own farm, perhaps you could have meteorological arrangements for your work?—We have only attempted it in one small way and that is in connection with the growth of *bajri*.

3921. *Mr. Calvert:* You answered some questions put by the Chairman as to the facilities for research work, and so on; in your written note you say; "It is desirable that these workers should be encouraged". Would you kindly make that more concrete: what kind of encouragement would you give?—I mean if a man shows no tendency to go, he ought to be asked to go.

3922. Would you give him more for expenses?—No, the study leave rules as a matter of fact are very liberal.

3923. They are not very fully taken advantage of, are they?—I think one reason is that it is very difficult to spare men; that is where the trouble with regard to an under-study comes in where you do not always have an equally good man ready to step into his place when he goes on study leave.

3924. You do not think the study leave rules should be made more liberal?—I have not taken study leave myself, but my Indian staff who have taken study leave have found it sufficient; at least, so they tell me.

3925. We were told the other day of a member of the Imperial Agricultural Service who had never visited Rothamsted?—I am one of them.

3926. That cannot be due to lack of enthusiasm?—I think it is largely due to the fact that when one goes home one wants to do other things.

3927. Would it not be a good thing to encourage officers when they go home on ordinary leave to visit these institutions?—Most certainly.

3928. It might be suggested to them; it should be made easy for them to go there, and possibly the leave might be extended for that purpose?—There is no initiative from the India Office to encourage officers to visit these institutions. I have never had a note from the India Office saying, "Will you kindly go round these places and look at them?"

3929. As Economic Botanist you are or have been concerned with plants of indirect economic importance in agriculture?—Yes.

3930. That is to say, plants which have no direct agricultural use but which might be used to bind the soil and prevent erosion. I suppose that would be rather outside your sphere of activity?—No, very much inside it. That question has arisen both in connection with erosion and in connection with sand binding.

3931. Have you advised on this question of sand binding?—Yes, I have once or twice.

3932. Have you been successful?—We have the plants, but I have never seen the things I have recommended applied on a big scale.

3933. We can find the land all right if you can find the plant?—We have two plants that will do it.

3934. Do you think a further Botanist should be appointed to take up side lines like sand binding?—That again is a special problem which I would sooner see tackled in the way I have already mentioned, as a special problem, with a special budget and a special personnel.

3935. In this particular sphere of yours is there any measure of help or co-operation between you and the Professors of Botany in the various colleges?—Yes, there is.

3936. You do work together?—Yes.

3937. And is their post-graduate work linked up with yours?—Until quite recently some of their post-graduate students were coming to me.

3938. *Mr. Kamat:* You said about 25 per cent. of your agricultural graduates go back to farming?—Yes.

3939. Out of that 25 per cent. who take to farming, how many, to your knowledge, make farming a distinct success from a business point of view?—For that again we have no figures: it is extraordinarily difficult to obtain statistics as to the men who have passed out as to what they do or whether they are successful or not.

3940. Do you not think it is rather important as a matter of prestige for the college students, that such examples of distinct success in farming should be brought to the notice of cultivators?—I do think so.

3941. Would it not be advisable to keep a record of those people who take to farming and ask them to give an account of their careers?—Certainly.

3942. Do you know a single instance of one of your college students who has made college farming a great success?—Yes, I do.

3943. I mean made a fortune?—I will not say made a fortune, but made enough to enable him to come to Bombay, buy tractors and take them back with him. That was a man from the United Provinces who took our course and degree. He had his land and capital, of course, before he came to us.

3944. Where your students have not been successful to what do you attribute that failure?—Is it due to want of capital or want of land?—I have not gone into any single case in detail. I think the difficulties are largely land and capital.

3945. If Government were to give land on certain concession terms, do you think the students would take to farming as a business in greater numbers and find their own capital?—That is an exceedingly difficult question to answer. We have amongst our students some men whom nothing will stop from farming; that is the class we want; that class would take up the offers you suggest. Whether it would be wise to induce any other class to take it up I am very doubtful.

3946. In your system of agricultural education you have now at the top the Agricultural College and you have also the Loni type of special schools?—Yes.

3947. In between those two, have you any institutions in which boys could be trained in agriculture with a knowledge of English of a secondary character?—The short course of one year given at the College of Agriculture to some extent does fill that gap. Men come with a knowledge of English sufficient to follow the teaching, who do not wish to take a degree, whose work is more largely practical and has less of the underlying sciences in it than the college course itself. That is a course which has distinct possibilities in it.

3948. Is the short course a popular feature of your system of education?—It is popular in this sense that we can always get the small number that we can actually accommodate: 10 to 20.

3949. On page 104 with reference to fruit growing and fruit preserving you say, invested capital has to wait a long time before it gets any return from the fruit growing. It means a wait of 3 or 4 or 5 years in the case of most fruits?—That is so.

3950. But if at the end of 5 years the return is good, are not people attracted to fruit growing on the scale we hear of in foreign countries?—On the whole they are not, because so far the class that has graduated from our college has not got the necessary capital.

3951. But if at the end of 5 years, it gives a good return, can they not find capitalists who will go in for it on a large scale as a business, as they do in other countries?—That brings in the element of risk, and the majority of our students cannot afford to run any risks.

3952. In other words, they do not inspire very great confidence in investors; is that the position?—I am thinking now of the individual man who is not prepared to start on a line of work in which he does not see the prospect of an immediate livelihood.

3953. To take a concrete case, if you can prove that orange growing or citrus growing is a paying proposition which pays 8 to 9 per cent. on the capital invested, why cannot your graduates inspire sufficient confidence in investors to get enough capital?—I presume the reason is that we have not got a striking example on a big scale yet to show them.

3954. Will you describe in detail what difficulties the fruit growers have to meet in the marketing of oranges and mangoes, for instance?—I am afraid my knowledge is insufficient to answer that question. Horticulturists can deal with that very much better. I understand the difficulty is mainly due to the fact that the fruit is handled by more than one person between the actual grower and consumer; there is a great deal of loss in transport and there is no grading.

3955. Take, for instance, the Poona market for the sale of oranges. Fruit comes into Poona market from a long distance, about 15 miles. Generally, is there more than one middleman to handle the fruit between the grower and the consumer?—I am afraid I cannot give you a definite answer on that point; my knowledge is not sufficient.

3956. So far as I know, there is only one middleman, and he handles the whole thing between the grower and the consumer. Fruit preserving has been tried on a large scale?—I would not call it a large scale.

3957. I suppose a beginning was recently made in one or two places?—Yes.

3958. Do you think there are possibilities in canning and fruit preserving?—I think there are definite possibilities.

3959. I believe the difficulty with regard to imported tins has recently been solved; tins are now manufactured in Bombay?—Yes.

3960. The difficulty is with regard to capital, I think?—Very largely.

3961. Chiefly an economic difficulty? I think so.

3962. Do you think in certain areas people have not appreciated the value of fruit preserving, and therefore Government should help to start factories?—No, I would rather the industry worked its own way unhelped, because, if it did so, it would be on a sounder basis.

3963. Would you be in favour of the Government subsidising those who undertake to establish the industry?—Not a direct subsidy.

3964. How are people likely to gain confidence in fruit preserving as an industry unless they see some demonstration?—By the ordinary way that any business firm manages to get its products sold, I presume: by the cheapening of the process and the advertising of the product.

3965. But if it is left to private enterprise and the man who undertakes the production makes a mistake, that would have a very bad effect on the possibility of other undertakings being subsequently commenced?—Yes.

3966. The danger of the ill effects consequent upon a mistake made by a private producer might be obviated by a little pioneer work; would you not support that?—No; my experience is that once that help is given it is exceedingly difficult to withdraw it.

3967. *Dewan Bahadur Malji:* At page 104 you say: "Fruit-growing offers itself as a suitable subject for the development of co-operative sale societies associated with standardisation of the varieties planted and grading of the fruits when harvested". Have you tried this experiment in connection with any co-operative fruit sale society?—No, I have not.

3968. Have you anything in view in the immediate future?—No, I put that down purely as a theoretical statement because it is so obviously the line which should be followed.

3969. Is not this idea very possible in this part of the country?—It is.

3970. Would you mind trying it?—I can make no promises at this stage.

3971. Are you in favour of a system of granting licenses for the sale of seed to guarantee its purity and germinal capacity so that purchasers would not have to buy in the market without any guarantee?—I do not think the abuse is sufficiently great to demand such a remedy, and I also think it is impossible to enforce that type of legislation unless the population is determined to enforce it.

3972. Do you not think it might be applied to cereals?—I have not yet had brought to my notice any serious case of abuse in which such legislation would be necessary.

3973. Are you in favour of the publication of meteorological news in the vernaculars?—I had not considered that. The news itself is not of so much importance to us. It is the correlation of the actual meteorological phenomena with the growth of the plant that I am interested in. We want particularly to know when plant damage is likely to occur; we can avoid that damage if we know in time.

3974. So that the notification of the meteorological state of affairs to the public would be a matter of some importance?—Yes, but not at this stage; it requires a good deal of work yet by the Meteorological and Agricultural Departments.

3975. *Sir Ganga Ram:* On page 102, you say: The majority of students who have studied agriculture in the College of Agriculture, Poona, have entered into Government service in one department or another"?—Yes, in the Provincial Departments as Deputy Collectors and in the Educational Department as teachers.

3976. In the Education Department do they receive sufficient pay?—I have not heard complaints.

3977. Have you tried to secure all the appointments in the Irrigation Department for your students?—No, but one or two have secured appointments in the Special Irrigation Division where they have been studying the problems of salt land.

3978. In the Punjab they have guaranteed that all the appointments as *Zilladars* in the Irrigation Branch shall go to agricultural graduates?—I am afraid our organisation does not allow that.

3979. When you spoke of fruit preservation, to what fruits were you referring?—Preserves have been made of mangoes, bananas and figs.

3980. Is there a fruit preserving factory?—Yes, there are three to my knowledge.

3981. Do you include horticulture in your teaching syllabus?—Yes, we do.

3982. And sericulture?—No, that is only included as part of their entomological studies; it is not taken up as a technical branch.

3983. Is there any part of this Presidency where the population take sericulture seriously?—I cannot remember at this moment; I think the Salvation Army have one place, but it is not taken up as an industry of the population.

3984. You say you want to increase the amenities of life in agricultural areas. How are you going to do that?—I have already said in answer to

a similar question that I can only give a few cases that I have known where it has been done in a small way; I have no general recommendations to make.

The Chairman: I think the point has already been very fully covered.

3985. *Sir Chunilal Mehta:* Agricultural officers on leave, when they can afford the time, try to visit institutions and to attend congresses?—That is so.

3986. I think you attended the Potato Conference when you were on leave?—I did.

3987. So that, whenever they can, officers on leave do try to enlarge their knowledge?—That is so.

3988. *Mr. Calvert:* When you attended that Conference were your expenses paid?—They were, but I was sent definitely in that case as a delegate of the Government of India.

3989. *Sir Chunilal Mehta:* To your knowledge there has been no demand for improvement in the amount of financial assistance that is given for study leave?—No, there has been no demand.

3990. *Sir Thomas Middleton:* In connection with your grass experiments, is there any area or district in which the formation of enclosures has been taken up by the villagers?—There is this one place.

3991. Is there any apart from Nasik?—No, I cannot call to mind a place where it has been taken up.

3992. Do you attribute that mainly to the cost of fencing?—Partly to the cost of fencing and partly because the ordinary villager does not understand that the grass will of itself improve if it is properly treated.

3993. I should have thought he could be brought to comprehend that. The two difficulties I see are fencing and rights of common pastures?—In some cases that is so, and there, of course, the difficulty of dealing with the whole village comes in, especially where you have factions.

3994. *The Chairman:* Do you find that the rural population has an accurate knowledge of the food value of grasses?—In places where cattle are important you find that the people understand the relative values of the species very clearly.

3995. Are you yourself doing any work in connection with fodder preservation?—Personally, no.

3996. Who is doing that work in this Presidency?—The Livestock Expert and the Deputy Directors.

3997. In doing your selection work on grasses, do you have regard to the preservative qualities of the grass?—Yes, I ought to correct that statement; we have been experimenting, particularly with pit silos, on the behaviour of these grasses and weeds in pit silos.

3998. So that to that extent you have been carrying out experiments in the preservation of fodder?—That is so.

3999. On page 103 you say, "One is almost inclined to believe that we have got in India all the pests that we are likely to get." Are you sure you want those words to stand as they are typed? I do not know whether you would care to modify them at all?—I will modify them in this way: "Up to date there has been little attempt until recently to restrict pests from outside entering India."

4000. You desire to leave it at that?—Yes.

4001. What do you regard as the most important line of research that you are engaged on at the moment?—From the general point of view I should say research on means for producing drought-resisting varieties of crops.

4002. Any particular crops?—The one that I am working on is *bajri*, one of the inferior millets, but it applies to all crops.

4003. In what neighbouring Province is that particular crop grown?—You get it very largely in Madras; you also get it in the Central Provinces and in the United Provinces.

4004. Take Madras for the moment; is any work being done in that direction on that particular crop in Madras?—I am not acquainted with any work being done there; it may be but I am not acquainted with it.

4005. In the Central Provinces?—I have not seen it mentioned.

4006. In the United Provinces?—There again my ignorance is complete.

4007. Are you satisfied that if work of that sort were being done in those three Provinces you would know about it?—No, I am not satisfied.

4008. So that on that single concrete example it emerges beyond dispute that correlation of research work is lacking?—That is so.

(The witness withdrew.)

Mr. E. S. FARBROTHER, Superintendent, Civil Veterinary Department, Bombay Presidency, Poona.

Replies to the Questionnaire.

QUESTION 1.—(*a*) (*ii*) VETERINARY RESEARCH.—Practically the whole of the Veterinary Research work carried out in India is performed at Muktesar where the Imperial Institute of Veterinary Research is situated. In addition to the research which is done there, the Institute—with its branch at Izatnagar—also manufactures all the sera and vaccines required in the Provinces and Indian States; in fact, I gather that the manufacture of these products is now the chief function of the Institute.

The Institute has attached to it a very large estate, the administration of which, together with that of the Institute, takes up practically the whole of the Director's day. As he is also the senior research officer, he cannot have very much time to devote to this branch of his work and since he is usually an officer selected specially for his research abilities, it appears to be a pity that he cannot devote more of his time to the work for which he is especially fitted. I think it is necessary therefore, if Muktesar is to take its proper place in connection with veterinary research that there should be appointed a whole-time Director, and for reasons which I will attempt to show later, he should be an officer with a wide experience of Indian conditions and with administrative ability. Such an officer could easily be found among the senior officers of the Indian Veterinary Service. The whole of the research staff would then be able to give its undivided attention to its legitimate work.

The full staff should be recruited as soon as possible and I understand that this is to be done.

Muktesar, situated as it is up in the hills of the United Provinces, though in an ideal situation for the work which it has to undertake is too isolated to be able to deal with local problems, and must remain a central research institute, dealing with the wider problems in connection with animal disease only. For this reason it is necessary to have in addition local research laboratories for dealing with the more local problems which are met with from time to time. In this Presidency, I understand that administrative approval has been given for the erection of an up-to-date bacteriological laboratory in connection with the Bombay Veterinary College, and if an efficient and experienced research staff is recruited the work which I have in mind could easily, I think, be undertaken there. Up to the present time no serious research work has been carried out in the Presidency for the want of properly equipped laboratory and a trained staff. Our present method is to send material to Muktesar and the Director there is always very willing to give any assistance he can. But it is impossible for him to send his officers all over India to investigate these conditions in the field. There is also plenty of room for research into the treatment of disease in which both the central and local research institutions could be of immense value to the Provincial Services. It would be necessary that the officers of both the central and local institutions be able to tour and in Presidencies where local laboratories are opened in connection with colleges, it must be understood that they are not only there for teaching purposes, but are an essential part of the Provincial Service and that the officer controlling the District work has as great a claim on the services of the laboratory staff as the college has. If this is not possible then it would be best to have an independent laboratory to assist the district workers.

In all research work it is essential that the programme, if it is to be taken to a successful conclusion, must be continued without interruption such as might result from the want of funds. To insure a continuous supply of money, the possibility of forming a veterinary research fund might be taken into consideration. The fund could be administered by a committee appointed by the Government of India and the money allotted where

it is required. It is conceivable that most of it would go to Muktesar, but some could also be spared for the local institutions when it was urgently required for special purposes.

Research into animal diseases is of the greatest economic importance in India and it is necessary that it be put on a sound footing. I suppose that in no other country in the world is less interest taken in this subject, although the bullock is essential to the livelihood of the vast majority of the population.

QUESTION 4.—ADMINISTRATION.—(*a*) and (*c*) (*i*) It is my opinion that a Government Veterinary Service can be best utilised in the detection, investigation, and control of epidemic and other diseases which are of economic importance In India, however, the various provincial Veterinary Services have been given other work to do in addition to this, *viz.*, the management of veterinary hospitals and dispensaries. In the Bombay Presidency and Sind the hospitals and dispensaries are maintained by the District Local Boards and the services of the subordinate veterinary staff are lent to the Boards for running these institutions; but as the men are also to carry out the work in connection with epidemics they remain under the control of the Superintendent. The position is peculiar from the point of view of the staff as they have two masters to serve, it cannot be satisfactory to the Boards for they have no control over the men in charge of their veterinary institutions and it is not satisfactory from the point of view of the Superintendent for since all, or practically all, of his staff is in charge of stationary institutions, he finds it difficult to concentrate his men where they are most required when extensive epidemics occur. If the Veterinary Assistant Surgeons are to run their dispensaries properly and the livestock owners are to get the full benefit from these institutions, the former must be always present. Such is not the case, for the owner never knows whether the "doctor" will be present. On the other hand, if disease is to be properly dealt with hospital work must suffer. Under present conditions both branches of the work suffer.

From an economic point of view, the control of contagious disease and the investigation of unusual mortality among livestock are of the utmost importance, and it is in this work that Government Veterinary Services should be employed. There is plenty to be done in the whole of India for a whole-time diseases of animals department to be formed in each Province and an essential part of their organisation would be the local research laboratories already referred to. The activities of these departments should be confined to the detection of disease (a most important item), investigating their causes, and undertaking measures to combat them. In their efforts in this direction, they must be supported by legislation. The staff must be freed from all work in connection with hospitals and dispensaries, the entire control of which should be left to the Local Boards, Government officers acting only in an advisory capacity to the Boards. It is only in this way that India can get the best value from its Veterinary Services.

The Government of India could and should assist in the work by having a Veterinary Department of its own, similar to the Bureau of Animal Industry in the United States of America. With such a department with the Central Government, it should be possible to co-ordinate the efforts of the local departments in their efforts to combat epidemic diseases. The head of the department would be the Director of the Muktesar Institute of Veterinary Research and it is for this reason that I have stated (under Veterinary Research) that the Director should be an officer with an extensive knowledge of Indian conditions and with administrative experience The duties of the Government of India department would be (1) the co-ordination of work in the Provinces and Indian States, (2) the prevention of spread of disease from a Province or State to adjoining territory and (3) the investigation of the wider problems of animal disease met with in India, for which purpose it has already got an excellent research station at Muktesar.

It appears to me to be very doubtful if the full value of Veterinary Services to agriculture has yet been realised in India, or at any rate, in the Bombay Presidency. Very little money is spent on it in comparison with other departments, and its progress has been hampered by the absence of higher officers. The Superintendent has to do all the administrative and executive work with the help of one Personal Assistant and five Veterinary Inspectors—officers of ungazetted rank. In this respect, it compares very unfavourably with the Civil Veterinary Departments of other Provinces, most of which have two or more I. V. S. officers and a full complement of Deputy Superintendents. The work in all branches has considerably expanded in the past few years and if progress is to be continued, it is essential that decentralisation must take place. Recently proposals were submitted to Government for this purpose and administrative sanction was accorded to a partial decentralisation by the creation of a separate office for the Deputy Superintendent. It is important, however, that at least one, and preferably two more Deputy Superintendents be appointed in addition to the one already appointed, and for whom the creation of a separate office has been approved. This would relieve the Superintendent of all routine duties and leave him more time for his administrative work and for general supervision.

In the Bombay Presidency there are three separate veterinary establishments, each of which has a separate Head, who is directly under the control of the Minister of Local Self-Government. It appears to be desirable for the better co-ordination of the work within the Presidency that these different establishments should be brought under one Head, who should be designated the Director, Civil Veterinary Department. This officer should be responsible to Government for the proper administration and control of all veterinary work, including veterinary education, in the Presidency and Sind. His assistants should be designated Assistant or Deputy Directors as the case may be. The present system is unwieldy and has so far as I am aware, no counterpart in any other Government department. Apart from the better administration and co-ordination resulting from the amalgamation of the three departments, it would probably result in a certain amount of economy in administration.

For any movement towards the better co-ordination of veterinary work in India, it is necessary that the Indian States be brought within the scope of the movement; to this end the Senior Veterinary Officers of the States should be invited to attend the meetings of Veterinary Officers, which are supposed to be held every three years. These meetings should be held regularly and more frequently. I would suggest that instead of Veterinary Officers attending the meetings of the Board of Agriculture in India as members of the Board, the Veterinary Officers' Conferences should be held biennially and scope for discussion extended. At present, the discussion of administrative subjects is excluded from the programme of these conferences, but I see no reason why Veterinary Officers should not be permitted to discuss such questions among themselves, instead of having to discuss them in the full meeting of the Board of Agriculture.

An essential to the better co-ordination of veterinary effort is the existence of some central authority to head the movement. There is no representative of the Veterinary Services with the Government of India who could organise it. Had that Government appointed its own Veterinary Adviser, he could do all that is necessary so far as local financial conditions permit, and I would strongly advocate the appointment of such an adviser. He could combine with his advisory duties that of Director of the Imperial Institute of Veterinary Research at Muktesar, in the same way as the Agricultural Adviser is also the Director of the Agricultural Research Institute at Pusa. His office should be under the direct control of the Government of India and he should be responsible to that Government for all veterinary work which it may decide to undertake. At present, the Government of India appears to have delegated all veterinary work to the Local Governments, but if a really serious effort is to be made to control disease, then

the Government of India will have to take part and a Veterinary Adviser will be essential.

QUESTION 15.—VETERINARY.—(*a*) I do not quite understand how the system of placing Civil Veterinary Departments under Directors of Agriculture was ever introduced into India. No one would, I imagine, suggest that the Medical Department should be placed under any but a professional officer and I do not see why the Civil Veterinary Department should be treated differently to its sister department. I am emphatically of opinion that the department should not be under the control of the Director of Agriculture, but that it should have a Director of its own. In this Presidency, the two departments were separated in 1919 and since then the Superintendent has been directly responsible to the Minister and I consider that this system should continue.

In my opinion it is wrong that a professional department should be placed subordinate to any but a professional officer. The Minister in charge also should receive his advice on professional matters and the requirements of the department direct from the department concerned and not through the medium of a lay officer. So far as I am aware this is the only department which it has been suggested should be treated otherwise than in this manner.

The principle of separating the two departments has been accepted by all Local Governments in India with the exception of the Punjab. It has worked well and there is no necessity to retrogress by placing the Civil Veterinary Department under the Director of Agriculture again.

(*b*) (*iii*). I am not entirely in favour of the transfer of control of veterinary dispensaries to provincial authority but would advocate it under certain conditions. I have already stated that I consider it essential that separate departments should be formed for the detection and control of contagious diseases of livestock. If such departments were formed I would leave the entire control and management of veterinary hospitals and dispensaries to Local Bodies, Government Veterinary Officers only acting in an advisory capacity to them. If, on account of financial reasons Local Bodies are unable to support these institutions without the whole of the assistance that Government is now giving them, and if Government are unwilling to maintain a sufficiently large staff to meet both requirements, then I would advocate that Government should take over entire control of all dispensaries. This proposal has already been submitted to Government as an alternative to the creation of a separate department for animal disease.

(*c*) (*i*) and (*ii*). Speaking generally, agriculturists make good use of our veterinary dispensaries so far as they can and I think I am correct in saying that over 50 per cent. of the cases treated belong to that class. Stationary hospitals and dispensaries can only properly serve a limited area though many people come from outside that area and ask for medicines for the treatment of their stock. The majority of the patients treated, however, come from the town or village, or its immediate vicinity, in which the dispensary is located. One dispensary cannot serve the whole of a taluka or two or three talukas as the case may be and to remedy this I have considered the introduction of itinerating dispensaries having a jurisdiction of not more than one taluka. Two such dispensaries have already been started and a few more will be opened shortly, but it is too early yet to state whether this system will be more successful than the stationary institutions. In the past itinerating dispensaries have not proved a success in this Presidency, the probable reason being that they were expected to serve too large an area.

(*e*). Usually there is very little difficulty in securing sufficient serum to meet the demand. Owing to the distance of Muktesar from Poona, it takes about a fortnight for a consignment to reach us after indenting by wire, and we are occasionally without for a few days. A very heavy demand on Muktesar may also result in a little delay and I would like to see the possibility of opening a more central serum depôt investigated.

(*f*). The main objection I have met with from villagers to submitting their stock to preventive inoculation is of a superstitious nature. With the spread of knowledge of the advantages of preventive inoculation however, this objection is being gradually broken down. Another objection to the use of preventive inoculation against rinderpest has recently arisen and that is the short period of immunity conferred. Formerly we were able to state that immunity against this disease would last about three weeks, but recent research has proved it to be of shorter duration. This necessitates re-inoculation of protected stock during an outbreak and the people have not yet become used to this. Many instances have occurred however where re-inoculation has been undertaken with complete success, the animals so protected having remained healthy throughout a long outbreak.

Fees, at the rate of two annas per head are charged for all inoculations and vaccinations other than rinderpest in this Presidency and this does undoubtedly act as a deterrent in many cases. Frequent reports are received that the people would be willing to have their stock protected if it can be done free and in certain cases this is done as an object lesson on the value of this treatment. I have suggested that these fees should be abolished altogether as the income derived is very small in proportion to the expenditure and because they do act as a deterrent to the more widespread use of preventive inoculation.

QUESTION 16.—ANIMAL HUSBANDRY: IMPROVEMENT OF LIVESTOCK.—(*a*) (*i*) In all efforts to improve the breeds of livestock in India no serious attention appears to have been given to the effects which epidemics have on all such operations. Rinderpest is practically always causing losses and periodically a great wave of this disease passes over the country and takes enormous toll. Hæmorrhagic septicæmia and blackquarter occur every year and carry off many victims. Foot and mouth disease is not so important so far as mortality is concerned, but is of great economic importance; anthrax is of very great international importance owing to the export trade in hair, hides and wool. In addition to these epidemic diseases there is certainly a heavy annual loss from parasitic diseases, the true extent of which we do not yet know, as mortality from this cause is not often reported. We do, however, know that a large number of parasitic diseases exist. The effect of all this loss on breeding operations is obvious and there can be no doubt that disease, combined with famine is largely responsible for the present deteriorated condition of Indian cattle. If improvement in the livestock is to be effected we must first deal with the cause of deterioration, and one of the first essentials is undoubtedly the systematic suppression of epidemic diseases.

One of the great weaknesses of the present system of dealing with contagious disease is that there is no obligation on the part of the owner to undertake measures to prevent disease spreading, nor is the Civil Veterinary Department given any authority to insist on necessary measures being undertaken. Secondly our reporting agency is very weak. Many epidemics are not reported until they have gained a good hold, thus making their suppression more difficult. Thirdly, the Civil Veterinary Departments have not been organised to deal with the situation properly. With this I have dealt previously and will not enlarge on it any further.

So far as the carrying out of measures of control is concerned, the only way to obtain the desired results is to compel livestock owners to take such measures as are considered desirable to prevent disease from spreading. By this I mean that efficient control can only be effected by means of legislation. As to whether this legislation should be undertaken by the Central or Local Governments is a question which must be considered. In the United States of America, where a similar system of Government obtains, Local or State legislation for the control of disease within their own limits, is undertaken by the State Governments, and the Central or Federal Government deals with interstate control. The weakness of this system apparently lies in the fact that there is no uniformity among the various States, and I am of opinion that this can only be remedied by the Central Government passing a Diseases of Animals Act for the whole of India. The Government of India

would probably have to take an active share in the work, in the same way as the Federal Government of the United States does. So far as anthrax is concerned, in view of its international importance it is incumbent on the Government of India to take steps to prevent the dissemination of the disease in India and to and from India and other countries.

The improvement of the reporting agency is a great difficulty. In the Presidency proper it is one of the duties of the village police officer to report the existence of disease in the village. In some cases, however, the police *patel* is in charge of a group of villages and the fact that an epidemic is causing losses among the stock of one of them is frequently not brought to his notice—at least, that is the excuse he offers for not reporting it. In other cases the *patel* does not realise the importance of this duty, and many cases have come to notice where an epidemic has been creating havoc among the livestock of a village without the fact being reported at all. The only way I can see of improving on this is for the veterinary staff to go round the villages, fairs and markets, examining the cattle and immediately reporting and taking action to prevent its spread when discovered, and for this it is of course essential that a department for control only should be organised.

The measures which should be insisted upon are as follow :—

(1) It is essential in the first place to have prompt reporting, and whatever agency is used for this purpose, the responsibility of this must be impressed upon it, and failure to report should be punishable.

(2) Isolation and segregation of affected and incontact animals, without this all other measures would be of little avail. It is essential that incontacts be segregated as well as the affected isolated, as the former are capable of carrying infection, although they may not be showing active symptoms.

(3) Disposal of carcases. The present custom, and it is difficult to stop, is for the Chamars to remove the carcases, skin them and throw the remains away. This should be prevented and all intact carcases disposed of by burning or burial.

(4) Disposal of excreta, etc. This is as essential as the disposal of carcases.

(5) Closure of all fairs and markets in areas where disease is existing. These fairs and markets are frequently the cause of disease spreading over wide areas.

(6) Control over the movement of herds owned by dealers, butchers and graziers. These herds are a frequent source of contagion and we have at present no means of stopping the movement of these herds, whether they are a source of danger or not.

(7) Thorough disinfection of all stables and standings, etc., where diseased animals have been.

(8) Thorough disinfection of all transport used for the conveyance of animals.

(9) The compulsory inoculation of incontact animals with antisera in the case of those diseases for which it is available. In Madras I understand that this is now being attempted.

One feels that we can do nothing under existing conditions to prevent disease from spreading and causing infinite harm to the livestock industry. This has been particularly impressed upon me in connection with two extensive epidemics with which I have had to deal in the past six or seven years. The first was in Baluchistan where the disease was introduced by hired transport animals imported from the Punjab for military purposes. It spread rapidly over the lower part of Baluchistan and into the upper part of Sind. In the case of the hired transport animals, the Officers of the R. A. V. C. were able to suppress the disease once they decided to undertake compulsory periodical inoculation. In the villages, however, it was a

different matter. A certain number would agree to have their cattle protected and probably carried out the measures recommended to them. Some would not, and it is these irresponsible people who are responsible for the disease spreading in all directions. The same experience was met with in this Presidency in 1924-25-26. In spite of the inoculation of large numbers of animals with antirinderpest serum, the disease continued to spread and all one could hope to do was to reduce the mortality. In this I consider we were very successful, but it was obvious that if disease was to be confined within narrow limits, the optional method of control would have to be abolished and compulsion introduced.

Oral Evidence.

4009. *The Chairman:* Mr. Farbrother, you have put in a note of your evidence in two instalments. I deal first with the one which begins with Veterinary Research. I would ask you first whether you wish to make any statement of a general character or whether you are prepared to proceed at once to questions?—I have no particular statement to make.

4010. I observe from what you have put before the Commission that you are fully alive to the importance of the bullock and of cattle generally in assisting agriculture in this country. Your note begins with a statement of the position of the Institute at Muktesar?—May I be permitted to say I have never visited Muktesar personally. This is purely from knowledge I have picked up.

4011. We will bear that in mind. Do you think the Muktesar Institute is fulfilling its purpose as a central research station?—So far as I can gather, I think it is.

4012. In your experience in this Presidency, have you known it to fail in any specific directions?—No.

4013. You set out in your memorandum suggestions for the reform of the organisation at Muktesar; you say you think that if Muktesar is to take its proper place in connection with veterinary research there should be appointed a whole-time Director. What relation do you think that Director should have to the Government of India?—I think he should be Veterinary Adviser to the Government of India.

4014. Have you anything to tell the Commission about veterinary education in India?—I have never been intimately connected with the question of education except so far as my men are concerned. I think, for instance, the course of instruction might be extended and made more advanced than it is at present.

4015. How many posts fall vacant every year?—We are at present recruiting about 10 men a year ourselves. Next year I have got administrative approval for the appointment of 15. That is roughly what we are absorbing. There is very little else for veterinary surgeons to do in this country except Government service at present.

4016. What would be the qualifications for these appointments?—They are graduates of Bombay Veterinary College.

4017. On page 118 you speak of the advisability of forming a veterinary research fund. How do you propose to get the money?—I do not know quite, unless it is obtained by public subscription and assisted by Government in some way.

4018. But you have no definite scheme in mind?—No, I have not a definite scheme in mind.

4019. On page 119 you say: "It is my opinion that a Government Veterinary Service can be best utilised in the detection, investigation, and control of epidemic and other diseases which are of economic importance. In India, however, the various provincial Veterinary Services have been given other work to do in addition to this, *viz.*, the management of veterinary hospitals and dispensaries." Surely for carrying out what you regard as the essential duty of the service it is necessary to have some clinical material, is it not? There is plenty of clinical material.

4020. So that you do contemplate the service having charge of certain hospitals?—What I contemplate is a service similar to that which we have in England: a contagious diseases branch of the Ministry of Agriculture.

4021. On quite a different point: on page 120, you are speaking of the Board of Agriculture meetings; your suggestion there for reform is that veterinary officers might confer amongst themselves. Would it not be possible to combine both plans?—Yes, I think it would, if we could meet at the same time at the Board of Agriculture, as a meeting of veterinary officers alone I mean.

4022. Because it is important that veterinary opinion in this country should be kept in close touch with purely agricultural problems, is it not, where those problems touch matters of cattle improvement and so on?—We are really not actively engaged in cattle improvement ourselves in this Presidency; the Agricultural Department have taken it over.

4023. I am aware of that; but take the question, for instance, of immunity from disease; that is partly a question of heredity, is it not?—I do not think it is as regards the diseases with which we have to contend.

4024. You do not think the fact of the susceptibility of imported stock as compared with indigenous stock to certain diseases prevalent in India, particularly in relation to the schemes for the improvement of breeds by crossing with imported stock, is important?—The reduced immunity of imported stock is chiefly due to the fact that they have not been subjected to infection. I mean the English animal is much more susceptible to rinderpest than Indian cattle are.

4025. So that you do not think it is a case of heredity but of acquired immunity, the result of infection?—Yes.

4026. It really is your view that no good purpose is served by bringing the Veterinary and Agricultural Services together in reference to the breeds of cattle?—No, I would not say that; I think there are questions on which veterinary advice may be necessary; probably veterinary representation would always be necessary on the Board of Agriculture.

4027. On what tangible points do you think advantage accrues from that meeting between the Veterinary and Agricultural Services?—What I had in mind was that they may require some advice on veterinary affairs in relation to their cattle-breeding.

4028. Our ideas have again come to agreement?—I do not think so quite; I may not be able to make myself clear.

4029. On page 122 you lay stress on the relation between epidemic diseases and the improvement of cattle?—Yes.

4030. Your view being, I take it, that the high mortality amongst cattle deters those who might otherwise spend time and money on improving the breeds, from doing so?—Yes, I think probably it does.

4031. What point had you in mind when you set down those words?—The constant loss that the breeders are put to from contagious diseases must deter them from putting a lot of money into the breeding of good stock.

4032. So that there again there is a very close inter-relation between your service and the improvement of breeds?—Yes.

4033. I am interested to note, and I am sure my colleagues are, that in your view there is a case for the passing of All-India legislation to control epidemic diseases?—Yes.

4034. Have you had experience of the ill effects of the absence of such essential legislation?—Yes, I think I have.

4035. Could you give us a case?—We have had very extensive outbreaks of rinderpest in the Presidency recently and my experience was that we were unable to check its spread. We were successful in reducing the mortality, but I was not able to stop it spreading from village to village and probably back again to villages at which it had already been.

4036. On this point you are also of opinion that it would be necessary to attempt, at any rate, to work in conjunction with the Indian States?—Yes, I think so.

4037. Have you had any indication as to how any suggestion of that sort would be received by the Indian States?—No, I have not so far; from the minor States in the Presidency I have had requests for assistance in the suppression of their outbreaks.

4038. In the meantime I take it that if there is an outbreak of haemorrhagic septicaemia just over your provincial boundary, there is nothing to prevent the owner of an infected animal walking straight across your boundary leading his animal, is there?—Nothing.

4039. On this matter of legislation by the Government of India I notice in the provincial memorandum* provided for the Commission there is mention of the Glanders and Farcy Act, which is the only Act of the kind in force. Have you had any experience as to how that Act works?—I have to put it into force every year.

4040. And is it your view that the operations of that particular statute have tended to check the spread of these diseases?—So far as regards glanders and epizootic lymphangitis, yes.

4041. I gather it is your view that the only hope of dealing adequately with outbreaks of contagious disease amongst animals in this Presidency will be by the formation of a mobile corps which could be removed to that part of the Presidency where the outbreak has occurred?—Where the corps was chiefly required, yes.

4042. Otherwise the whole of your force is dissipated amongst the various districts?—Yes, under present conditions.

4043. And you cannot effect any substantial concentration at the point of danger ?—No, that is my trouble at present.

4044. Do you know whether any plan of that sort has been considered by Government?—I have submitted proposals to Government in connection with legislation as to contagious disease.

4045. Do you know what was the result of your suggestions?—They are not taking it up for the time being; they are, I think, awaiting the result of this Commission.

4046. Now is your chance to drive home the point. Do you wish to say anything more than has been set down in print about it? Would you like to emphasise the importance of the formation of such a corps, or do you think you have said all that can be said about it? How about its cost? That is an important point?—That depends largely on whether Government is only going to keep a corps for that purpose or whether it is going to keep one corps for this purpose and one for the management of dispensaries as they are at present. That would, of course, increase the cost considerably.

4047. You would not suggest, when there were no epidemics, keeping your corps standing by like the Metropolitan Fire Brigade?—There will be plenty of work for them. Epidemics are always with us.

4048. Turning to your other memorandum, you lead off with a clear statement of your views on the present system whereby in certain Provinces the Civil Veterinary Departments are placed under the Directors of Agriculture. That does not apply to this Province, does it?—No; we are at present separated.

4049. Whose battle are you really fighting on that page?—No one's. The Questionnaire asks for an expression of opinion as to whether the Civil Veterinary Department should be under the Director of Agriculture or independent.

4050. I want your frank view on this point. What do you envisage as the ideal organisation as far as veterinary work, cattle improvement work and dairying work are concerned? Have you any desire to bring these three together under one Head?—No particular desire, no.

4051. You have no ambitions about cattle improvement?—I have no desire to bring it under my control.

4052. You do not think it ought to be?—I do not think it is very important whether it is under the Agricultural Department or the Civil Veterinary Department.

4053. You have no tinge of the normal departmental avidity in these matters?—I have never had the control of cattle-breeding in my hands.

4054. Would you care to tell the Commission anything about your view of the suitability of the serum-simultaneous method of prophylaxis? Do you think the time has come when the system has been sufficiently worked out to

* Not printed; Memorandum by the Bombay Government for the Commission.

make it a practical one for general application?—I think the disadvantage of it for general application at present, particularly in the case of small owners, is that the animals have to be laid up for a period of about 10 days. The small owner would not be able to do that.

4055. I understand the period of rest in the case of some animals is a good deal more than that?—That is the minimum.

4056. What is the percentage of mortality?—In the few we have done it was *nil*; there was no mortality. We have not done very many in this Presidency up to the present.

4057. Can you give me any figures about the application of this serum-simultaneous method? Do you know how many animals have been protected by this method in this Presidency in the last 12 months?—We have tackled 2 farms in the last 12 months. In one, the Government farm at Bankapur, we did the greater part of the stock, and in the other, a dairy farm, we did about half. Total stock protected was 182.

4058. The general public has not made any use of the treatment?—The Palghar Dairy where animals were protected in January 1926 is a private body. To that extent the general public have taken advantage of the system and we have had applications from other private bodies and individuals to protect their cattle and this is being done in the near future.

4059. How about the serum-alone method of inoculation against rinderpest? Has that been used lately?—Yes, we use it very extensively.

4060. I think you give some figures about that in your memorandum, but in case this figure is not given, can you tell us how many animals have been done?—In 1924-25 we did something like 117,358 inoculations against rinderpest, and in 1925-26 about 91,300. The disease was not so prevalent in the latter as in the former year.

4061. The immunity lasts so short a time that I suppose you only inoculate in districts where the disease is actually present?—In the case of actual outbreaks only.

4062. I should like confirmation or the reverse from you on this point, which we have heard from another witness. Is it the case that rinderpest hangs about the village so long that if you inoculate a portion of the animals only they are very apt to be infected after the immunity conferred by their inoculation has disappeared?—Yes. I have in mind one village where the disease prevailed for 2 or 3 months, and we were doing inoculations continuously among some of the animals to protect them. Those which were protected continuously were not affected by the disease, but the disease continued in the village itself for some time afterwards.

4063. On a different question, if you had your own way and if your central Provincial Service was devoted entirely to research and dealing with contagious disease and so on you would contemplate some service at the disposal of the districts, would you not?—I think it would be better if the districts could arrange their own in that respect.

4064. This is really an important point. To what extent do you conceive your own service should control the district service? Do you contemplate a complete divorce between the two?—Yes, I think they should be separate. The District Local Boards would appoint their own men.

4065. Entirely?—Probably with the advice of a senior officer. We should act as advisers to them and make recommendations to them if they required it.

4066. Have you any clear conception how that would work? Have you planned it out yourself?—I do not think that the Boards could entirely support and maintain their own establishment and institutions without financial assistance from Government at the present time. Given the financial assistance and the advice of Government technical officers, I consider the Boards could manage their own institutions.

4067. I understand that as part of that system you would recommend a further multiplication of local animal hospitals? You would like more of

them?—I should certainly like to see more hospitals opened. We have not enough of them at the present time for ordinary purposes.

4068. Under the charge and control of the District Boards?—Yes, if we have a separate department.

4069. Are you going to have a central animal hospital as well? You are going to carry on research at the centre?—Yes.

4070. You will require a certain amount of clinical material with which to carry on that research?—Yes.

4071. How would you provide it?—Our men could get that in the villages in connection with their work on contagious and other diseases. The District Local Board men would also be able to take advantage of the research institute in regard to their problems.

4072. I had not thought of a central research station without shelters for animals and all the equipment one is accustomed to see at these places?—Yes; it would have to be fully equipped and have accommodation for experimental animals.

4073. *The Raja of Parlakimedi:* Do you encourage the taking in of boys from outside British territory, from the Indian States, and training them in veterinary science?—I think we do. I have not control of the Veterinary College, but I think they encourage it and are quite willing to take any people the Indian States wish to send.

4074. Do you also encourage the lending of Assistants from your department to Indian States when they want it?—We have not been asked for that, except occasionally when there has been an outbreak of contagious disease. We have not lent men to the States for their ordinary work.

4075. If the Indian States are prepared to pay for all the implements and other things, have you any objection to doing so?—I do not think such a case has occurred up to the present. I have never been asked to supply men from the department except to deal with contagious disease. In any case we should have to refuse for want of staff.

4076. As regards the advantages of inoculation against rinderpest and other diseases, such as that which affects the nostrils of the animals, do you have the advantages of inoculation published and circulated amongst the villages?—No, we have not had that done.

4077. Do you not think if advisable that your department should do such things?—Certainly it is.

4078. It is not being done now?—No. I may however state that at the last meeting of Veterinary Inspectors in my office held on 24th August 1926, the question of publishing results of inoculation in village *chavdis* and *mamlatdars' kacheries* was considered. We decided to institute an enquiry into the ways and means of introducing such a system, but the results of the enquiry are not yet to hand.

4079. *Sir James MacKenna:* On page 120 you say: "In the Bombay Presidency there are three separate veterinary establishments, each of which has a separate Head, who is directly under the control of the Minister of Local Self-Government." What are those three establishments?—There is the Bombay Veterinary College, the Principal of which is also in charge of the veterinary work of the Harbour Board; there is the Civil Veterinary Department of the Presidency proper, and the Sind Civil Veterinary Department, which is separate.

4080. Three officers with the qualification of M. R. C. V. S.?—Yes.

4081. Do you not think the Hon'ble Minister would rather be advised by one than by three?—Yes.

4082. An establishment like that would stand a Veterinary Adviser such as exists in other Provinces, would it not?—Yes.

4083. I take it the method of dealing with veterinary matters in this Presidency is by means of fixed dispensaries?—Yes. We have recently, at my

suggestion, introduced a couple of touring dispensaries, but at present we do not quite know whether they will be a success.

4084. How many Veterinary Assistants have you?—114 at present engaged.

4085. What is roughly the cattle population?—Presidency proper 8,433,397 and Sind 2,324,703 according to the Census of January 1925.

4086. How many Inspectors have you?—Five.

4087. How many Deputy Superintendents?—One, who is my Personal Assistant.

4088. Am I right in believing that the incidence of cattle disease here is relatively less than in most other Provinces in India?—I cannot say; I have no statistics to show that.

4089. Do you not think the best method is a combination of fixed and touring dispensaries? In the one case the owner has to bring his animal to you; in the other you go to him?—Our men do a certain amount of touring, of course.

4090. But they are rather tied to the hospital, are they not?—Yes.

I would recommend you to write to the Veterinary Adviser of the Government of Burma for his new scheme, combining the two, which makes provision for a flying column to meet the case of sudden epidemics.

4091. *Professor Gangulee:* You advocate the separation of the Civil Veterinary Department from the Agricultural Department. Do you suggest this on grounds of more efficient administration?—Yes, on the whole.

4092. You advocate such separation for all Provinces, do you not?—Yes; I think it would probably lead to greater efficiency.

4093. You say in your memorandum that you advocate separate departments for the detection and control of contagious diseases. Do you mean you want two departments, one for detection and the other for control?—No. My idea is that there should be a separate department for the detection and control of contagious diseases, separate from the department which is in charge of dispensaries.

It is not clear in this note.

4094. *Mr. Calvert:* Would you expand that a little?—At present our men are in charge of dispensaries.

4095. You have some touring dispensaries as well?—Only two at present, and they are purely experimental. What I suggest is that we should have a separate department on similar lines to the contagious disease of animals branch of the Ministry of Agriculture at Home, whose work is entirely in connection with contagious diseases. These dispensaries take the place of the private practitioner, who is absent in India.

4096. Would it be a field department or a research department?—A field department and also research.

4097. Then there would be two departments in the field?—One is practically confined to the dispensaries, and works on the everyday diseases of livestock. What I am thinking of is a separate department for contagious diseases.

4098. *Professor Gangulee:* Then you make a reference to Local Bodies. Do you not think Local Bodies are capable of the control of veterinary dispensaries?—I have not said they are not.

4099. I wanted to know your view about Local Bodies taking control of these dispensaries?—I think with the help and advice we could give them they could control them.

4100. They are not able to control them independent of any support from the Provincial Government?—I do not think they would be able to do that.

4101. Your experience is that these touring dispensaries are a failure?—I have not said so.

4102. You say in your note they have not proved a success in this Presidency?—That was in the past, before the present department was formed.

They had one or two of them then which had to cover something like a whole district. It is impossible for one man to do that.

4103. Would you advocate a provincial station for the manufacture of serum?—I do not think that is necessary. Muktesar can turn out all we want.

4104. You say you would like to see the possibility of a more central serum depôt?—That is for storage, so that it could be more easily obtained.

4105. Is there any periodicity in the outbreaks of rinderpest in this Presidency?—There appears to be, yes.

4106. What factors control that periodicity?—It would seem to be something like this. After a very extensive outbreak, a large number of the animals probably attain a certain degree of immunity. The young stock when they are born have not that immunity, and so we get a new generation less immune than the old generation.

4107. You say the two annas charge for inoculation acts as a deterrent in many cases. Do you think it would make much difference if that charge were not made?—Yes, I think it would mean there would be more inoculations against blackquarter, anthrax and so on.

4108. Would you recommend compulsory cattle inoculation?—Yes, I would.

4109. A word about the veterinary inspection service. In the event of an outbreak of contagious disease, what agencies have you in existence now for reporting the matter to the authorities?—The present agency in this Presidency is the village *patel*.

4110. Is that satisfactory?—It is improving gradually, but it can hardly be called satisfactory at present.

4111. What measures do you recommend for the disposal of the carcases during an outbreak?—Burial or burning.

4112. Under the supervision of whom?—The veterinary officer, or some other responsible person.

4113. And if they are not available in the area?—We should have them available in the area if I had what I am asking for.

4114. Are there many cattle markets and fairs in this Presidency?—Yes, a certain number.

4115. Do you think that they are instrumental in the spread of disease?—We have had instances where that has occurred.

4116. At the time of the fair, do you send someone there to exercise supervision?—Yes, as far as possible.

4117. Is the Veterinary College in Bombay popular in the Presidency? Are more students being attracted to it?—I think their numbers are increasing.

4118. *Mr. Calvert:* I understand from the printed note submitted to the Commission that cattle-breeding operations were taken from the department in 1919. Why was that?—The Director apparently considered it was more suitable. As far as I can gather from the orders (I was not here at the time) he thought it was getting rather a large subject and that it required the whole-time services of one officer.

4119. Are cattle-breeding operations now under veterinary or agricultural officers?—Agricultural.

4120. Do you know that the Hissar cattle farm, the biggest in India, is under purely veterinary control?—Yes.

4121. Would you in view of the success of that farm still advocate that it should be under the Agricultural Department?—No; if it is being successfully run up there I see no reason to change the control. I have not advocated its transfer.

4122. You have no particular advocacy, one side or the other?—No.

4123. Are you satisfied with the preliminary training of the students who join the Veterinary College in Bombay, with the grounding they get before

joining the college?—I only know them through being an examiner, and their knowledge of English seems to me rather poor.

4124. So that when they go out as veterinary subordinates they are not well equipped with a knowledge of English. It is a 3 years' course?—Yes.

4125. Do you think there is some room for improvement in the course?—Yes.

4126. *The Chairman:* Is it part of your responsibility to make a representation on that point to higher authority?—I do not think so. I am simply concerned with the work of the Civil Veterinary Department; the Principal of the college is responsible for all educational questions.

4127. *Dr. Hyder:* Do you make any report as an examiner?—The Board of Examiners make a report.

4128. You act as an examiner. Do you make a report to that Board?—A combined report is sent in by the Board of Examiners at the conclusion of the examination.

4129. *Mr. Kamat:* Speaking about the District Local Boards and the veterinary subordinates under them, you said the position was peculiar from the point of view of the staff, in that they had to serve two masters. What alternative method would you suggest? Would you have two separate staffs, one for the District Local Boards and one under you?—Yes.

4130. What would your own separate staff do at times when there were no epidemics?—Unfortunately, we have always epidemics.

4131. There are epidemics throughout the year?—Practically throughout the year.

4132. In fact, you want a whole-time department for animal diseases?—There are not only epidemics to be seen to; there are other causes of death such as parasitic disease, which we have not been able to tackle properly up to the present owing to the men being placed in charge of stationary hospitals. Owing to that we do not come across them as we should.

4133. You say you find it very difficult to concentrate your men in times of epidemic. Is not that more or less natural, even in the case of hospitals for human beings? When epidemics occur the Civil Surgeons have to be given extra work?—I think they have a special staff to assist them.

4134. Are you sure there is a special staff for that purpose?—I think they have what they call a general duty staff, or something like that. I am not certain on that point.*

4135. You refer to the Epidemic Diseases Act and compulsion against owners either in the matter of prevention of disease or reporting of disease. What penalty would you have? Would you make it a criminal offence?—Yes, I think it should be. I think it is criminal for a man not to take precautions to prevent disease spreading from his own cattle to other people's.

4136. Has this been tried in other Provinces to your knowledge?—They have a Cattle Act in Madras. I am not quite certain how it is working there.

4137. How long have they enforced it? Have you any idea?—It is an old Act now. They have had it for a considerable time, but I understand they have not had the staff to work it properly.

4138. If it is an old Act, has it had any effect on the spread of contagious diseases, or on the insufficiency of reporting?—So far as I know, it has not been actively enforced in Madras until recently.†

4139. It has been a dead letter?—Yes, for want of staff to enforce it.

4140. If it is a dead letter there, why do you advocate it here?—If we had the staff we could work such an Act.

---

* On further enquiry the witness finds that the general duty men of the Medical Department are utilised for relief and special duty, such as attendance at fairs, etc.

† The witness subsequently pointed out that the Madras Act was put into force in certain tracts in 1925-26 with successful results in restricting outbreaks of rinderpest.

4141. It is not only a question of legislation, but of having adequate staff?—Yes. We want the staff to work it.

4142. If your other suggestion of a separate department and separate staff, apart from the District Local Board staff, were adopted would you not be able to cope with it without legislation?—We want legislation to assist us.

4143. You want legislative power behind you and the staff to put it into effect?—Yes.

4144. Is this your greatest hindrance to cattle-breeding?—I think it is one of the great hindrances to cattle-breeding; the other is famine.

4145. Do you attribute greater importance to the difficulty about compulsion or to famine conditions?—They are both very important so far as the breeding of cattle is concerned.

4146. Supposing such an Act were passed, providing for measures for isolation, segregation and disposal of dead animals, arrangements will have to be provided for those in almost all the village areas if you have compulsion?—Yes.

4147. In that case, would not that be rather a big scheme for a Province to carry out, from the financial point of view? To make arrangements for segregation and isolation in various localities would mean that the financial aspect of it would be a serious hindrance?—It should be possible for a Province to carry out its own regulations financially.

4148. The financial aspect of it would present no serious difficulty?—It depends on the extent to which it was worked, of course.

4149. *Sir Ganga Ram:* Do you know that Muktesar is making 5 lakhs a year for Government by selling serum?—I have heard they have made a profit.

4150. Can you not make that serum here? Why can you not keep your share in that to yourself?—We have not got the facilities at present.

4151. Is there any physical difficulty?—No, provided we could get the required number of animals down here to carry out the work and a suitable station.

4152. Who is your technical superior in the Presidency?—I am directly responsible to the Minister.

4153. You are not responsible to any other technical officer?—No.

4154. Does horse-breeding come under you?—It did; we have discontinued it. The District Local Boards of Ahmednagar and Sholapur still keep a few stallions but Government is not doing anything in the Bombay Presidency proper at present in that direction.

4155. Have you any farm here like the farm in the Punjab, where you can get bulls of good quality for breeding?—There is one at Charodi in Gujarat and another at Bankapur.

4156. Do you look after the herds from a veterinary point of view?—Yes, so far as our professional services are required. We have nothing to do with the management.

4157. *Sir Thomas Middleton:* Comparing the organisation of veterinary work in this country with that with which I am familiar with in Britain, we have there (1) the Ministry of Agriculture and Fisheries controlling disease and (2) private practitioners doing work which, I understand, is done by Local Boards in this country?—Yes. That is more or less the situation.

4158. The Local Boards in India replace the private practitioner in England, and there are in rural districts either no private practitioners, or very few?—In the absence of private practitioners, the District Local Boards, with the assistance of Government, open dispensaries for the benefit of the people.

4159. Apart from the large towns, is there any considerable number of private practitioners?—Outside Bombay, I do not suppose there is one in the Presidency making a living.

4160. So that, in fact, if the Local Board does not provide the dispensary and hospital accommodation required, there is no agency to take the place

of the private practitioner?—I sometimes wonder whether the dispensary has not displaced the private practitioner nowadays, at any rate in big places like Poona.

4161. *Dr. Hyder:* Do the military *salutaris* take up private practice when they retire?—Yes, I think so.

4162. *Sir Ganga Ram:* Is your staff allowed private practice?—Yes.

4163. What remuneration do they take?—We do not lay down any rules for the charging of fees. We allow them to make that arrangement between themselves and the owners of the patients. The usual charge is about Rs. 2 per visit and conveyance.

4164. *Sir Thomas Middleton:* I gather you consider that the proper function of the Civil Veterinary Department should be the regulation of contagious diseases?—Yes.

4165. Apart from financial difficulties, which have already been referred to, and the small number of the staff, how do you think you could ensure reporting? That is the difficulty I envisage?—That is one of my difficulties at present. That is one of the reasons why I want whole-time staff, so that they can move about and discover disease.

4166. If you had whole-time assistants, would they discover outbreaks? Is not the task too big?—I do not think so.

4167. They would be able to inspect fairs and markets, but the inspection of villages is a very big task?—We have still the other agencies working in addition.

4168. So that you think, if you had this organisation which you indicate, there would be no substantial difficulty on account of non-reporting?—There would still be some difficulty, but I think it would be very much reduced indeed.

4169. One point to be borne in mind in regulating disease by orders is that we should not issue orders which we cannot enforce. So far as I can judge the situation, I should think you would have very great difficulty in enforcing orders in this Presidency?—I am rather optimistic about this subject.

4170. *Dr. Hyder:* My colleagues have examined you on your written evidence, and I want to elicit information on a few points mentioned in the report which you have submitted to the Bombay Government for the year 1924-25. I understand you act as examiner to the Bombay Veterinary College?—Yes.

4171. I understand that the percentages of passes were 73 in the First Professional, 72 in the Second and 80 in the Third. Do you not think those are high percentages?—They are high. They are good percentages.

4172. In cases of surra do you treat by Bayer 205?—In this Presidency the number of cases of surra is not great. We want facilities for putting horses suffering from surra under treatment.

4173. You have got 83 dispensaries for all the districts and 6 more are to be opened in the course of the year. Is that a large enough number for all the districts?—No. We are supposed to recruit up to one dispensary for every taluka.

4174. Where are these dispensaries usually located?—At taluka headquarters.

4175. You say something about the Burdizzo method of castration. Do you think that Government should undertake to pay for that?—I made that suggestion in my report to get it, used more extensively.

4176. Are there any special areas in this Presidency in which such diseases as rinderpest are specially rife? Apart from Nasik and Dharwar have you any such special areas?—The report was for the year 1924-25. That was the year in which we had a virulent and extensive outbreak of rinderpest; and though certain tracts were more affected than others, it was general every-

where except in the Panch Mahals. No particular area of the Presidency is more liable to visitations of this disease than another.

4177. I find the table showing cost of feeding absolutely blank?—We had no breeding operations going on.

4178. What is the system which you have as regards rewards to people for reporting diseases?—We do give rewards for assistance to the department in the form of presents and certificates. But the sum allotted for the purpose is not very great, *viz.*, Rs. 200.

4179. What do you think of the *pinjrapoles*? Are they breeding centres of disease?—I do not consider them to be so. They are sometimes visited by disease, but that is from the importation of new stock. In the Bombay *pinjrapole* we have managed to reduce considerably the incidence of disease by arranging to isolate all new comers to the *pinjrapole*.

4180. You are not in charge of Sind directly?—I know Sind.

4181. There are only 16 veterinary dispensaries in Sind. Do you think that is a large number?—No, it is insufficient.

4182. In Sind you have 17 Veterinary Assistants and one man on reserve duty?—Yes.

4183. That one man apparently is your mobile column. He would not check many outbreaks? You said something about the breeding of horses. What has become of the breed of horses used by the Mahratta cavalry in the old days. Does that breed still exist?—There are very few horses in this Presidency worth mentioning.

4184. *Sir Chunilal Mehta:* Would you tell us what your relationship is with the Livestock Expert, in view of the remarks on page 122 of your note? Is there co-ordination or consultation between your department and that of Mr. Bruen?—None, except when they want our services for treatment of their animals.

4185. What sort of co-ordination should there be? Would you suggest any method?—No, I do not think I can suggest any particular way in which co-ordination should take place at present.

4186. *Dewan Bahadur Malji:* Your Veterinary Assistants are allowed to have private practice even when they are on duty. They draw their salary and you allow them also to pocket fees?—Under Government orders they are allowed private practice.

4187. Then, their fees are unlimited. They may ask for any amount on the principle of demand and supply?—I do not think the income from that source is very large at the present time.

4188. In the village this is felt to be very revolting?—I do not quite follow what you are driving at.

4189. I am driving at this point. Should your Veterinary Assistants be allowed to demand any fees without any control from the superior officer?—We have not laid down rules as to what fees they should charge.

4190. What will be the result if any Veterinary Assistant is unreasonable in his demands? What is the owner of the sick animal to do?—He can go to the dispensary.

4191. But what will happen when there are no dispensaries near by?—We are trying to reach those centres through the touring officers.

4192. Can you suggest any better arrangements?—No.

(The witness withdrew.)

Mr. V. H. NAIK, M.A., Bar.-at-Law, Collector of Bijapur, Bombay Presidency.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—Bijapur district of which I am in charge as Collector is noted for uncertain rainfall. Scarcity and famine frequently occur. The important problem for investigation in this district is that of conservation of moisture, so as to make crop production possible by the application of dry farming methods. For investigating this problem and carrying on experiments, a research station is necessary for the district.

QUESTION 2.—AGRICULTURAL EDUCATION.—(*i*) The present supply of teachers and institutions is not sufficient.

(*ii*) Bijapur district is in urgent need of an agricultural school.

(*iii*) Teachers in rural areas should as far as possible be drawn from the agricultural classes.

(*iv*) I have no exact information as to attendance at existing institutions. If it be not satisfactory, the way to secure better attendance is to improve the curricula and methods of instruction.

(*xi*) The agricultural education of adults in rural tracts may be started by holding classes of short courses of agricultural instructions in suitable centres of each district. They may be popularised by making the instruction practical and interesting and by offering prizes, certificates, etc., to mark appreciation.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) In my opinion, the use of iron-plough, the introduction of improved Kumpta cotton (Dharwar No. I), and the steeping of *jowari* seed with a solution of copper sulphate in order to protect the crop against smut disease are among those measures that have proved highly successful in the Karnatak Division of the Bombay Presidency.

(*b*) If improvements are tried on a field scale at suitable centres of each district, and if systematically organised parties of cultivators are brought to see the standing crops raised under improved methods, that will surely increase the effectiveness of field demonstrations.

QUESTION 4.—ADMINISTRATION.—(*c*) (*ii*) There is at present no major port of international importance on the whole sea-coast between Bombay and Colombo. It is said that the coast of North Kanara is suited for the development of a port of such magnitude. Bhatkal, now a small British port on the coast of North Kanara, was in the 16th century B. C. the gate-way between Vijayanagar and the outer world. It is understood that the Karnatak Indian State of Mysore seeks to develop it into a modern port. From the wider standpoint of British Karnatak and other territory, lying around and within it, this port or the neighbouring port of Kumpta may deserve to be developed as a British port. The country to be served by it grows cotton of good quality, and other agricultural produce on a large scale. It may in fact become an important cotton port on the coast of British Karnatak and redound to the agricultural prosperity of the country. The subject may be investigated.

QUESTION 5.—FINANCE.—The extension of the existing system of village co-operative credit societies, the establishment of special land mortgage banks, and the development of the Government system of *taccavi* are measures that may be recommended for the better financing of agricultural operations.

Short term credit.- Village co-operative credit societies are eminently suitable for providing their members—ryots—with short term credit required for the purchase of seed, manure, bullocks, etc.; and they may be started and developed everywhere. The District Central Co-operative Banks with the Provincial Co-operative Bank at the apex finance the village credit societies. In my opinion these co-operative institutions—village, district and provincial —may specialise in this business of short term credit. The service they can

render to agriculture by supplying ryots with funds even for the purchase of ordinary agricultural requisites will be undoubtedly great.

Long term credit.—For enabling ryots to take up permanent land improvements, such as, excavation of irrigation wells, construction of wads (field embankments), etc., long term credit is necessary. For providing such long term credit, special land mortgage banks with State aid may be established in suitable tracts and the system of *taccavi* extended everywhere.

A special land mortgage bank may be formed on the following plan:—A portion of the shares of the bank may be taken up by Government and the rest by the investing public. Long term deposits also may be obtained. Loans may be advanced on a first mortgage of lands for purposes of land improvement or debt redemption. Small annual instalments payable over a sufficiently long period of years may be fixed for the liquidation of the loans. The bank may have the power of recovery under the provisions of the Land Revenue Code. The Collector may be the president of the bank, *ex-officio*.

Taccavi.—Care may be taken to see that only energetic and industrious cultivators are given *taccavi* loans for schemes of land improvements previously approved. It may also be seen that the schemes are properly drawn up by skilled officers and that they are profitable. If cultivators who are selected carry out such approved schemes, they are sure to benefit. That will doubtless make the *taccavi* system popular and successful.

In my opinion, the distribution of *taccavi* to approved cultivators may be in the hands of the Collector's staff, as it has been in the past. There may also be a sufficient number of agricultural officers of the type of embankment officers for examining land improvements proposed by applicants for *taccavi* and preparing sketches and estimates.

The above remarks about the *taccavi* system may apply to special land mortgage banks also.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—If a ryot who is otherwise competent, has a large debt carrying a high rate of interest, the way to help him is to investigate his liabilities, to pay off the same with an advance at a lower rate of interest, and to take annually from him, in satisfaction of the latter, a small sum over a sufficiently long period of years. Government may take power to investigate the liabilities of suitable cultivators who are overburdened with debt with a view to help being given them in the manner indicated. The funds required may come either from Government direct or from special land mortgage banks.

QUESTION 8.—IRRIGATION.—For Bijapur district I suggest the following:—

(*i*) There are six sites suggested as suitable for making canals. They are:—(1) Kolchi, (2) Shivyogmandir (Govanki), (3) Aiholli and (4) Ramthal on the Malaprabha, (5) Herkal and the Ghataprabha and (6) Galgali on the Krishna. Of these, (1) Kolchi, (2) Shivyogmandir (Govanki) and (3) Herkal are recommended as specially promising. Their immediate survey may be taken up.

(*ii*) Tanks for irrigation may be constructed in suitable localities. The Superintending Engineer on special duty has on his list a good number of suitable sites for such works.

(*iii*) Wells for irrigation:—Wells are successful in Indi taluka and a few other tracts of the district. The extension of irrigation wells in these tracts alone is recommended.

QUESTION 9.—SOILS.—Wads (field embankments) may be constructed along contour lines. By construction of a wad or a series of wads across the water channel, the whole field will become divided into a number of plots. By tillage across each plot it will tend to become level, and rainwater that will otherwise flow away will be retained and spread over it. Further, the erosion of the surface soil will be prevented. As a wad or series of wads properly constructed results in the retention of rainwater in the field, it yields some crop even in a year of deficient rainfall. Its crop yield is of course increased in a year of good rainfall.

QUESTION 10.—FERTILISERS.—The use of cowdung as a fuel may be penalised with proper safeguards.

QUESTION 11.—CROPS.—(*a*) (*i*) A great improvement of existing crops can be brought about by supplying ryots with pure and selected seed of important varieties of crops grown.

(*iii*) As to the distribution of seeds, the case of Bijapur district may, for example, be considered:—

The total cropped area of the district is 2,886,000 acres. Of this, that under cotton is 866,000 acres; that under oil-seeds 56,000 acres; that under wheat 129,000 acres; that under *jowari* 1,400,000 acres; that under *bajri* 175,000 acres; and that under other cereals and pulses 117,000 acres.

The seed of no crop is so badly mixed and so impure as that of cotton. Ryots' cotton is taken to ginning factories, where it is ginned and the seed gets mixed and broken. In the southern talukas of Bijapur district Kumpta cotton is grown, whereas Khandesh cotton is grown, to some extent, in the northern talukas. The result is an appalling mixture of cotton seed, which ryots obtain from ginning factories or shops in the bazar and sow. I would suggest the following plan for producing pure Kumpta cotton seed and supplying it to ryots in this district:—

The Agricultural Department may start a cotton seed farm of about 300 acres and raise seed sufficient for sowing 15,000 acres. The seed yield of the departmental seed farm may be supplied to selected big farmers, having in all 15,000 acres under cotton. They should bind themselves to cultivate their fields well, gin the produce separately and sell the seed to a co-operative society, supplying cotton seed to ryots throughout the district. The seed of these 15,000 acres will suffice for nearly 750,000 acres. The departmental seed farm suggested here may be worked separately or in conjunction with the experimental or research station suggested in the answer to question No. 1.

The seed supply of other crops such as oil-seeds, wheat, etc., may also be organised on a similar plan.

(*iv*) In Mudargi and Nargund Pethas of Dharwar district, the thick clumps of prickly pear afforded shelter to pigs which damaged crops. During the period of crop growth extending over several months, villagers kept watch over-night to scare away pigs from their fields and their health consequently suffered. But a campaign for the destruction of prickly pear by applying fire to it, by allowing it to dry, by cutting it down afterwards, and by burning it again, was carried on in 1923, 1924 and 1925 throughout the III Division of Dharwar district, including Mudargi and Nargund Pethas. The result was that pigs finding their abodes destroyed migrated to distant hills. Thus the country side was freed from the pig trouble. In another part of Dharwar district containing thick forest, walls were constructed for keeping away the pig from the fields enclosed by the wall. These measures have proved successful.

(*c*) In Mudargi Petha, above referred to, the soil is light and sandy. The crop of *kharif jowari* grown in such soil is bound to be poor. Ryots sought to grow ground-nut in rotation with *kharif jowari*, but the pig damaged the ground-nut crop and thus checked its extension. But the campaign of prickly pear destruction has driven away the pig and I understand that the area under ground-nut which is a more profitable crop than *jowari* has increased considerably in Mudargi Petha in the last two years.

QUESTION 16.—ANIMAL HUSBANDRY.—The Government scheme of storage of *kadbi* for saving cattle in a year of fodder famine was worked out in Bijapur district this year with success. The total quantity stored is over 65 lakhs lbs. at a total cost of Rs. 47,000. Of this, nearly 60 lakhs lbs. were stored this year at a rate of Rs. 6·85 per 1,000 lbs. Proposals have been made for storing nearly 219 lakhs lbs. in the ensuing season at a cost of Rs. 1,50,000. Thus the total quantity to be stored by the end of the next season will come to 284 lakhs lbs. at a total cost of nearly Rs. 2 lakhs. The total number of plough cattle in the district is 134,000. The provision of about 670 lakhs lbs.

of *kadbi* will suffice for ⅓rd of these plough cattle for 5 months at the rate of 10 lbs. per day per animal. As ryots also store *kadbi*, it is recommended to store 500 lakhs lbs. for the present.

An average Government stack of *kadbi* is 100′ long and 20′ wide at the ground surface and its height from bottom to apex 30′. The cross section of the stack is pentagonal. The stack is plastered with mud. It is known as *Kilbanavi*. It contains over 3 lakhs lbs. of *kadbi*. It is estimated to last 4 or 5 years and to lose 15 per cent. of the stock at the end. Ryots ordinarily store *kadbi* in small heaps called "Goodu" and put mud over them. These "Goodus" are said to lose nearly 50 per cent. of the *kadbi* in one or two years. The Government *kadbi* storage scheme is thus calculated to conserve the fodder resources of the district.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(1) Kurbars in Bijapur district are sheep graziers. They also weave *kamblis* (country blankets) from wool. They may be taught better methods of sheep-raising and wool-weaving.

(2) Village carpenters and blacksmiths make agricultural implements and supply them to ryots. The former may be taught better methods.

(3) There are weavers of coarse cotton cloth in the district. They may be taught better methods.

Co-operative organisation may be tried for the improvement of these village industries.

QUESTION 19.—FORESTS.—Kurbars in Bijapur district are sheep-graziers. They have applied for additional forest area, being thrown open for the grazing of sheep and goats. The matter is being considered favourably by the Forest Department.

For improving the grazing quality of forest areas, the Economic Botanist proposes to initiate experiments.

QUESTION 20.—MARKETING.—(*a*) For stimulating the development of market-gardening, fruit-growing and other intensive forms of agriculture, each agricultural belt may have in the centre a large city. There are instances of fruit-growers discouraged to some extent, by the non-existence of a big consuming centre at a reasonable distance. The subject is a vast one, and I venture to call attention to it.

QUESTION 22.—CO-OPERATION.—(*a*) The honorary organisers of co-operative societies may be replaced by a paid staff of Government officials, especially for organising co-operative societies in backward areas.

Non-official agencies, such as the Central Co-operative Institute, do not seem to be capable of taking up the difficult task of organising and developing various types of co-operative societies. The Central Co-operative Institute with its branches holds conferences and training classes and issues periodicals. The propaganda of this nature, the Institute appears to do well. It may also take up the work of supervision of its constituent societies and the local supervising unions of societies to be started may become part of the machinery of the Institute. But the organisation and expansion of societies and their statutory audit may be left to the paid staff of the Registrar.

(*b*) Credit societies may be organised and developed everywhere.

Purchase societies.—It will perhaps be expedient to have a single large society for a whole district for the purchase and distribution of agricultural requisites such as seed, manures, implements, etc., rather than many small societies, each for a village or a group of villages or a taluka. A district society may buy, on a large scale, agricultural requisites and distribute them throughout the district. The society may also take up the dissemination of agricultural literature, establish a library and a museum and hold meetings. It may have branch offices in talukas and distribute agricultural requisites through them to ryots. These branches may thus serve the purpose of institutions now known as Taluka Development Associations. A centralised district society with adequate funds appears to be necessary, if the non-official side of agricultural propaganda and the supply of agricultural requisites are

to be efficiently organised. The Agricultural Department may treat as Taluka Development Associations the taluka and petha branches of the district society and give grants accordingly to the latter.

(*c*) Societies for the sale of produce such as cotton, oil-seeds, etc., may be developed. They may arrange to secure good seed, as the existing cotton sale societies of Dharwar district have done; and hand it over to the district agricultural purchase society for distribution to ryots.

(*d*) I consider that credit societies have made available to the cultivator capital at reduced rates of interest and that their operations have also tended to lower the rates of interest demanded by the ordinary moneylender.

Non-credit societies also are to some extent attaining their objects; but their operations need to be systematised and developed on a large scale.

QUESTION 23.—GENERAL EDUCATION.—I venture to submit that in a country like India, teeming with millions of small agriculturists, the whole system of general education —elementary, middle school and higher—needs to be agriculturalised to a marked degree. What is general education after all?—It is the impartation of knowledge of facts and figures in different grades to pupils, so as to improve their mental equipment. Facts and figures of history, geography, mathematics and natural science are collected together and graduated into different elementary, intermediate, and advanced series. The impartation of the elementary series of such facts and figures is said to provide the pupils with elementary education; that of the intermediate series with middle school education; and that of the advanced with collegiate or higher education. It does not appear to be an impossible task to collect facts and figures, specially bearing on agricultural history, agricultural geography, agricultural mathematics and also facts and figures of various branches of natural science, in their relation to the processes of agriculture and rural economy, to graduate them, and to incorporate them into the curricula and practical exercises of general education—elementary, middle school and higher. A number of elementary schools have recently been given what is called agricultural bias; and the experiment is said to be successful. That perhaps indicates that the whole system of general education can be effectively agriculturalised with the highest possible good to the country and its people. If the system of general education is divorced from the agricultural needs of a vast country like India, and if we make a rush for compulsory universal general education, as we have been doing, nothing but unemployment on an unprecedented scale and consequent discontent and misery would be the result. India is a poor country and cannot afford the cost of a universal general educational system and an equally universal special agricultural educational system. The only solution seems to be the agriculturalisation of the former as far as possible. It appears to be necessary to set up a Joint Board of general educationists and agricultural educationists, if the great task of agriculturalising the text books and curricula of general educational institutions is to be accomplished as rapidly as possible.

QUESTION 24.—ATTRACTING CAPITAL.—As the system of general education becomes more and more agriculturalised, as the instruction and training in technical agricultural schools and colleges tends more and more to turn their students into skilled agricultural businessmen, as experts discover more and more profit-producing improvements, and as the dignity of agricultural pursuits enhances in the country, men of capital and enterprise will in increasing numbers take to agriculture.

QUESTION 25.—WELFARE OF RURAL POPULATION.—(1) In many areas portions of old cart tracks owing to lack of repair and constant use, have become deepened and thus unserviceable. These tracks may be repaired or new tracks laid out, with provision for their regular repair. Further, a scheme for the development of road communications in such areas may be suggested.

(2) A scheme for providing drinking water wells in villages, suffering from scarcity, may be recommended.

(3) Prickly pear is a nuisance in many village sites. It leads to insanitation and disease. Prickly pear in thick clumps provides abodes for pigs which damage crops. Consequently, ryots have to watch their crops overnight and their health suffers. A campaign for the destruction of prickly pear may be initiated everywhere. The results achieved in the III Division of Dharwar district during the period of 1923, 1924 and 1925, when I was in charge of that tract, have been satisfactory.

(4) Congestion in village sites is appalling. A scheme for encouraging villagers to build houses on suitable plots outside village sites may be recommended.

(5) Most villages have got *chavdis*. These may be improved and extended so as to make them a sort of village halls for the holding of rural social functions.

(6) Faction is the bane of village life. Village officers—*patil* (headman) and *kulkarni* (accountant) having not got enough official work to do, sometimes participate in factiousness. Training classes for *kulkarnis* have been held for some years. But a training class for *patils* was held this year in Bijapur district with success. I suggest that village officers may be trained in agriculture. The active interest of the *patil* and the *kulkarni* in improved agriculture will mean a new factor, tending towards the peace and prosperity of the village.

(7) If trained village officers are entrusted with agricultural work on a small extra remuneration, they will form a vast body of agricultural propagandists in rural areas.

QUESTION 26.—STATISTICS.—*Other suggestions.*—(1) The Secretary of State in Council, in virtue of sectoin 26 of the Government of India Act, is under a statutory obligation to lay before both Houses of Parliament an annual account, exhibiting the moral and material progress and condition of India. The implication of this obligation is that the Secretary of State in Council is responsible for initiating measures for the moral and material progress of the vast agricultural classes of the country, and for gauging the improvement effected from year to year. The Collector may be charged with the general oversight of execution of these measures in his district.

The Deputy Director of Agriculture, though subordinate to the Director for technical control, may be subordinated to the Collector, in respect of introduction of approved agricultural improvements in the district. There may be no practical difficulty in the way of the Deputy Director in charge of several districts, operating under the Collectors of all those districts. Under such arrangement, the Deputy Director and his staff may turn out more work in each district than at present. Similarly, the Assistant Registrar of Co-operative Societies may function in the district under the Collector, in respect of co-operative agricultural organisation. Even the existing staff of Circle Inspectors under the Collector may be brought within the scope of this co-ordination. The Collector may also have the assistance of District officers, such as the Executive Engineer for irrigation, the Executive Engineer for roads the Deputy Educational Inspector, etc. For working out such a district scheme of centralisation for the purpose of rapidly improving agriculture and bringing about rural prosperity, the Collector's office at the headquarters may be strengthened by the creation of a separate agricultural branch.

Approved agricultural improvements, such as, iron ploughs, selected Kumpta cotton seed, treatment of *jowari* seed with copper sulphate, etc., may from time to time be notified by the Director of Agriculture to the Collector; energetic action may be taken to introduce those improvements and incorporate them into the routine of husbandry in the district; and the Collector may submit an annual return as to each improvement, showing the acreage, etc., covered by it in the year. Similar annual returns may also be furnished by the Collector, in respect of construction of wads (field embankments), excavation of irrigation wells, construction of minor irrigation tanks, construction of irrigation canals, extension of road communications, expansion

of agricultural bias education, etc. A summary of these annual district returns may be incorporated in the report of moral and material progress of the country to be submitted every year to Parliament. A district with the Collector at the head is a territorial unit of sufficient size for the introduction of agricultural improvements and the measurement of their progress from year to year. Different activities, tending to promote the agricultural and rural development of a district may all be carried on intensively in the district, and their progress marked and appraised every year from the stand point of that district.

(2) A statute for the better development of agriculture in India, embodying various provisions, may be passed by Parliament.

Oral Evidence.

4193. *The Chairman:* Mr. Naik, we are very much obliged to you for the written evidence you have submitted. Have you got anything special to say before we proceed to question and answer?—No, nothing.

4194. You say that there is a specific problem in your district and in order to investigate this problem and carry on experiments a research station is required for the district? Is that a special problem peculiar to the district? —That problem is a very difficult one and is peculiar to that tract.

4195. You mention that it is a famine tract and you want investigation in conservation of moisture. Are you familiar with such experiments and research as are being carried on at this moment at Poona in this particular problem?—Yes, I think some experiments have been started recently.

4196. I want to know on what you founded the view that the setting up of a special research station in a particular district was to be justified?—The reason is this. The whole district is liable to frequent famine whereas only parts of other districts are so liable to famine at long intervals. The Bijapur district is supposed to be liable to famine frequently so far as the whole area is concerned.

4197. Provided the particular problems of the district were being adequately dealt with by existing institutions, you would not advocate the creation of a new one, would you?—No.

4198. You say that Bijapur is in urgent need of an agricultural school. What kind of agricultural school were you thinking of? Either of the Loni type or agricultural bias schools?—This is under the serious consideration of Government now.

4199. On page 137 you say that for providing long term credit, special land mortgage banks with State aid may be established. What do you mean by special land mortgage banks?—I mean a bank which will advance long term loans for the purpose of redemption of debts and financing costly land improvements.

4200. But do you contemplate these loans being made through the co-operative credit societies?—No, not through the existing short-term co-operative credit societies.

4201. On page 137 you describe a method by which the State, that means the general body of tax-payers (and it is as well to remember that the two things are identical) might come to the assistance of cultivators to relieve them of part of the interest on their debt?—Yes, at low rates of interest.

4202. I take it, if I have understood your plan aright, that the amount of easement which the cultivator would enjoy as the result of the adoption of your scheme would be the difference between the interest he pays now and the interest that he would have to pay to Government, that is the full extent of the relief, is it not?—Yes, and help in other directions.

4203. But financially that is the sum total?—Yes.

4204. What rate of interest are cultivators paying in the district with which you are familiar?—From 15 to 20 per cent.

4205. At what interest do you anticipate Government would lend?—They lend now at 7·29 per cent.

4206. So that the difference between the 15—20 per cent. and 7·29 per cent. would be borne by the general tax-payers. That is the scheme, is it?—No. The State raises money at a lower rate than 7·29 per cent. Suppose the State were to provide a part of the funds of a mortgage bank; that would not mean a burden on the general tax-payer. All the funds of a mortgage bank will not come from Government.

4207. Have the local candidates in the elections adopted that platform?—Not specifically, but they are all keen agricultural reformers in my part of the country.

4208. I am very interested in your note on animal husbandry. On page 138 you state: "The Government scheme of storage of *kadbi* for saving cattle in a year of fodder famine was working out in Bijapur district this year with success." What exactly do the words "work out" mean?—Government agents in the district have actually stored *kadbi* in the course of this year.

4209. They have carried out the whole experiment successfully?—Yes.

4210. There was no famine, was there?—No. As a matter of fact we shall be storing in good years in order to have a store for bad years. Experts say that *kadbi* can be kept for four or five years if properly stored.

4211. What is the proposal that has to be carried out under the scheme?—In my district 6,500,000 pounds have been stored. We hold this for a bad year and we are not issuing it this year because this is a good year.

4212. Do you know whether the decision has been taken to repeat this experiment next year?—Yes, Government have been pleased to sanction Rs. 1,50,000 for operation in the coming agricultural harvest season.

4213. On page 139 you advance a very understandable complaint on the part of local fruit-growers; they are discouraged by the non-existence of a fruit-consuming centre at a reasonable distance?—Yes.

4214. Of course, better transport would bring the consuming districts nearer?—It would, but local peculiarities and local convenience are a factor.

4215. The only alternative is the creation *ad hoc* of an important consuming centre for the benefit of those who are growing fruit; you do not contemplate that, I am sure. But do you think that by better communication something might be done to bring your fruit cultivators into closer touch with the market?—Yes, something could be done.

4216. On page 140 you state: "As the system of general education becomes more and more agriculturalised, as the instruction and training in technical agricultural schools and colleges tends more and more to turn their students into skilled agricultural businessmen" and so on. Have you any personal knowledge on which you base this view that the products of these colleges are turning to agriculture as a profession?—I know a few of them but not many.

4217. You will agree with me when I say what attracts business men is the prospect of security for their capital and attractive returns on their investments?—Yes.

4218. Businessmen have a curious knack of finding out these things without the assistance of agricultural schools or anybody else?—Yes.

4219. On page 142 you state that a statute for the better development of agriculture in India, embodying various provisions, may be passed by Parliament. You contemplate there an All-India Act?—It would be an amplification of section 26 of the Government of India Act.

4220. Do you think that the provincial administration would welcome a statutory provision of that sort from a central authority?—The Government of India Act specifically lays down an implied duty on the Secretary of State for India and I should say anything like an amplifying act would naturally follow.

4221. I think you are on firm ground there as far as it goes?—Yes.

The Commission then adjourned till 2-30 p.m. on Tuesday, the 26th October, 1926.

(Mr. Naik gave further oral evidence on the 27th October, 1926, see page 181.)

Tuesday, October 26th, 1926.

POONA.

PRESENT:

The MARQUESS OF LINLITHGOW, D.L. *(Chairman).*

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.
Sir THOMAS MIDDLETON, K.B.E., C.B.
Rai Bahadur Sir GANGA RAM, KT., C.I.E., M.V.O.
Sir JAMES MACKENNA, KT., C.I.E., I.C.S.
Mr. H. CALVERT, C.I.E., I.C.S.
Professor N. GANGULEE.
Dr. L. K. HYDER.
Mr. B. S. KAMAT.

The Hon'ble Sir CHUNILAL V. MEHTA.
Dewan Bahadur A. U. MAIJI. } *(Co-opted Members.)*

Mr. J. A. MADAN, I.C.S.
Mr. F. W. H. SMITH. } *(Joint Secretaries.)*

Mr. A. G. EDIE, Chief Conservator of Forests, Bombay Presidency.

Replies to the Questionnaire.

QUESTION 9.—(*a*) (*i*) The soil in the neighbourhood of bare hills in the Deccan is usually very poor sandy murum, washed down by the torrents from the bare hills. This state of things would be improved if the hills were covered with tree growth, which would prevent the erosion of the soil from the hills.

(*a*) (*iii*) Lessen the floods by increasing the tree growth on the hills.

QUESTION 10.—(*f*) The used of wood instead of cowdung for fuel should be encouraged. Owing to its bulk the transport of fuel is expensive, and it is not possible profitably to exploit fuel from the forests to places beyond the immediate neighbourhood at a low cost, which increases rapidly with the distance from the forest. In areas remote from forest the remedy would seem to be to plant strips of trees along the banks of streams and on the borders of the fields, preferably quick growing fuel-producing trees.

QUESTION 11.—(*a*) (*iv*) This matter was investigated by a committee some years ago. From my own experience I can say that the only sure method of preventing damage to crops by wild animals is the erection of stone walls or stout fencing. The eradication of prickly pear and lantana, which generally grow near villages and fields, would lessen the amount of cover available for wild animals.

QUESTION 16.—(*b*) (*i*) Owing to the very low rate of grazing fee charged for cattle grazing in forest, many cattle are kept which are useless except to yield a little manure.

(*b*) (*ii*) In areas of thick forest a belt of land around the fields has been handed over to the cultivators with permission to clear it if they so wish and use it for the growth of grass and leaf manure and other purposes subsidiary to agriculture.

(*d*) Up till recently the forest area has been divided into two parts, one of which is open and the other closed to grazing throughout the year. Experi-

ments are now being carried out in accordance with which areas will be closed for part of the year only, with a view to determine whether by this means the total output of grazing and fodder grass will be increased.

QUESTION 17.—(*b*) In forest districts cultivators are employed on forest works during the slack season of agriculture, and on the whole it can be said that the demand for such labour is greater than the supply.

QUESTION 19.—(*a*) Yes, as far as this can be done on a communal basis, Grazing is allowed on payment of nominal fees (usually annas 4 and sometimes less per head for agricultural cattle), and fuel, bamboos, small timber, leaf manure and other essentials for agriculture are allowed free or at low rates. In thickly populated areas the demand on the forests for these purposes is very heavy, whereas in forest areas remote from the centres of population the contrary is the case. With reference to the remark "on a communal basis" above it should be pointed out that in most cases the forests are open to all the cultivators of a village or group of villages as a whole, and this undoubtedly leads to waste and ill-usage, much of which might be avoided if areas of forest were allotted to individuals, as is occasionally done; this however can only be arranged in rare instances.

(*b*) The supply of firewood and fodder in rural areas might be increased by improvement in communications, thus facilitating transport, and by protection of land suitable for their growth within the areas themselves. This protection would entail a curtailment of the grazing and other facilities, and in each case it must be decided separately whether such curtailment is likely to be justified by results.

(*c*) Deterioration of forests on hillsides and on the banks of streams has led to soil erosion. This can be seen at its worst in the case of "Kumri" or shifting cultivation, which entails the cutting and burning of all forest growth on steep hillsides, resulting finally in the complete disappearance of the soil. The only preventive is the preservation of the forest growth in such places; there is no cure within a reasonable period of time once the damage has been done.

(*d*) The presence of large areas of forest may lead to a small increase in the rainfall, but this is a point on which we have no definite information, and it is not likely that the increase in the rainfall is at all considerable.

But undoubtedly the presence of forests helps to retain moisture in the soil, and thus regulates the flow of water in streams, which usually contain water throughout the year in forest clad areas, whereas in open areas they are raging torrents in the rainy season and quite dry during the rest of the year. It is an axiom which admits of no doubt that the denser the forest growth the more constant is the flow of water in the streams of the area.

Agricultural land in the neighbourhood of bare hillsides is liable to be flooded by the torrents which flow from the hills during the periods of heavy rain, which coincide with the period during which the land is under crop, and heavy damage is caused by the floods. Where the hillsides are covered with forest growth this damage is averted.

(*e*) As a rule it is not advisable to create forest in the neighbourhood of villages. It is desirable that the land around a village should be open and not densely clad with trees. If the idea is to increase the supply of forest produce available for the people it would be better to afforest areas at a reasonable distance from the village (say a mile or so), or better still for the villagers themselves to plant trees in their holdings. It will take years of educating to get them to do this, but is worth trying.

(*f*) Forests subjected to excessive grazing suffer deterioration. Animals eat the young plants and browse the older growth, and damage the young trees by trampling and rubbing and thus prevent the regeneration and proper growth of the forest crop. Excessive trampling of the soil during the rainy season, when the incidence of grazing is heaviest, renders it unsuitable for the production of tree growth. Where grazing is very heavy the forest growth quickly deteriorates and eventually disappears, and this is followed by erosion of the soil.

The incidence of grazing should be limited to an amount which the forest can fairly bear, and areas containing young growth should be closed to grazing.

Owing to the very low rate of grazing fee charged the number of cattle grazing in forest is excessive. If higher fees were charged the people in all probability would restrict the number of cattle somewhat.

Oral Evidence.

4222. *The Chairman:* Mr. Edie, you are the Chief Conservator of Forests, Bombay Presidency?—Yes.

4223. You have put in a note of your evidence, and we have had an opportunity of reading it through. Would you care to make any statement amplifying what you have written, or would you like to proceed at once to question and answer?—I do not think I want to make any further statement.

4224. You agree with me, I take it, that the conduct of forests in India is very important from the angle of agriculture?—Yes.

4225. Do you think that the relations between the Forest Department and the Agricultural Department are as close and sympathetic as they might be?—We are not really in very close and direct touch with the Agricultural Department. We are more in touch with the Revenue Department through the Collectors.

4226. Do you think that it might be in the interest of agriculture in the Presidency, if you were in closer touch?—I have not thought about it very much. We are in close touch with the Collectors, the Revenue Department; and anything which has to do with the rights and privileges of the people is dealt with between the Revenue Department and ourselves. We do not come much in touch with the Agricultural Department.

4227. Has it ever occurred to you that it might be to the advantage of the cultivators if your officers had a short course of instructions on the means by which forests may render assistance to agriculture?—I had not thought of that, but I should think it would be a good thing.

4228. It would not take very much time?—No.

4229. Do you think it might be useful also, if certain of your officers were attached for a longer or shorter time to the Agricultural Department, so as to have an opportunity of seeing the forests from the agricultural viewpoint? —I think that might be tried, yes.

4230. In answer to question 9 (*a*) (*i*) on page 145 you say "The soil in the neighbourhood of bare hills in the Deccan is usually very poor sandy murum, washed down by the torrents from the bare hills. This state of things would be improved if the hills were covered with tree growth, which would prevent the erosion of the soil from the hills." Have you already had experience of that operation in the Presidency?—Yes.

4231. How about the expense? Is it a costly operation?—We could not plant these hills. The only means of getting tree growth on them would be protection from fire and cutting, and a certain amount of protection from grazing would be necessary. We could not think of planting them.

4232. How long, as a rule, does it take in the Deccan to establish a growth of trees? Is it trees or shrubs?—Mostly thorny shrubs.

4233. How long does it take to establish that?—On some hills the soil is almost completely gone. I think it would, as a rule, take 10 years before there will be any appreciable difference.

4234. You would have to have protective measures in force for 10 years?— Yes, I think so.

4235. Would that be expensive?—If we had to put on forest staff to protect these hills, it would become fairly expensive, unless the villagers did it themselves.

4236. You know India very well. Is it likely that they will do it themselves?—There is a good deal of teaching required, as things are at present. I have known of cases, where they have done it themselves, in Kanara, but it is very rare.

4237. I am trying to get from you whether you think, from your experience, this is an expedient which might be adopted for wide areas, or whether you think it would be too expensive to carry out on an important

scale?—I am afraid it would be too expensive, unless we can show them examples which they would follow.

4238. You have no rodent in this country such as the rabbit, which attacks young trees?—We have no rabbits, but porcupines, hares and rats still do a lot of damage.

4239. Can you protect young trees against them?—We do, to a certain extent, in our plantations. We put stones round the plants.

4240. Fencing would be out of the question?—Yes.

4241. In answer to question 16 (*b*) (*i*) on page 145, you say "Owing to the very low rate of grazing fee charged for cattle grazing in forest, many cattle are kept which are useless except to yield a little manure." Are you advocating any change there?—If the number of cattle which graze in forests is excessive and it is desirable to keep down their numbers, I think the only thing would be to raise the fee. In some places there is more grazing than the forests can stand.

4242. Raising the fee would have a selective tendency?—It might, but I think the fee would have to be raised a great deal. The fee has been raised of late years, and there is very little difference in the number of cattle. It has been raised from 2 annas to 4 annas, but the number of cattle grazing is just the same now as before, so that merely raising the fee like that has not had any effect.

4243. In the next answer that you have given, you point out that in areas of thick forest, a belt of land around the fields has been handed over to the cultivators with permission to clear it if they so wish and use it for the growth of grass and leaf manure and other purposes subsidiary to agriculture. Do the cultivators take advantage of that permission?—Not always, but frequently they do. Chiefly this is done in heavy forest districts like Kanara and Belgaum, and it is done to a certain extent in other places, but often the cultivators are annual tenants, and they do not know whether they will be cultivating that bit of land next year. It demands a lot of labour to clear this belt all round the fields. If they do not know how long they will be cultivating that little bit of land, they cannot afford to do it; but I have seen a good deal of it done.

4244. In answer to the next question, you outline an experiment which has been carried out, with a view to the increase in the total output of grazing and fodder grass, by the closing of certain areas for part of the year only?—Yes.

4245. Is that a new experiment in this Presidency?—It has been going on for two or three years only.

4246. Are there indications as to whether it is going to prove a success?—We think it is. What we are doing is to close an area towards the end of the monsoon season, allow the grass to seed, and keep the same area closed in the early part of the next monsoon, so that the young grass grows up from the seed.

4247. You close it for two periods, the period of seeding and the period of germination?—Yes.

4248. Until the grass gets established?—Yes, and I think I can say that it is leading to an improvement. With the help of the Agricultural Department we have taken some small areas, and we are making accurate tests of the output of grass.

4249. Do you allow grazing between seeding and the growth of the young grass, or do you keep the cattle out of it?—We keep that closed.

4250. How about grass cutting as opposed to grazing? Is that prohibited in the same period in these areas?—No; I do not think it would be, as a rule.

4251. You have three classes of forests here, have you not? You have forests where both grazing and grass-cutting are allowed, forests where grass-cutting only is allowed, and forests where neither grass-cutting nor grazing

is allowed?—Yes, but there are very few forests where grass-cutting is prohibited. Those closed to grazing are mostly open to the cutting of grass.

4252. In answer to question 17 (*b*) on page 146, you have stated " In forest districts cultivators are employed on forest works during the slack season of agriculture, and on the whole it can be said that the demand for such labour is greater than the supply." In spite of the fact that you call for such labour in the slack agricultural season, you cannot get enough labour to do the work. Is that the position?—That is very common. In real forest districts, the labour supply is a good deal less than we want.

4253. How do you account for the fact that you are not able to attract the labour during a season when that labour is not engaged in cultivation?—Most of our big works are in areas where the population is small, and to come to these works they have to go long distances. Also, our forest districts are mostly unhealthy. That is one of the reasons why they do not come.

4254. How are the wages fixed?—In the open market. Most of our work is really piece-work.

4255. You do not think that it is failure to pay sufficiently attractive wages that prevents them from coming?—I do not think so. We pay good wages.

4256. Can you give the Commission any idea of what the average wage is? You have told us that the wages are determined by competition in the open market. I suppose that is competition with the other employers?—A man on felling work, timber work, will make a rupee a day easily. A cartman with his cart will make at least Rs. 2 a day, or something more than that.

4257. Are these average figures?—Yes. I am talking about work in our big forests.

4258. Apart from the felling and the carting, there may be a certain amount of unskilled labour required for the carrying of brushwood, etc.?—There is a good deal of that in the way of burning fire lines, plantation work, etc. A good deal of it is done on daily wages.

4259. What do you pay?—8 annas to 12 annas for unskilled labour of that sort.

4260. Is it in the category of the daily wage earners that you have this shortage, or in the category of the piece-work earners?—Both.

4261. Are you, as a department, carrying out any experiments in the preservation of fodder against famine?—We store fodder against famine. We bale hay and store it.

4262. Are you making any silage at all?—We have tried it on a small scale at different times, but it was never gone on with. We were told that silage cannot be moved long distances. If you are storing it in one place as insurance against famine, it must be used there; it will not stand a long journey, whereas the hay which we bale may be sent hundreds of miles to the famine districts.

4263. I suppose you make it year by year and store it?—Yes. We store hay for 3 to 4 years.

4264. And then you sell it?—As we get the opportunity.

4265. It is some time since you had a famine in this Presidency?—This year we have sold off nearly the whole of our stock, because the rains came very late.

4266. By "stock" what you mean is the stock in its 4th year, and not the whole stock?—What we have been storing for the last three years. We have sold most of it.

4267. Was there a famine this year?—There was great scarcity in the months of May, June and July. The rains came in very late.

4268. Was it scarcity amounting to anything in the nature of fodder famine?—Practically a fodder famine up in Gujarat and Kathiawar. They wanted grass very badly.

4269. So that your reserves have been seriously depleted against the possibility of a famine coming next year?—There will not be a famine this year.

4270. Against the failure of the next monsoon?—We have now got one year's stock left. We will add one year's and we will have nearly two years' stock by the end of next year's monsoon. We will not be badly off.

4271. What does it amount to in 2 years?—We have cut it down of late on account of the expenditure. We store now each year about 100 lakhs, that is, 4,500 tons, and we store that for three years, and then if a famine year comes we cut and bale much more in the areas where there is grass. I think, in a famine year, we ought to be able to supply 500 lakhs, or 20,000 tons.

4272. Does that quantity that you mention as being your normal store for 2 years represent an important proportion of the grass which is reasonably near a railway, or can you do more?—We could do a good deal more than that.

4273. You could, if you were financed, store a great deal more than that?—Yes.

4274. Of the same quality?—Pretty much the same quality.

4275. When you come to sell at the end of 4 years, do you find a ready demand?—No; not as a rule. Of course, if there is scarcity, we sell it to the local people in the famine districts; otherwise, if it is a good year we have to sell in the open market, and we have to sell at a loss.

4276. You cannot cover the cost of cutting and storing?—I do not think so. We are bound to lose a good deal in a year which is not a year of scarcity.

4277. *Sir Henry Lawrence:* How much would you lose on a ton?—I think we might lose Rs. 8 to Rs. 10 a ton.

4278. *The Chairman:* On this matter of shifting cultivation, *kumri* cultivation, do you think that a sufficiently firm control of *kumri* cultivation is being maintained, in the interests of agriculture as a whole?—We have a fair control. It is always bound to be very destructive, but we are trying to make it as little destructive as possible, by lengthening the period of rotation. They use to crop it for 2 years and leave it fallow for 6 years, and hoped to get another crop by that time; but there was nothing to cut then. We are now making it 2 years' cropping and 14 years fallow, by which time we hope that there will be a certain amount of regrowth left for them to cut and burn and get another crop.

4279. Have you any suggestions to offer for the further control of this practice?—We want to get rid of it as soon as we can.

4280. Is there any hope of that?—It will die out very gradually.

4281. It is a question of settling the population which is accustomed to live by these methods of cultivation on a more permanent basis. Have you anything to say on that?—That could only be done by sending them away, which we do not want to do.

4282. Is it in fact being done at all at the moment?—Yes, in the south of the Presidency; some in Satara, some in Belgaum and Kanara.

4283. Can you give the Commission any idea as to the rate at which this settlement of these *kumri* cultivation tribes is being effected?—It is very slow.

4284. A few villages a year?—Yes, if that.

4285. How many acres of actual *kumri* cultivation are there in the Presidency every year?—I am afraid I could not say off-hand.

4286. Could you give us any ideas at all?—There must be some thousands of acres. It is not an enormous area; I think a few thousand acres.

4287. In relation to soil denudation or soil erosion, is it a really important problem in this Presidency?—I think so. It is very desirable to stop it if we can, but I cannot say it is absolutely essential.

4288. I suppose if the first erosion begins on higher levels, on an important water system, the damage may progress without any further *kumri* cultivation at all? The denudation proceeds?—Yes. We get a little regrowth coming up, which partly covers the soil.

4289. *Sir Henry Lawrence:* Is the question of *kumri* cultivation of small importance in this Presidency compared with other Presidencies?—I do not know how it would compare with other Presidencies. It is not a very big matter in this Presidency. The area is not very large.

4290. What is the extent of your forest area?—15,000 square miles.

4291. How many acres of *kumri* cultivation do you deal within a year?—It would not be anything like 15,000 acres.

4292. At any rate, it is not one of your major forest problems?—No.

4293. *Sir Ganga Ram:* What is the percentage of total forest area, as compared with the whole area of the Presidency?—About 12½ per cent. It is about one-eighth of the total area.

4294. With regard to grazing fees, do you mean the rate is 4 annas a month or 4 annas a year?—The rate is 4 annas per year.

4295. Is it true that you allow them a pair of bullocks for ploughing free, and charge for everything else?—All the so-called village cattle are paid for at the rate of 4 annas.

4296. Do you allow a man a pair of plough bullocks free?—Not as a rule. In a few districts that is done, but the normal rate is 4 annas.

4297. Do you charge for milch cows?—Yes. That is the general rule. In a few districts it is free, but as a rule they pay for it.

4298. The Inspector General of Forests advocates the terracing of the hillsides inwards so as to intercept the quick flow of rain water. Have you tried it in any of your forests?—We have not done anything like that in our forests.

4299. What is the area of this belt of land around fields that has been given to the people free?—It is from 44 to 100 yards wide, with a minimum of 44 yards.

4300. Do they make use of it?—In some places they do. They do not do so in some places. The labour difficulty is very great in these heavy forest areas.

4301. You say that the increase of trees may attract rainfall. Why is it "may"? Why not "must"? It is a well-known fact now?—I do not think it affects it much. I do not think the presence of trees increases the rainfall very much.

4302. It has been proved now in the Punjab. There was almost no rainfall in Lyallpur before?—It may make a small difference. It may make a difference of 5 per cent. I do not think it would make much more than that.

4303. You say that the forest conditions can be improved by planting fast-growing trees. Is it due to lack of funds that you have not made experiments?—That was on private land, was it not, to increase the supply of fuel for the people, and not in forest areas?

4304. Can you give us the names of the trees which will grow on the edge of fields but not cast any injurious shadow on the crops?—They will cast a certain amount of shadow.

4305. But it may not be injurious?—*Babul* is the commonest tree that we see in the fields.

4306. But *babul* is the old tree of this country. What are the new ones?—We had better stick to the old; we know they will grow.

4307. Do the zamindars regard the vicinity of forests as a benefit, or do they consider it as a torture? In our Province the zamindars consider them as a torture machine. Do not your forest guards torture the zamindars?—I do not think so.

4308. Are the forest guards generally honest?—They are fairly honest, I think. Their pay is small, of course.

4309. How do they make it up? What is the pay of a forest guard?—He begins on Rs. 15 and goes on to Rs. 25. I think they are reasonably honest.

4310. *Sir Thomas Middleton:* Your total reserve for famine you say amounts to 20,000 tons. That was the estimate you gave us of the total reserve of grass. This quantity would suffice for about 20,000 animals for a famine period, if there was a total failure?—It would be sufficient for about that number.

4311. It would only allow 10 lbs. per head?—Yes. It is a supplementary supply, of course.

4312. If we take the whole supply, it is obvious that the amount of fodder that you are able to store is infinitesimal as compared with the needs of the cattle in the Presidency?—There is one thing to remember. In a famine year, we cut a very great deal more than that.

I understood you to say that you have 20,000 tons accumulated against a famine year.

4313. *Sir Henry Lawrence:* No; that is the reserve?—And there are certain areas where even in a famine year there is a supply of grass, and we could cut a good deal more than that.

4314. *Sir Thomas Middleton:* You might have much more than 20,000 tons available?—Yes, I think we can do a little more than that; I do not say very much more than that, because the railway wagon question comes in. It has got to be conveyed a long way by rail. It has got to be stored a long way off from the famine districts, and the transport difficulty comes in.

4315. The greater proportion of your forests are open forests? Open for grazing?—Yes. I think out of 15,000 square miles of forests 2,500 square miles are closed to grazing and the rest are open.

4316. And you told us that you have had success by closing and re-seeding?—We have been trying that of late years and we think it has become a success.

4317. Have you ever tried to regulate grazing, not by fencing, but by grazing stock at a certain place for three weeks or a month and then moving them on?—The people do that a good deal themselves. They graze them in one place for a few days and then shift them to another.

4318. Do you think that is quite sufficient?—Of course, you will always find that near the village the land is much more heavily grazed than farther away. They will not take the trouble to go far, but within easy reach they have a rough sort of rotation.

4319. *Dr. Hyder:* The major portion of your forest property is under your control and a part is under the Land Revenue Department?—About a fifth is under the Land Revenue Department and the rest is under our control.

4320. Besides being forest officers you have got to be excise officers? Your functions are mixed up?—It is only in one or two districts that the forest officer is an excise officer. In a number of districts we do some land revenue work, but in only two or three cases is the area administered extensive.

4321. In answer to question 10 (*f*) you say, "Owing to its bulk the transport of fuel is expensive, and it is not possible profitably to exploit fuel from the forests to places beyond the immediate neighbourhood at a low cost, which increases rapidly with the distance from the forest." You will admit that no forest property can be a valuable asset unless it is made accessible?—Yes.

4322. Have you any active policy of constructing roads so as to open up your forests?—Yes, we are doing as much as we possibly can.

4323. I find from your report that you are losing money on this account, because it is stated that on certain portions of the road which were constructed but which were not metalled, you lost heavily on account of the absence of metalling?—Yes; we do that in several places.

4324. You have an active programme of road work?—We have a regular programme: we do a good deal of road work now.

4325. What is the total value of the grazing that you provide both at concession rates and free?—We reckon the value at full rates at about 21 lakhs. I think we realise in cash something like 5 or 6 lakhs.

4326. That is the value at full rates?—Yes. The full rate is what we call the one rupee rate. It is about 21 lakhs, I think.

4327. And you charge only 6 lakhs?—Our charge is between 5 and 6 lakhs.

4328. And the value of the grazing you give is about 21 lakhs?—Yes.

4329. *Sir Chunilal Mehta:* Mr. Edie, it must be very comforting for you to hear from Sir Ganga Ram that in an advanced Province like the Punjab there is agitation against the Forest Department by the cultivators. It seems to be common all over India, apparently?—I suppose it is.

4330. Then this question of *kumri* cultivation has often been under the consideration of the Forest Department. You have tried to control *kumri* cultivation and you have made certain concessions to the cultivators, and arrived at what you think is a satisfactory compromise?—Satisfactory for the time being. Whether it will last I do not know; the question will probably crop up again after 10 or 12 years. At present I think it is satisfactory.

4331. *Dr. Hyder:* How many years do you allow the cultivator to cultivate and after how many years do you allow him to take it up again?—At present it is a 16-year rotation. They cultivate for two years and they allow it to lie fallow for 14 years. This is the system which we brought into being two or three years ago.

4332. *Sir Chunilal Mehta:* As regards the question of keeping in touch with the Agricultural Department, you have not really any settled co-ordination, but you often come in contact with them; for instance, in Kanara, where the question of agriculture and forests is very acute, your officers examine what is being done on the Kumpta farm, for instance?—Yes.

4333. And examine what kind of leaf manure would be profitable for rice cultivation, and what concession ought to be given and so on?—Yes.

4334. So that you are in some kind of touch with the Agricultural Department?—Yes, we are to that extent.

4335. With regard to the labour charges that the Forest Department have to pay in high forests, you have explained to the Commission the extreme difficulty of getting labour?—Yes.

4336. And you said that you could do with any amount of labour?—With a good deal more than we have.

4337. And the high cost of labour would not be a matter of great consideration for you?—No; we can afford to pay good wages.

4338. And you are in fact losing good revenue by the absence of labour?—Yes. By paying out Rs. 10 we would probably make Rs. 30.

4339. You have tried to attract labour not only by your own official efforts but you have also given out contracts for the purpose?—Yes, a lot of our work is done by contract.

4340. And those contractors provide their own labour?—Yes.

4341. And they too find it difficult to get labour?—Yes.

4342. Still, in the high forest area (say, in Kanara) you have attempted to get settlements of cultivators?—We tried; we got a few, but it does not seem to prosper very much.

4343. You even tried to get a society of milkmen to come into your Kanara forests?—That has done rather better.

4344. So that you do want to give as much facility as possible to the cultivator?—We want the people there: we want to get them if we can.

4345. Consistent with your duties to the Forest Department?—Certainly. The forest is of no use to us if it is empty; we must get some people there, because we want labourers to work there.

4346. Would you mind expanding a little your answer to the question about fodder and grass storage that was put to you by the Chairman? Was it the intention of Government when the scheme was started, or even under the extended scheme that is now in operation, to provide for all the cattle that would suffer in a famine?—I should not think so: that would be impossible.

4347. In fact, Government simply thought that in famine times they would supplement in this way other efforts to supply grass and fodder?—Yes. We could not do more than that.

4348. The present storage of both grass under your department and of *kadbi* under the Revenue Department and through the agency of the District Local Boards was based on the understanding that Government would take the figures of imports into the Presidency in the worst famine year and try to provide the same quantity by means of both *kadbi* and grass?—Yes.

4349. Your grass varies considerably in quality?—A good deal.

4350. Navapur grass is not very much liked by the cattle?—It may not be liked by the cattle, but we sold every stick of it this year.

4351. At concession rates?—At a loss, yes.

4352. There is plenty of scope in the Navapur forest for the further cutting of grass if it was required in famine time?—Yes, there is a big supply there. It will not be touched now, except possibly in a big famine year; we have given up cutting there.

4353. Do you know the quantities of *kadbi* that are proposed to be stocked in the Central and Southern Divisions?—No.

4354. It is very much more than the grass that is stocked by the Forest Department?—I believe so.

4355. And *kadbi* is about twice as nutritious as ordinary forest grass?—Yes.

4356. Now, would you mind enlightening the Commission on the question of charcoal-making? Is that not a very important industry which the Forest Department should undertake?—We are now going in for that as much as we can, because to me it seems to be the only way of getting fuel carted a long distance at a low rate. It takes about 3½ tons of wood to get 1 ton of charcoal, which means that there is a very considerable saving in transport either by road or by rail.

4357. How are the requirements of charcoal, say at Poona, met?—A good deal of that is brought from the forests by contractors. Some of it comes to Poona even from the north of the Belgaum district.

4358. How many miles away would that be?—Nearly 200 miles by rail. It also comes from the Thana and Kolaba districts.

4359. And from the Mahableshwar hills?—From Mahableshwar and Panchgani; but only a little of it.

4360. Do you consider that charcoal will at any time take the place of cowdung as fuel? Can the Forest Department make fuel, both wood and charcoal, so cheap as to be able to stop this waste of cowdung manure?—That is a question of price. We cannot sell charcoal much under Rs. 40 a ton. I think it will cost Rs. 28 a ton at the very lowest.

4361. What is the average?—I do not think we could fix the average at less than Rs. 40.

4362. That is not your timber ton?—It is the ton weight.

4363. Have you made any experiments to see whether charcoal as you make it now could be compressed into briquettes?—We have not tried it. To do so would mean crushing it into powder, I am afraid.

4364. I heard that some such thing was being done. Government have not considered the question of losing on charcoal?—We have prepared charcoal to sell and sold it at cost price, and even had a loss by advertising it, and the sale of it has spread considerably in the Deccan and to a certain extent in

Satara, Khandesh and other districts. A good deal that is made in Thana and Kolaba goes to Bombay.

4365. Do you think there is any prospect of its displacing cowdung as fuel?—I think it is a very distant prospect in places far from the forests. There is still the transport question.

4366. For instance, in your Kanara forests you have 80 per cent of the wood which is not of much value?—Yes.

4367. Much of it goes absolutely to waste at present?—A great deal of it does.

4368. Have you ever considered having, or do you have any research either here or at Dehra Dun for seeing whether any use of it could be made for the purpose of cheap fuel or charcoal?—Actually we have made charcoal on a small scale, but it never paid its way. It is too far from any market. A few of our contractors have actually prepared charcoal for sale in places like Hubli, Dharwar and Belgaum, but the market seemed to be very limited.

4369. *Professor Gangulee:* With regard to fodder grass, have you undertaken any systematic study of the different varieties of fodder grass grown in your forests?—No, we have not.

4370. Do you not think it is rather important from the point of view of assisting the cultivator to increase the fodder supply of the country?—Yes; it would be beneficial, of course, if we could increase the proportion of good kinds of grass.

4371. With regard to the suggestion you make in the last page about increasing the fee for grazing to stop excessive damage by grazing, have you been able to decrease grazing by raising the charge from two to four annas?—No. The number remains about the same.

4372. What would be the increase you would suggest to decrease grazing to the necessary limit?—I am afraid we will have to make it pretty heavy. We do not want to overdo it.

4373. Then, that is not the solution?—No. After I wrote that, I went into the figures carefully and found that since the rates were doubled there has been no decrease in the number of animals grazing.

4374. With regard to fodder supply you make an interesting observation here that improved communications would help the supply of firewood. Do you consider that the existing transport facilities are inadequate?—We do. We are going in for various forms of mechanical traction in a small way. We will probably increase it a good deal as time goes on.

4375. When you speak of improved communications, have you actually anything concrete in mind?—Yes. Roads and railways.

4376. Roads in forest areas?—Yes, and extension of railways to the forest boundaries where possible.

4377. Are the railway rates for timber and fuel satisfactory?—No. They are very high.

4378. You consider them very heavy?—Yes. The cost of bringing timber from Kanara (in the south of the Presidency) to Bombay (a distance of a little over 400 miles by rail) is much more than the cost of bringing timber by sea from Rangoon to Bombay. Therefore, Kanara timber cannot compete with Burma timber in Bombay because it is so much cheaper to bring it from Rangoon.

4379. As regards afforestation, can you give us an idea of the area that will be available for increased afforestation in your Presidency?—Do you mean which is not under forests at present?

4380. Yes, land that can be put under forests?—There are vast areas of uncultivated land, but we do not want to have much of that under forests. Really we have as much under our control as we can manage.

4381. But do you agree that the waste land available in the country could be utilised for afforestation?—It might be; but it is mostly grazing land,

and the question will arise whether the demand for grazing would allow any of that land being given up. To turn it into forest means closing it to grazing for a few years, to allow the natural forests to come up. It is a question whether the graziers can afford to let that amount of land go out of their control for the requisite number of years.

4382. You do not hold out any prospect of increasing the forest area in this Presidency for some years to come?—I do not think so. I think we have got as much as we can manage now.

4383. No further extension is possible?—It is possible, but I hardly think it is desirable.

4384. Do you follow any definite programme in your work, that is to say, do you chart out a forest policy programme for five or ten years ahead?—We have got working plans of all important forests for periods varying from 10 to 20 years, and in some cases for longer periods, and we follow a regular programme.

4385. *Mr. Calvert:* Do I understand that you are not attempting in this Presidency to reclaim ravine land by afforestation?—We are not doing that.

4386. Nothing on the lines of the Talwar plan is being tried here?—No. Not at present.

4387. Is it because it is not a paying proposition?—We have not thought of it. As a matter of fact we are very short of funds at present. It would be an expensive thing, this ravine reclamation.

4388. It would not be a paying proposition here?—We have not gone into it carefully.

4389. *Dr. Hyder:* Have you large areas of ravine lands?—Not very large. I do not think we get anything like what you have in the United Provinces.

4390. *Mr. Calvert:* And the Punjab?—We have nothing to compare with that here. There is a little in the vicinity of some of our big rivers and the streams running into them, but it cannot be said there is a big area in this Presidency.

4391. Has your department tried to supply fuel to cultivators with the object of inducing them to keep their cowdung for manure?—Not with that special object in view. We open depôts in villages and towns outside the forests for the cheap sale of firewood, but the idea of that is to prevent the looting of our own forests and to regularise the cutting. We have never gone in for it to stop the burning of cowdung.

4392. Do you find them willing to buy wood fuel?—They do buy it, yes.

4393. *Dr. Hyder:* With regard to the question of a substitute for cowdung as fuel, do you know that the people who eat rice and *bajri* have an objection to the use of coal or other fuel as a substitute for cowdung because they say that to do so makes the food taste of the smoke? If you can invent any type of *choola* in which we can use charcoal or other fuel we might get over this difficulty?—Charcoal should not smoke the food; it does not give out much smoke.

4394. They say ordinary coal does?—Ordinary coal does. The use of charcoal will prevent the smoking of the food. It would be a very good thing to use: it gives out very little smoke.

4395. *Mr. Calvert:* With regard to this question of limiting grazing to the amount which the forest can bear, has any proposal to increase the fees been turned down by the Bombay Government?—No. We put up proposals two or three years ago to increase the normal rate of grazing from 2 annas to 4 annas, and Government agreed. We have not had any proposal for raising the fee turned down.

4396. In your forest grazing lands, apart from the cultivators, do you suffer from having people who are purely cattle-breeders?—We have got professional graziers or cattle-breeders in some districts.

4397. Are they migratory?—Yes.

4398. Do they pay a higher rate?—Yes, they pay one rupee.

4399. Would you tax them out of existence?—No. The cultivators buy their cattle from these breeders, and it would be a hardship to the cultivator if we drove these people away.

4400. Do you think in the interests of the present cultivators themselves and of future generations you should restrict the present rights in the forests? —I think on the whole we restrict them sufficiently. I think the forests in our own charge are being sufficiently well looked after to be able to meet the needs of future generations.

4401. You were discussing with Sir Chunilal the question of charcoal. Are you trying those new methods of carbonisation in retorts and so on to minimise waste of combustion?—We have got a man now who wants to start a big scale industry. But we have done nothing ourselves up to now. We simply burn the charcoal in an overground kiln.

4402. You are not trying to make briquettes out of the dust?—No.

4403. Is not that a practicable proposition?—It might be considered. We have never tried it.

4404. Is the Dehra Dun Institute helping you in the economic utilisation of your products?—They are. We send them enquiries and they help in the way of timber testing, testing timber suitable for sleepers and various other purposes.

4405. Do you think there is a possibility of working up minor industries based on forest products? Charcoal is one, and there is lac cultivation, sericulture, etc.?—Yes.

4406. Is there any opening here for those?—There are a good many minor products like *myrobalans* in which there is a certain amount of industry now but which have not been worked up.

4407. I gather the impression that you do not contemplate any large scale plantations in this Presidency?—No. We replant what we cut down.

4408. No fresh plantations in new areas?—Very little.

4409. You do not think there is any need or scope for that?—I do not think we have ever thought seriously about that, because we have neither the staff nor the funds. I do not think there is very much scope for it. The only new plantations we make is to do a little with the planting of casuarina trees on the sea shore. Otherwise we only replant what we cut down.

4410. There is no need to have special fuel plantations near the large towns?—Our large towns are generally on the railways, and they get fuel at moderately reasonable prices.

4411. *Mr. Kamat:* In answer to question 9 (*a*) (*i*) on page 145 you say that the soil in the neighbourhood of bare hills in the Deccan could be improved if the hills were covered with tree growth. Have you made any experiment with sowing seeds of a hardy type so as to cover the hillsides with shrubs?—That was done years ago in the Deccan. There were attempts to plant them. So far as I know, however, that was very spasmodic, and was not followed up with precautionary steps to protect the young plants, and I think it resulted in nothing.

4412. No systematic experiments have been made?—No, not in that kind of way.

4413. In answer to Sir Ganga Ram you expressed your doubts as to whether the presence of forests had much effect on rainfall. Have any experiments been made on that subject?—There have been experiments all over the world in that direction, but we have not made any here.

4414. In that line nothing new is necessary?—I do not think so.

4415. Replying to question 19 (*a*) on page 146, you say that if areas of forest were allotted to individuals rather than to cultivators as a whole in a village or group of villages much waste could be avoided?—I think it would to a certain extent.

4416. In pursuance of this policy, do you auction off forest areas which are grass-bearing to certain individuals?—Yes; grass, for instance, we sell to individuals.

4417. By auction?—By auction or tender, yes.

4418. And the man who buys by auction as a middleman makes a profit from the villagers?—He may.

4419. Have you reason to believe the profit he makes is very high?—I have heard complaints of that, and in the case of grass, which the local people buy from him, we are thinking of fixing a maximum price at which he should be allowed to retail it. At present he can make the best bargain he can.

4420. Do you not think that the system of auction is detrimental to the interest of the villagers and their cattle?—Wherever the villagers as a body will pay a fair price for grass we prefer to let them have it. They are taking to that now and are clubbing together and buying an area.

4421. You say the Bombay Government sanctioned raising the grazing fees from 2 to 4 annas. Was that in order to prevent waste or simply from a commercial desire to get as much money as possible out of the grass?—We felt that 2 annas was such a very small sum in proportion to the value of the grazing that it would not be a hardship if the people were asked to pay a little more.

4422. On the whole, by raising the grazing fees from 2 to 4 annas how much has the Bombay Government made?—I think, from a lakh and a half to two lakhs from the village cattle.

4423. The total extra income to the Bombay Government was only a couple of lakhs?—We do not talk of two lakhs as "only."

4424. On the other hand, the inconvenience to thousands, and perhaps millions, of cattle must have been rather great?—That one and a half or two lakhs of rupees is distributed amongst 12 or 14 lakhs of cattle.

4425. *Dr. Hyder:* Has this increase in the grazing fee restricted the number of cattle?—The number of cattle grazing now is just the same as it was before.

4426. *Sir Ganga Ram:* Have you got the same rate for bullocks, sheep and goats?—Sheep and goats are charged a different rate. The fee varies in different districts. The fee for goats, I think, is 2 annas; for sheep 1 anna and for horned cattle, 4 annas.

4427. *Mr. Kamat:* Even supposing that the number of cattle has not decreased, still the general dissatisfaction amongst the cultivating community was rather great, and that was not worth having at the cost of 1½ to 2 lakhs of rupees?—I do not think that we heard very much dissatisfaction. When I went round with a Forest Grievances Committee last season we heard a good deal about it, but at the time the fees were raised there were very few complaints.

4428. Do you ever meet groups of villagers, and ask them if they have complaints or grievances?—Yes.

4429. Apart from your contractors and others?—Yes; frequently.

4430. You say that the dissatisfaction was not very serious?—I do not think so.

4431. *Dewan Bahadur Malji:* You have nothing to do with non-forest districts?—Very little; practically nothing, in fact.

4432. Do such non-forest districts consult you about disposing of odd pieces of land here and there which can supply good pasture and grazing?—A question like that came before me not long ago. It was from one such district in Gujarat. They asked my advice.

4433. Are there any separate Government rules for the disposal of such lands in consultation with you?—I do not know of any for waste lands in non-forest districts.

4434. You told Sir Chunilal Mehta that if more wages were paid more return could be had in the shape of timber cutting and so on. If that is so, from a business point of view why not go in for it?—Because of scarcity of funds. Our funds are very much cut down nowadays.

4435. It is only a question of temporary accommodation?—It is difficult to get funds for expenditure as the general budget is being cut down, and so ours has been cut down too.

4436. Was this matter ever mentioned to Government?—Yes, every year when I send in my budget.

Sir Chunilal Mehta: My question, to which the witness replied in the negative, was whether the Forest Department would mind paying higher wages because they would get more profit. The difficulty was to attract labour. They could not get labour.

4437. *Dewan Bahadur Malji:* If more labour can be had with such payment would you go in for it?—Yes, we would.

4438. Are there any records of charcoal experiments made by Government in forest areas under your charge?—We have been making experiments on charcoal for the last 6 or 8 years and they are being continued both by us and our contractors.

4439. Do you think that there are any chances of success?—I think so. It is gradually getting better, I think.

4440. *Sir Ganga Ram :* Do you keep the reserve hay in open stacks or in bales?—In bales.

4441. Hand bales?—Steam pressed bales.

4442. Do you tie it with rope?—With wire

4443. What does it cost you per bale?—It is usually done by contract. It costs us about Rs. 12 per 1,000 pounds, Rs. 27 per ton.

4444. *Sir Henry Lawrence:* Including the grass?—Yes.

4445. *Sir Ganga Ram:* A rupee a maund?—Yes.

4446. We do it in the Punjab for 4 annas and including the hoop iron we get 8 annas for the whole thing. We supply to the Military Department and the grass is of exceedingly good density. What is your density? How many cubic feet per ton do you get?—We get bales of 250 pounds. It is about 12 pounds per cubic foot.

4447. At what rate do you sell this when famine comes?—That is fixed by Government. Government try to sell it at cost price.

4448. Zamindars have no money in times of famine. Does not Government give it for nothing?—We have nothing to do with the selling. Government does that.

4449. They give your department some credit for it?—We do it as agents for the famine relief. It does not come out of the forest budget; it is famine relief work. We do it because we are there and the grass is in our forests.

4450. Have you got any timber in your forests suitable for railway sleepers?—We sell a lot of teak sleepers.

4451. You have got teak?—Yes.

4452. Is it inferior to Burma teak?—We think it is just as good, but we have not got so many of the bigger trees.

4453. What do you charge per sleeper?—We charge Rs 4-4-0 per sleeper for metre gauge.

4454. And for broad gauge?—We do not make them for broad gauge; our big forests are all down south, where the railways are metre gauge.

4455. Still, they can be transferred to the broad gauge. The *kutcha* roads in the forests are all bridged and can be used by motor cars?—We have got some roads with bridges.

4456. Are they all bridged properly?—Some of them are bridged and some not.

4457. Is any attempt being made to bridge all of them?—We are building bridges.

4458. *Sir Henry Lawrence:* You know that experiments in charcoal were made 10 or 12 years ago by Mr. Hodgson in the Belgaum forests?—Yes.

4459. Are they being carried on now?—They were dropped towards the end of the war, I think.

4460. But they promised success about 10 years ago?—Yes. Experiments are being actually carried on on the same lines in Khandesh and Satara now.

4461. What is your forest budget, what is roughly your income and what is your expenditure?—The income is about 73 lakhs and expenditure about 40 lakhs.

4462. You remember the days when your income was 20 lakhs and your expenditure 25 lakhs?—I never knew it quite as bad as that, but certainly our income was a great deal less than it is now.

4463. Your budget shows a much better appearance now than it did 30 years ago?—Very much better.

4464. *Professor Gangulee:* With regard to the question of villagers planting trees in their holdings, I should like to ask you whether your department encourages that sort of thing?—In a small way we have done it in Kanara. We have got people to do it a little, but I cannot say we have done much in that direction.

4465. Is there any scope for it?—It requires a good deal of teaching but it would be a very good thing if we could get them to do it.

4466. You have a suitable forest nursery where they could buy suitable plants?—They do it directly from seed.

4467. Do they come to you for seed?—Yes. They are quite free to go in and collect the seed themselves if they like.

4468. They do not come to you for assistance?—They do occasionally.

4469. *Sir Ganga Ram:* One of the cultivators complained that the forest is a source of misfortune for them because wild pigs shelter in the forest, come out to feed and damage the crops?—Yes; wild animals do. That is true to a certain extent.

4470. *Mr. Calvert:* Is it a fact that in the forest areas people live very largely on forest produce?—We have wild tribes like Bhils. They feed on forest fruits, etc.

4471. Have your cultivators very valuable rights in the forest?—They have very valuable privileges; they have very few rights.

4472. *The Chairman:* Have you commenced recruiting for the new superior Provincial Service?—No.

4473. When will that commence?—I think we shall have to start next year.

4474. Do you anticipate any difficulty in engaging a sufficient number of officers under that system?—It is very hard to tell. Up to now we have recruited for our old Provincial Service; we do not know whether we shall get the same type of men or possibly men with a little better education for the new Provincialised Service.

4475. That service is taking the place of the old Imperial Service?—Yes.

4476. There is one central training Institute at Dehra Dun?—Yes, they are just starting the new training there.

4477. Will you tell the Commission about that? Have you any views?—The Bombay Government have made no rules yet about recruitment or training, but I presume that our men are to be recruited in this country and that they will be sent to Dehra Dun for training. I do not know whether they will be better than the old provincial men.

4478. If you have any views as to the relative suitability of central training stations and provincial training stations, we should like to hear them?—We only recruit one or two men per year and we could not keep up a training class for that.

4479. There would not be enough to train?—No, there are only one or two per year.

4480. You must have a definite training centre? You could not train them by attachment to your existing staff?—Naturally they would have to go to a college for 2 years' training; that would have to be Dehra Dun as far as I can see.

4481. So that on the whole I gather you are in favour of the Central institute at Dehra Dun?—Yes.

(The witness withdrew.)

Mr. OTTO ROTHFIELD, Khairpur Mir, Khairpur State, Sind.

Replies to the Questionnaire.

QUESTION 3.—(*a*) I should rank easily first—putting the right man in the right place and leaving him there. Personal influence has done more than anything else to influence the practice of cultivators.

(*b*) My main suggestion is that full accounts showing all expenses must be kept, published and explained. The cultivator is interested in the business side.

(*c*) Concentration and intensive work in small areas.

(*d*) *Successes.*—(1) Introduction of cotton-growing among the wildest people in one of the wildest tracts of the Presidency—cause—personal influence of Mr. Trikamlal Lakhia.

(2) Improvement of Khandesh cotton—cause—chiefly, I think, Dr. Mann's personal interest.

(3) Renascence of good Surat cotton—cause—the personal influence of Mr. Bhimbhai under Mr. Keatinge and Dr. Mann *plus* the good selling arrangements made.

(4) The popularisation of Spanish ground-nut first in the Deccan and now also in Prantij and other parts of Gujarat cause—not specially known.

(5) The increase in fruit-growing and handling, *e.g.*, in Khandesh—cause—the teaching of the Agricultural Department.

(6) The popularisation of iron-ploughs, especially in the Deccan cause—constant display by the Agricultural Department and the discovery of a good and pushing firm to make and sell them.

QUESTION 4.—(*c*) (*i*) The outstanding defects of the Agricultural Department in the past have been (*a*) that the officials were too apt to want volume in their results and would therefore go to the big landlords and neglect the small holders, (*b*) that the officials were too much bureaucrats and too little public servants, (*c*) that the department was not co-ordinated with the kindred departments, especially the Co-operative, and it was not part of a separate homogeneous Ministry.

The Veterinary Service has been too small—and too neglected—to count at all.

I should note that in Bombay the defects noted above in the Agricultural Department have been remedied to a great extent in the last five years.

But a thorough administrative improvement cannot be expected till the now obsolete "Secretariat system" is replaced by a system of Ministries like that in vogue in other countries.

(*c*) (*ii*) The Railways sometimes manipulate rates to the prejudice of the agriculturists. (Of course the wagon trouble hits the agriculturists too.) At present there is still no method of putting popular pressure on the administration of railways.

QUESTION 6.—(*a*) (*i*) The main cause of borrowing is that the cultivator needs money while the owner of money looks for investments. There were until lately—there are even now—few reasonably safe methods of investment in this country.

(*ii*) The sources of credit are (*a*) the village shopkeeper, (*b*) the taluka town *sowcar*, and (*c*) the co-operative movement.

(*iii*) In the majority of cases the main cause of failure to repay is that agriculture is a losing business to the defaulter. Sometimes the cause is temporary depression, *e.g.*, famine. The main trouble about the Indian cultivator is not that he repays too little but that he repays too much.

(*b*) No special measures of the kind suggested are in my opinion of any use whatever. If the law is bad, it should be amended as a whole: if it is good, it should apply to the agriculturist as to every other citizen.

The general measure which is necessary is to do all that is possible to see that the cultivator is allowed a decent profit for his work, not merely by securing better and fairer marketing, punishing fraud and so on, but also by securing that there is no more dodging with protective duties, cotton excises or exchange against his consent and agreement. A strong and enlightened "Country Party" is a necessity of the agricultural situation in India. At present cultivators (or the co-operative movement which is their best representative) have too often no voice on those questions of finance, taxation and administration which concern them even more acutely than the leaders of "big business." The burden of debt will be lightened as soon as cultivators obtain a larger say in Imperial policy and thereby increase their profits.

The only special measure that I recommend is education and propaganda to explain the uses of the Insolvency Act to the cultivator. Incidentally, co-operative schemes of debt-redemption can never be successful till much more use is made of that Act.

(*c*) The right to mortgage and sale should be restricted and controlled in backward areas for limited periods but not generally. Non-terminable mortgages appear to be used only for fraudulent purposes—if so, they should be prohibited like every other form of fraud.

QUESTION 7.—Yes. I should like to develop this in my oral examination, if allowed.

QUESTION 8.—(*b*) No one is satisfied with the existing methods. The main defect is payment by area and not by water. Co-operative methods of distribution and control should be introduced. By-laws for this purpose were drafted in the Bombay Presidency in 1923 at suggestion of special committee of 1923 but have been turned down after three years' incubation by Government because the Irrigation Department stated that some different and unorganised schemes worked on rather different methods had not "caught on" though as a matter of fact two out of four were successful.

QUESTION 11.—(*a*) (*iv*) The fencing (or rather "walling-in") of cultivators' fields on a co-operative basis has proved successful in this Presidency. In order to make these schemes more successful and more just Government should contribute its share to the expenses in proportion to the waste land in the village. At present Government stands to derive the greatest immediate pecuniary advantage with no direct outlay.

QUESTION 18.—(*a*) No special measures are needed in the parts of India with which I am familiar.

Better wages and better housing would be the most effective methods of attracting labour. But of course in all countries people find the country "dull" and are attracted by the vices and glitter of towns.

The causes of shortage of labour are many, *e.g.*, high death-rate; preference for trading; caste impediments and so on; but they are causes which will only gradually be removed.

QUESTION 20.—(*a*) Not very satisfactory. I cannot, however, give the details required.

(*b*) No. I am not satisfied.

(*c*) By co-operative marketing with the aid of agricultural experts.

(*d*) Yes.

QUESTION 22.—(*a*) and (*b*) These are matters on which I would request permission to make my remarks orally. Generally I would say that I should like to see a great deal more money spent by Government in putting experts at the command of co-operative societies for technical advice and work, and also in assisting propagandist and educational institutions. On the other hand, speaking for India generally, I should like to see official control removed as far as possible, which in my opinion is somewhere about the point reached in France and in the Bombay Presidency. Further I should like to dwell on the capital importance in India at this stage of its development

of the field of banking being occupied to the utmost by the co-operative movement.

(*c*) Yes. Certainly.

(*d*) In the main, yes. But there are many qualifications.

QUESTION 24.—(*a*) None in my opinion.

(*b*) Expensiveness of money is probably the main cause. How can any improvement be successful when the interest on capital is seldom less than 10 per cent? But the extreme difficulty of obtaining technical advice is also a great impediment. The other discouraging factors are obvious.

QUESTION 25.—(*a*) Housing, water-supply, and birth-control are probably the three main needs.

(*b*) Such enquiries are needed; but I should prefer to see them done by non-official agencies, though Government may reasonably be asked to pay for them at least in part. The methods followed by Dr. Mann, Professor Gilbert Slater, Mr. Patwardhan for the Registrar, Co-operative Societies, Bombay, and the Central Co-operative Institute, Bombay, are each good in their way. The ideal may perhaps be found in an amalgamation of these methods.

(*c*) I should prefer to answer this orally if permitted.

4482. *The Chairman:* Mr. Rothfield, you are a retired officer of the Indian Civil Service?—Yes.

4483. You have been good enough to put in a series of answers to the Questionnaire for which the Commission is greatly obliged to you and which we have all read with much interest. I should like to take you through that document, unless you wish to make any general statement; I shall give you an opportunity of amplifying any particular points?—I only wish to apologise for the shortness of the replies and the fact that it is not very carefully done, but I only arrived in India on Friday and only got the Questionnaire when I came up here on Saturday; I was not able to do it as well as I should have liked to have done it.

4484. I do not think the Commission will complain of short answers. Your answer to question 3 (*b*) on page 163 is: "My main suggestion is that full accounts showing all expenses must be kept, published and explained. The cultivator is interested in the business side." I take it that what you mean there is that accurate costing on all operations on demonstration plots, and so on, should be kept?—Yes.

4485. So as to disabuse the cultivator's mind of the idea that all the resources of Government have been put into the crop?—That is what the cultivator usually says.

4486. And he is sometimes right, is he not?—I am afraid so, yes.

4487. There is a rather more formidable proposal on page 163: "But a thorough administrative improvement cannot be expected till the now obsolete 'Secretariat system' is replaced by a system of Ministries like that in vogue in other countries." Do you care to develop that at all?—One of the great drawbacks of the present system is that the heads of departments have to work officially, or should I say on paper, with the political heads of the departments, the Ministers, through the Secretariat, which was devised before the reform scheme came in and is no longer appropriate. Take, for instance, the particular departments with which the Royal Commission is concerned: the Agricultural, Co-operative and Veterinary Departments. I will leave the rest aside for the moment. Agriculture and co-operation are under the same Minister, but interposed between them and the Minister is a Secretary who is really the Secretary of the Revenue Department. Usually, I admit, there is also a Deputy Secretary, whose attentions are more devoted to the Transferred subject but who works definitely under the Revenue Secretary, and who naturally cannot assume the responsibilities which depend on the Secretary. Now the way that works in practice is that, for instance, the Registrar, let us say, or the Director brings up to the Minister certain proposals for a change in policy for discussion and approval. He goes up to him as the permanent head of a department naturally would in any country. The Minister approves of the proposals. They are then drawn up in detail. They are then submitted through the Revenue Secretary, and, in conformity with the old Secretariat system, the Revenue Secretary naturally thinks himself entitled not merely to criticise the form of the proposals and to see that they are put up in a correct form, but also to start revising the matter of the proposals already approved by the Minister. In other words, the head of the department and the Minister find between them a person whose primary duties are, after all, concerned with another subject, but who, all the same, under the prevailing system is sufficiently in authority to control not merely the form but also the matter.

4488. Was the origin of that method of working which you describe as the Secretariat method founded in the conception of finance as the vital matter in all administration?—No, I wish to guard myself against any confusion on that subject. No one for a minute can complain of the interference of the Finance Department; there must necessarily be a strong Finance Secretariat, and no head of a department in this or any other country could possibly object to his proposals, as far as they involve finance, being subjected to a

Finance Department. That is not the origin of what I have called the Secretariat system. As far as I can trace it, its origin lies in the fact that the Government used to consist of a perfectly united body consisting of His Excellency the Governor and two Members of Council, corresponding with district officers in the various districts and necessarily having to have some one, who was originally little more than a clerk, to convey the rather rare letters to their agents in the districts, receive the answers, file them and collate them. While the departments grew the central conception remained for a long time as it was, centred on two official Members of Council and the Governor, and the same system fitted in perfectly well, except that the clerical staff, filing arrangements and so on had to be extended to meet the increasing work. But the point has been reached now when there has been really a complete change of the Governmental system as you may say, while on the other hand, the Secretariat system still remains as it was when it was introduced under very different circumstances.

4489. What experience have you of these matters yourself? I am not quite clear what branch of the service you were in?—During my last 3½ years I was Registrar; I was also a member of the Legislative Council for 3 years.

4490. Turning to a very different subject, on page 163 of your memorandum, question 4 (*c*) (*ii*): "The railways sometimes manipulate rates to the prejudice of the agriculturists." That is a charge of some substance?—When I used the word "manipulate" I did not necessarily mean dishonest manipulation; I mean that they use the rates to benefit dealers in certain centres and actually to hit the agriculturists. I did not intend to imply anything otherwise disparaging. There are instances where it told very severely against agriculturists. For instance, in 1911-12 there was a very severe scarcity, I hardly like to call it famine, in the Broach district. In consequence, grass had to be brought by cultivators from Central India to the Broach district. But the railway, in consequence of a certain rate-war they were then carrying on, fixed the rates in such a way that, for instance, it was actually cheaper for a cultivator to fetch his grass from Central India to the town of Broach, which is fairly in the south of the district, unload it, re-load it on a train or on a cart, and take it up to the next station or the second next station to the north rather than book it to those stations directly.

4491. From your experience and looking at things from the broadest possible angle, do you think the railways fail in their service to Indian agriculture?—No, I do not think I should be justified in saying that.

4492. On page 163 you say: "The main trouble about the Indian cultivator is not that he repays too little but that he repays too much." That is a little cryptic; would you care to expand that at all?—There is such a very strong feeling of honour amongst the Indian cultivators in regard to debts incurred, say, by their father or even by their grandfather, that they will go on crippling themselves generation after generation in repaying the interest on those debts rather than take any steps to be done with them once and for all either by the Insolvency Act or by giving up the land and buying other land again if necessary.

4493. You mean the debt grows out of all proportion to the security: where the security is land, the cultivator might well part with the land, clear himself of his debt, create a little more debt and buy some more land?—Almost always.

4494. Would you publicly advocate that step?—I have advocated it in co-operative societies.

4495. What proportion of cultivators in this Presidency are aware of the existence of the All-India statute called the Insolvency Act?—I have no idea; I could not give a figure.

4496. Question 7 on page 164: you answer in the affirmative and say you would like to develop that answer. Will you kindly do so?—The point I made in dealing with this question which exercised my attention with the Hon'ble Minister for a considerable part of my service as Registrar was to make a distinction between sub-division properly so-called and fragmentation. By

sub-division I understand sub-division on inheritance and succession. By fragmentation I mean the dividing up of fields into very small fragments from whatever cause it may be. I personally am not convinced that sub-division by inheritance has directly caused so very much injury; but, whether it has or not, I am certainly convinced that any direct interference with it by legislation would be a very grave political error. On the other hand, I am certainly of opinion that fragmentation ought to be remedied as far as possible by what appears to me to be not particularly difficult legislation or by voluntary effort where possible in the way of re-stripping, and consolidation. Actually I proposed certain lines of legislation, after a study of the legislation in other countries, to try and effect this in this Presidency, and I understand that a draft of a Bill very much on those lines is at present being circulated by the Government of Bombay. Of course, I am also well aware of the excellent voluntary work done in at least two districts of the Punjab to consolidate fragmented holdings, largely due, of course, to the personal influence of Mr. Calvert. In those parts of India where it is possible, I should strongly advocate all co-operative measures being taken to ensure a voluntary effort in that direction. I must add that I think we are all of us rather apt to assume facts in regard to increase of fragmentation and sub-division of which there is remarkably little proof. As far as this Presidency is concerned I went into the figures as well as I could, with, I admit, a bias from my experience in favour of thinking that there was an increasing amount of fragmentation; but I must honestly confess that the figures I was able to obtain, though they may have been corrected since, did not go very far to prove it.

4497. You think there is a point where the normal means of consolidation counterbalance the natural tendency to further fragmentation?—I have never been satisfied as to what the cause is, but that is what I had to surmise was the case.

4498. Did your proposals include any principle of compulsion at all?—Yes, I think if you are going to legislate at all you must introduce compulsion. The basis of my proposals, and I think the basis of the present proposals, is option to move for a scheme of consolidation, and majority compulsion once the scheme has been drawn up.

4499. More than 50 per cent being a sufficient majority?—The original proposal was two-thirds, but I notice it has been pointed out by various officers since, and probably with justice, that in India a majority of two-thirds would be too much to ask, and 50 per cent has been suggested by several officers.

4500. 50 per cent of cultivators or 50 per cent of the land?—50 per cent of acreage I think is the basis; I cannot be quite certain.

4501. On page 164, in questions 22 (*a*) and (*b*), you have given us a short note and I understand there is more which you would like to give us?—Generally speaking, I think that Government might do more by spending more money on propaganda and by ensuring a more thorough audit where there is a system of official audit, by increasing the number of auditors.

4502. Has it been your experience that the audit has been definitely faulty?—No, I think the audit done by the Government auditors on the whole was an excellent one, but there was always a tendency to ask them to do more than they could do, and in consequence there was a tendency for audits to fall into arrear. Looking at the figures which I have now seen in this year's report, the same thing appears to me generally to be still the case; but of course, the present Registrar can deal with that better than I can.

4503. You are concerned with an extension of the facilities?—Yes, but I certainly consider that the actual founding of more societies, the encouragement to found more societies and the guidance to societies should be done by non-official agencies. I do think that on the whole the relationship of the Government official to the movement should more and more rapidly tend to be that of confining himself to his statutory duties, and that the Government effort should be in the way of giving money to be spent on

propaganda as far as possible by a non-official agency, and also in supplying expert aid to societies.

4504. That is to say advice as regards constitution and conduct as well as propaganda in favour of the initiation of societies?—I was not thinking so much of advice in regard to constitution and conduct *qua* co-operators, but, for instance, if they have a dam to build for irrigation purposes, to ensure that engineering advice should be given to them gratis if possible, or at a very small charge.

4505. That is for minor improvements of that sort?—Yes.

4506. When you say irrigation works, what are you thinking of?—I mean minor irrigation works done by co-operative effort.

4507. I take it from your experience you do advocate the provision of skilled advisers in the earlier stages of the society's life, do you not?—Do you mean official advisers by your question?

4508. I was careful not to say which I meant?—Certainly, some advisers there must be.

4509. Ultimately do you contemplate the withdrawal of those crutches, and the society being able to manage itself?—Hardly; I think there will always be need of advice, supervision and inspection from outside; but I should like the advice to be outside the society but within the movement.

4510. In other words, you think the Central Co-operative Organisation should provide it?—Yes, it and the financing agencies.

4511. And not Government?—No, except to the extent of audit; in the conditions of India certainly I am personally of opinion that an official Government audit is necessary.

4512. But otherwise, non-official assistance and advice?—I think so, except to the extent that the Registrar at the top through his statutory duties necessarily must exercise to some extent strong advice in the framing of policy; the very fact that he performs those statutory duties gives him great weight with the non-official bodies.

4513. Why do you despair of these societies reaching a stage in development when they might be able to find from within the members of the society a sufficient managerial capacity to carry them on?—Because I despair of human nature to that extent and do not think that people anywhere are able to do without higher authority and control.

4514. Do you think that under no conditions is the primary society capable of providing efficient management without supervision over and above audit from above?—I cannot go so far as to say that; I think there might be instances in which the primary society may manage itself very well, but that would not to my mind alter the fact that supervision is required. May I suggest an analogy? There may be towns and villages which are so peaceful and law-abiding that the police force has nothing to do, but I would not suggest withdrawing the police.

4515. At the end of your note of evidence you say you are prepared to answer question 25 (c) orally. Will you do so?—It is extremely difficult to give any generalisation at all; that is really the first and last broad conclusion I have arrived at in this connection. The conditions in this Presidency alone, for instance, vary so enormously that to my mind the great thing one has to guard against is generalisation. I have no doubt whatever that there are certain districts and certain classes of cultivators and even agricultural labourers, perhaps, who have attained considerably higher prosperity now, for instance, than they had 20 or 30 years ago. I must at the same time say that I am equally convinced that there are large tracts and very large percentages of cultivators whose conditions have become appreciably worse in the same time. We are dealing in Bombay, anyhow, with extremely complicated and extremely difficult economic conditions, and I should doubt if there is any single man, Indian or Englishman, official or non-official, who can really give a thoroughly sound opinion outside the limits of a very small area. We have in the Deccan roughly 750,000 cultivating owners. On refreshing

my memory with the papers, I saw that 66 per cent of the holdings in the Deccan, 332,000 holdings, are less than 5 acres, and that is in a plateau which at the best is very infertile and arid. It is quite obvious that those people are not making a profitable business out of agriculture. But one cannot go on and draw the logical conclusion that the land is going out of cultivation and out of ownership. It does not seem to be so; on the contrary, you have the very remarkable fact that in the Deccan a very much larger percentage of cultivable land is actually cultivated than you have in the fertile districts of Gujarat. I am not quite sure of the figures, but I think I am right in saying that in one of the Gujarat districts the proportion of cultivable land which is in fact cultivated is about 60 to 70 per cent while in the Deccan it is somewhere about 90 per cent. A fact like that at once causes one to pause in drawing any conclusions. Then you have conditions like those of the Konkan where the number of tenants is enormously larger than that of the cultivating owners, and where only about 45 per cent. of the cultivable land is cultivated, although there is actually no rain-failure and no possibility of rain-failure one may almost say. What I personally am inclined to think is that the average small cultivator in the Deccan finds it not only sentimentally agreeable but also expedient to him to retain a small holding and work elsewhere as well, because, although he is very often, I believe, paying for the luxury of having it, it gives him a holiday and it gives him a certain amount of produce which he likes to eat.

4516. And some prestige?—Also prestige. I certainly think it is politically extremely healthy that there should be this attachment to the soil and that they should be kept there.

4517. Statistics seem to show quite plainly that there has been an enhancement in the number of small owner cultivators at the expense of the purely agricultural, often landowning labourer?—I think they do, but I would not have said the statistics which I have obtained show that quite plainly. Are you speaking of the last census?

4518. I think so; it has been given in evidence before the Commission and was founded, I think, on the last census?—I have got the figures of the last census here as far as they bear on that, and I do not find them very plain, but I admit the figures are extremely difficult to distinguish. The general tendency I think has been that of distinct migration from the small towns to the large cities, but remarkably little migration from the villages to either.

4519. There was a suggestion that although agricultural wages had risen, there had been no tendency for that fact to attract more of the rural population to work purely as labourers, but that rather in fact there had been during the period of rise in agricultural wages an increase in the numbers of small cultivators?—Yes, I should say if anything there is an increase in the number of small cultivators, and I think there is very little to show that labour has increased. I think labour is more or less stationary and the cultivator has increased.

4520. Can you account for the fact at all?—I think probably it is due largely to sub-division and probably also I think to greater prosperity. I think that must be so, but it is very difficult to fit in with the facts, I admit. If one takes the Presidency as a whole, the cultivator I suppose has been more prosperous, which is shown I think by the fact that his womenkind work less than formerly. I suppose that prosperity has tended to make people buy land if they could, but that is the only suggestion I can make about it.

4521. I take it you agree that probably the small cultivator might be able to improve his cash position in life by giving up a small and uneconomical holding with which he is struggling and definitely taking up work as an agricultural labourer?—One would think so. There may be things attaching to the cultivator which the labourer has not. I overlooked question 5, which is more or less connected with co-operation; if you would like to ask me any questions about it, I should be very pleased to deal with it. I

happened to have to deal with the subject of *taccavi* just before leaving, and the policy to be adopted by the Bombay Government.

4522. Will you tell us about that?—I personally am entirely against going on with the Government system of *taccavi* under the Agriculturist Loans Act and would also prefer to see it dropped under the Land Improvement Act except so far as it is given through co-operative societies. I must confess that I consider *taccavi* to be a system which is now absolutely obsolete, and, moreover, one which however much it is given within the means available to any Government can only just touch the fringe of the requirements of credit. In this Presidency it has been estimated, I think fairly correctly, that the cultivators need every year between 20 and 25 crores of rupees. It is inconceivable that any Government, however large its revenues, would give anything much over one crore as *taccavi*, so that at the best it could only just touch the fringe of the matter; while, on the other hand, I consider the evils done by lending Government money under the Agriculturist Loans Act in the present economic state of India are very great and have practically no counterbalancing advantages. I would like to see *taccavi* given, if at all, only in specified backward tracts or in a famine year. But in a famine year, if assistance is to be given under *Taccavi* Acts, even then I think it should be under the Land Improvement Act rather than the Agriculturist Loans Act, under which money is always wasted. Certainly in the more advanced parts of India, here in this Presidency and I should think in Madras, the cultivator can now be very well left to the co-operative movement and other indigenous banks in so far as he is not a member of the co-operative movement. Naturally, I should prefer the co-operative movement.

4523. I can understand the virtue of confining Government loans to the avenues of co-operation, where co-operation exists, but where you have large areas where there is no co-operative credit, would you withhold all Government loans?—Even there I think so. I cannot think that a few doles of Government loans are really going to help them very much towards the solution of the problem of their credit in such areas whereas it is certainly going to retard the growth of the co-operative movement in those areas. I think the sooner they learn self-help the better for them. The only exceptions I regard as worth considering are those of one or two wild tribes or one or two castes holding on special tenures where for one reason or another the tenure itself makes it almost impossible for them to obtain credit in the ordinary way.

4524. There is no basis of credit?—Yes. As to the question of long-term credit, the real difficulty, of course, in the co-operative movement is the provision of long-term credit, not only here but in every country. Although co-operative banks do and will do their best to meet the difficulty by getting people to take up shares and make as many long-term deposits as possible, yet it is and will for a considerable period to come be very difficult for them to obtain enough long-term money to be able to lend to cultivators for periods of between 10 and 20 years. There I think it is inevitable and necessary that Government should step in and assist, but not necessarily in the form of *taccavi* under the *Taccavi* Acts. What we are doing in this Presidency is that Government puts money into the Provincial Co-operative Bank in the name of the Registrar, that money is distributed by the Provincial Bank in conjunction with the Registrar to District Banks, and through them to primary societies for the purpose of land improvement on schemes drawn up and approved.

4525. Is the commercial and industrial community interested in land mortgage as a basis of security? Are they inclined to lend on the security of land mortgages?—The idea has been taken up here after I left and I would rather not express an opinion about it.

4526. *Sir James MacKenna:* On page 104 of your note on the point on which the Chairman has just been examining you, you say: "On the other hand, speaking for India generally, I should like to see official control removed as far as possible, which in my opinion is somewhere about the point reached in France and in the Bombay Presidency." What stage have you reached in

the relaxation of official control in Bombay?—We do an official audit; we provide advisers like the people who advise in regard to cotton, and the Registrar and Assistants inspect; they give such advice as they can either directly or through the controlling agencies, and the Registrar, of course, exercises the statutory powers of registration and cancellation. But even in regard to inspection the remarks are confined to a minimum and are almost invariably communicated to the self-governing body immediately over the society inspected.

4527. Do I understand you are of opinion that audit should remain official? —I am strongly of that opinion.

4528. How far down in the co-operative scale would you carry it?—To the primary society.

4529. Do you not think it would be better and would encourage business training and method if that audit could be done by societies themselves?—I do not think it would do very much to encourage their business capacity; I think it would only result probably in a slipshod audit. As a matter of fact, in this Presidency that suggestion has been seriously made, but after consideration it was rejected by non-officials as well as officials. The suggestion was that an inferior non-official agency under the guidance of the Institute or some similar body should be substituted for the existing official agency.

4530. You are afraid that the audit by the agency suggested would be slipshod?—I am almost certain of it.

4531. You would not limit it to super-audit?—I do not think so, because I think the importance of the first audit is so very great, both for public credit and for the society itself, that I think a mere super-audit is not enough.

4532. Who audits the accounts of the Provincial Central Co-operative Bank?—They are audited by our department and also by a private firm of Chartered Accountants.

4533. There is a delicate point on the question of administration. Did I understand you correctly to say that when a scheme has been put up by a departmental Head and approved by a Minister, it is subject to criticism and amendment in the Secretariat?—Yes, certainly. It is subject to criticism during the process of going up to the Minister for the subsequent issue of his official approval. The official order of approval, the so-called Government resolution, is issued by the Revenue Secretariat, not by the permanent Head of the department who works with and under its political Head. If the Secretary of a Reserved department takes the matter up for discussion to the Member in charge and it is initialled, the Secretary then issues the orders; there is no other intermediary. When, however, the Head of one of the Transferred subjects (who is not at present classed as a Secretary) takes a proposal to the Minister and it is approved, it is not initialled in that sense, and the Head of the department cannot issue the orders himself. He has then to send it to a Secretary not belonging in any real sense to his own department or ministry, and this Secretary then starts treating the whole thing *de novo*.

4534. You do not know whether that system is peculiar to Bombay or not? —No, I do not.

4535. *Professor Gangulee:* On page 163 you point out defects in the Agricultural Department, and you say that in the past "officials were too apt to want volume in their results and would therefore go to the big landlords and neglect the small holders." Do you not think that is an inevitable process?—I think it was inevitable, but I do not know that it need go on.

4536. Agricultural improvements will percolate through from the big landlords to the small cultivators, will they not?—We have not in this Presidency any big landowners who cultivate themselves, and nothing passes through them to the small cultivators. All the cultivation in this Presidency is done by small cultivators, whether tenants or owners.

4537. Granting that this is a serious defect, can you suggest how the Agricultural Department can bring the results of its experiments directly to

the notice of the small holders?—Certainly; by what we are doing here, through the co-operative movement.

4538. Precisely how? Supposing better seed of some kind, or a new variety of cotton, has been produced by the Agricultural Department, how would you proceed to introduce that and give it to the small cultivator without taking any steps to interest the big landlords?—I may say at once that in most districts that grow cotton there are no big landlords. What we do is this. The Director of Agriculture and the Registrar of Co-operative Societies, if something quite new has to be considered, meet together and arrange jointly the programme to be followed. The directions issued go to the Taluka Development Associations, on which the Assistant Registrar and Deputy Director will sit. Then we have various Cotton Organisers, men who belong to the Agricultural Department who are working under the Co-operative Department and who are controlled by the two officers jointly to a large extent. These men go amongst the villagers preaching the virtues of the new seed. They show it and get the societies to agree to buy it and distribute it, or to sort it and sell it, as the case may be. Officials on both departments go amongst the villagers in the co-operative societies and talk about it, and make it their business to see that the cultivators thoroughly understand the thing.

4539. But there is no actual demonstration of the value of using the seed; you simply talk about it?—There is very often a demonstration, and I think I am correct in saying that nowadays plots are obtained as a rule through the co-operative society (from, of course, some member of the village) and the experiment, or demonstration, is made on such plots.

4540. Referring to another defect, you point out that the department was not co-ordinated with the kindred departments. Have you any definite idea how the desired co-ordination might be brought about?—I have. As a matter of fact, we have in this Presidency in the last few years gone a very long way towards securing it by the fact that both Agricultural and Co-operative Departments work under one Minister. That has enabled us to make arrangements, perhaps, not of a very rigid nature, by which the two officers concerned work together on all important questions. If necessary, joint cases were submitted to the Minister. Departmental Joint Boards were instituted, and that process was carried right down. I think that as far as it goes the system now existing in this Presidency is very satisfactory. My only objection to it is that which I have already mentioned in answering the Chairman's question in regard to having a Ministry or continuing under the present Secretariat system. The drawback to my mind was not in the work of the two officers concerned, but that in the case of a difference of opinion between them there was no recognised channel of approach to the Minister for the issue of official orders.

4541. You refer to kindred departments. Do you mean the Co-operative and Irrigation Departments?—I was thinking of those which come under one Minister. Irrigation presents very great difficulty. It might be put under the same Minister, but there are great difficulties in the way. It belongs more to Public Works.

4542. Veterinary?—Veterinary, certainly, and I think Forests.

4543. Education?—No, I think that is separate.

4544. Not primary education?—I think not.

4545. In what you say about railway rates, do you refer to the rates for agricultural produce or manure, implements, etc., or to all rates?—I do not know enough of the details now to be able to say. I used the word "manipulation" but what I had in mind was this. Latterly rates have been raised owing to the cost to the railway of some of their material, the price of which has been increased by putting protective duties on steel without the agriculturist being consulted. After all, he is the person who has to pay the duties, and in my opinion he should have been consulted in an organised way before the duties were imposed.

4546. On page 164 you say "A strong and enlightened 'Country Party' is a necessity of the agricultural situation in India." Are you referring to the

formation of an agrarian party in this country?—I was thinking of the political parties under the new reformed Government in this country. At the present moment there is no party which is specially interested in agriculture and I think the sooner there is a 'Country Party' the better it will be for the country's development.

4547. With regard to the control of the co-operative movement by non-official agencies, are there sufficient non-official agencies in the country?—I would rather not speak for other Presidencies. At the present moment there are enough in this Presidency to do the work which I suggest.

4548. Would you find such agencies in village areas, for instance?—Yes, we have our organisers and the district branches of the Institute.

4549. These organisers belong to the particular village area?—Yes.

4550. *Mr. Calvert:* In your experience as Registrar did you find the Usurious Loans Act was much availed of in the courts?—I have never heard of its use in this Presidency.

4551. Is it your experience that the right to mortgage land is utilised to obtain funds for productive purposes such as land improvement?—Very seldom for land improvement.

4552. Would not there be a little difficulty in preserving discipline in co-operative irrigation societies, in that you could not very well expel an irrigator who was entitled to participate from the same outlet?—It is a very difficult problem. It can only be met by being arbitrary and investing them with powers, I think.

4553. Why do you think official control is necessary? Why not educate a society to manage its own affairs?—I find it very difficult to put what I mean into words. I have not that trust in human nature, and I know of no countries, except Denmark and England, which have been able to carry on the co-operative movement without a good deal of official control. The circumstances of certain intensely individualist countries like Denmark and England are very different from those of India, and to my mind the analogy appears to be rather with the practice in France and practically every other European country. Another point is that if the co-operative movement is ever going to do what, after all, we as co-operators look forward to as the ideal, and that is, almost to be the State itself in all its economic aspects, it appears to me essential that the State in its political aspects should also to some extent control the co-operative movement inasmuch as it will also be controlled by it.

4554. From your experience of this Presidency you do not think the co-operative movement is going to be able to do without control?—May I ask if you are asking me whether I think the primary society will ever be able to do without control from above?

4555. The two points of difference are that whereas in the Punjab we try to educate the members to manage their own affairs entirely, you envisage control from outside?—From outside the primary society, certainly.

4556. You have not tried educating the members to do without control?—Yes, I think we are trying to do it the whole time. We are trying to make them entirely self-managing, and I believe I am right in saying that as a matter of fact there is a very much larger percentage of our societies which are entirely self-managing (which write out their own accounts, and conduct their whole business very well) than is the case in the Punjab or in any other Province. We have never suggested to them, however, that the time would come when they would be free from inspection by, for instance, the financing agency, or from audit by the Government auditor or from guidance.

4557. Who controls your District Banks?—They are controlled by the Directors, who are mostly chosen by the primary societies; but happily the District Banks are now brought into what amount to disciplinary relations with the Provincial Bank. The Provincial Bank supervises them.

4558. Has not Bombay gone further than any other Province in India in its legislative control over societies?—I suppose so. We have more definitely

stated in our legislation the points where we consider that control by the Registrar must continue than any other Province has done, but we confine ourselves strictly to those.

4559. And to circulars from the Registrar's office?—Yes, certainly.

4560. To an extent unknown in other Provinces?—That I am unable to say.

4561. Is not your non-official agency largely drawn from the non-cultivating classes?—Largely, yes; but not in the majority.

4562. What exactly is your objection to the co-operative leaders being actual cultivators who may be born leaders of men even though they may not be what we call "educated"?—I have no objection at all; we welcome them, if we can find them.

4563. Would not that be a better ideal, to find cultivators with the gift of leadership rather than non-cultivating outsiders?—Yes, but in this Presidency there is no sharp distinction between the two classes. We have a great many people who are both professional men and landowners interested in cultivation.

4564. I am speaking not of landowners but of cultivators?—The small landholder in this Presidency, whether he be a professional gentleman or not, does not actually plough himself, but he does look after the cultivation to some extent.

4565. I am referring to the man who guides the plough?—That would be the ideal state of things, to get the actual ploughman who has studied Marshall and books on banking generally.

4566. No, who has been taught by a highly trained staff for a period of years. You have applied to non-official audit the terms "inferior" and "slipshod." Is that based on comparison with your own?—No, on what it would have been had it been done here as it would have been done if the idea had been carried out of encouraging a rather cheaper audit by a non-official agency.

4567. You were not referring to Provinces where the audit is non-official?—No, to the scheme which was put forward here.

4568. Have you ever attempted to work out the proportions between secured and unsecured debt?—No, I have not.

4569. I gather from your note you are opposed to further amendments of existing Acts in order to protect the cultivator from exploitation?—I am not at all in favour of any special amendments or special legislation, but if the law is bad (and it is primarily for lawyers to say that) then it should be changed for all. I am not fond of the idea of special privileges.

4570. You have given a figure for cost of cultivation which works out at about Rs. 9 an acre. Is not by far the larger part of the cost of cultivation borne either by the labour of the cultivator's family or by labour paid in kind out of the harvest?—I am not sure what proportion it would be; I cannot remember the figures well enough. I have not had time to look up the basis on which these figures were arrived at.

4571. Have you in Bombay a new class of moneylending landlords?—Yes.

4572. Are they an evil?—They are usually even more unbearable than the old fashioned *sowcar*.

4573. *Mr. Kamat:* With regard to agricultural indebtedness, you have advocated the teaching of the uses of the Insolvency Act to the cultivators. Do you think the present cultivators are showing too much sense of honour in the repayment of their debts?—Too much ignorance, and largely too much sense of honour, yes.

4574. Do you not think the teaching of the Insolvency Act to the cultivators would be an extraordinary measure, demoralising the whole countryside?—More than the capitalist system?

4575. Do you know that in the olden days (from which time, of course, they have inherited their sense of honour) there was a counterbalancing factor,

namely, the law of *damdopat*, by which the moneylender could not exact more than twice the amount of the original debt?—Theoretically.

4576. Even in practice?—I have always been given to understand that was not the case.

4577. Do you not think the present tendency of the moneylender and the cultivator, by which each tries to defraud the other and, as it were, dodge the other, will be increased if you teach the uses of the Insolvency Act?—I think you are asking me to answer two questions at the same time: Is it an evil tendency? And would it be increased? It can be called an evil tendency, as every step forward is called. One is always told that the past was the moral age and the future will be the immoral one. The present phase seems to me an economic transition, such as you had during the thirteenth and fourteenth centuries in Europe, which is inevitable, and I do not see why the uses of Acts (which you can stigmatise as dishonest if you like) which are on the statute book should be confined to one side.

4578. You have referred to the sub-division of holdings and said there is no clear and conclusive proof that the evil is growing?—Yes.

4579. And that therefore you were against any legislation to interfere with succession and sub-division as such?—That is not the main ground, but one of them.

4580. When you say there is no clear proof, what period have you taken into consideration?—The period from 1900 onwards, with the important proviso that one must not be misled, as people often have been, by the figures previous to the Record of Rights Act. Only the other day I again saw statistics for 1903-04 compared with statistics of to-day. That is a useless comparison, but periods since the Act can be compared.

4581. You think there is no tendency for further sub-division?—It is very slight, if it exists at all. Perhaps it would be more correct to say it is not a serious tendency. There is a slight tendency, but not a serious one.

4582. If there is a slight tendency, as a preventive measure, would you not take into consideration the fact that if such legislation is passed in these days it means it will be passed by a majority of the people's representatives, and therefore the legislation would be justifiable?—I would not, because I think to talk of the people's representatives is begging the question. The legislation would be passed by people of a rather doctrinaire cast of mind belonging to the intelligentsia, and not by representatives of the villagers whom it is going to hit. Moreover, I feel sure that with normal conditions of development the tendency will correct itself, as it has done in France.

4583. Automatically?—By human action, of course.

4584. *Dr. Hyder:* How?—By birth control and later marriage.

4585. You are in favour of this course?—Of the control of sub-division? I am strongly in favour of the consolidation of fragmented holdings.

4586. I mean, you would advocate propaganda for birth control to check this evil rather than legislation?—It would be a much smaller evil than legislation at this stage, I think.

4587. Would you take cognisance of the fact that if such legislation were passed it would have to be more or less permissive; 75 per cent, or some such percentage, of the holders would have to be amenable?—In that case I think it would be useless. At one time I suggested, without pressing it, the possibility of constituting the so-called impartible family estate on the lines followed in France and Italy. That is the utmost extent to which I personally would be inclined to recommend action in regard to sub-division.

4588. *Dewan Bahadur Malji:* You were formerly Collector of various districts in Gujarat?—Yes.

4589. From your experience during that period, would you subscribe to the view that the result of education as given to-day is, unfortunately, that it tends to denude the countryside and add to the army of unemployed in the towns and cities?—I think so.

4590. Do you think agricultural education should be a *sine qua non* in the interior, where the majority of the people are agriculturists?—I would rather not answer that question; I have never gone into the technical side of it. I confess my first bias is against it, but I do not know enough about it to express any real opinion.

4591. After a certain stage is reached in primary education, would you permit agricultural education to be added?—Certainly.

4592. Do you know about the bias classes lately introduced?—No; I have only just heard of them.

4593. Perhaps one of the reasons why people are forsaking a country life is the possibility of getting higher wages in the industrial centres?—Seemingly higher wages, higher money wages; and also in this as in every other country the desire for cheap pleasures.

4594. If agricultural labour is organised with regulated wages and period of service (while at the same time not being turned into slavery) do you think people would stick to the villages?—Yes, to a much greater extent. I think the attachment to the village is greater here than in European countries.

4595. In the syllabus of rural schools, is it not necessary that the merit of labour should be taught by actual practice?—That again is a thing I have not really thought about.

4596. You told Mr. Calvert you would not advocate any exemptions to societies in business matters, or something like that; you would not afford them special protection?—I was not thinking of societies when I answered.

4597. Protection for the weak generally?—Protection is given by the special Co-operative Act, of course.

4598. Particularly in reference to the consumers' movement, where consumers' societies are found in the mofussil to control market rates and so on, would you not exempt them from such local taxation as the municipal octroi or terminal taxes?—To that extent I would be prepared to agree, but I do not like the principle very much even there. I would like to see competition on an equality; but when it has proved itself the co-operative society should be given control over markets, for instance, which in my opinion should always be with the co-operative society.

4599. Such exemptions are often allowed in Japan?—Yes.

4600. Development Associations were originated during your regime?—Yes.

4601. And the idea, I may take it, was that they should be registered under the Co-operative Societies Act?—Yes.

4602. The idea underlying that was to bring about better co-operation between the Agricultural and Co-operative Departments?—Yes. There was some discussion to start with as to the advisability of this registration, but it was eventually decided on.

4603. Do you not think registration under the Co-operative Societies Act gives a greater guarantee of continuity?—Yes.

4604. Otherwise they are only associations of individuals who have paid a rupee each and who can drop out at any time?—Yes. I am strongly of that view.

4605. Do you remember the Broach Agricultural Association?—Yes; it began very well and dwindled to nothing. We had a similar experience in East Khandesh.

4606. There is also the advantage of co-operative audit?—Yes.

4607. If these associations are not registered we lose that advantage?—Yes.

4608. With regard to your remarks on railway rates, during your time at Broach as Collector I believe the Bombay Steam Navigation Company introduced a system of steam launches which were of great advantage to the cultivators and enabled them to get their produce to market more easily?—Yes.

4609. The Railway Company then reduced their freights to offset the steamer competition?—Yes; they introduced "cut" rates to Broach and raised them against Broach.

4610. This matter was specifically mentioned to the Viceroy's Council?—Yes. It went right up to the Government of India and was watched by the Bombay Government on behalf of the Government of India for 2 years. The Bombay Government recommended certain action, but the Government of India favoured the policy known as "wait and see" and in the end we waited and saw.

4611. In the result the shipping company had to go away?—Yes.

4612. *Dr. Hyder:* With regard to the distribution of water by quantity, have you personal knowledge of such distribution in Spain, Italy and France?—None.

4613. You think it is practicable in India?—I have been advised by officers of the Irrigation Department that it is, and see no particular reason why it should not be.

4614. There is not only the technical side of installing the modules but the social, psychological side as well?—Yes, but in that direction I see no difficulty.

4615. Have you read Sir Valentine Chirol's book on Egypt?—No.

4616. Do you know whether there was any tendency for crime to increase there at the time of the distribution of water?—I did not know it, but I can imagine it. Was it co-operative?

4617. No. You attributed shortage of labour to the high death-rate. Do you think the death-rate among the rural population is higher than in any other class?—No, I do not think that, but it is much higher than it ought to be.

4618. The birth-rate is also higher?—That is partly why the death-rate is so high.

4619. But if the birth-rate is high and the death-rate is high, the result of those two influences on the population would be to keep it stationary?—But it does not follow that it does not add to the shortage of labour.

4620. But how has this shortage of labour arisen?—There is a very great waste; the process of bringing a lot of human beings into the world to be killed is very wasteful of human effort.

4621. I quite agree, but I want to know the causes of this?—I am afraid I am not making myself clear. Let us assume that women in the labouring classes work in the fields, that every woman in the working classes loses every year two months on account of the birth of a child, and again a certain period in nursing that child till its death and looking after it while it dies, she anyhow loses time and the country thereby loses labour which might be saved to it if that process had not been gone through.

4622. But this state of affairs existed, let us say, in 1880?—Yes.

4623. There was then a high birth-rate and a high death-rate?—Yes, but I did not say there was an increasing shortage of labour. We spoke merely of shortage of labour.

4624. There has been an increase in the number of holdings?—Yes, there has been an increase, certainly, but not a very large one.

4625. If the total area has been constant, then an increase in the number of holdings would indicate a decrease in the size of the average holding?—In the average, yes, it must.

4626. That being so, do you think the condition of the rural population is improving or getting worse?—Would you mind telling me the figures underlying your question?

4627. In reply to Members of the Commission I understood you to say there was an increase in the number of holdings?—I am certainly under the impression that there is a slight increase, but I am not sure of the figures. Assuming there is a slight increase, what is your question?

4628. That the size of the average holdings must be diminishing?—Yes, the average.

4629. *The Chairmain:* Unless more land is coming into cultivation?—Yes.

4630. *Dr. Hyder:* Would that indicate prosperity?—I think it is one of those cases where figures can be interpreted both ways. It may indicate prosperity in this sense, that more people are acquiring land; or it may indicate adversity in that none of them has got enough to live on. It may indicate prosperity in that they have got better cultivation and are able to get more out of 5 acres, or it may indicate that they are starving or not getting enough.

4631. Which is the true view?—I honestly cannot express a general opinion.

4632. You are of opinion that sub-division and fragmentation do not necessarily go together. If the land is of uniform quality, fragmentation need not follow sub-division?—It need not follow to the same extent. It would be perfectly possible to have sub-division without added fragmentation if the cultivators were sensible enough not to preserve superstitious observances with regard to their fields.

4633. *Sir Chunilal Mehta:* You would not rule out the giving of *taccavi* by the Government in famine areas?—No.

4634. You also make a reservation in favour of backward people like the Bhils?—Yes.

4635. Then I may tell you the Bombay Government have accepted your proposals?—Thank you very much.

4636. On this sub-division question, you recognise that, whatever your views may be, there is something to be said on the other side also?—Certainly; it is a very difficult and complicated question.

4637. And many officers of considerable experience hold that some kind of legislation is necessary?—Yes. I have, as a matter of fact, just read Part 1 of the proposed Bill dealing with fragmentation which certainly proposes to deal with sub-division in what appears to me to be a very reasonable way and in a way which would not be likely to arouse political discontent. I have not been able to go through the whole of the details of it, but I do not think the objections which I mentioned would apply to Part 1 of the proposed Bill.

4638. You have had time to look at Part 1?—I have just seen it.

4639. That appears to you to be the best way of tackling this very important question?—Yes, I think so.

4640. Your experience of the Taluka Development Associations leads you to feel that they are doing good work?—Yes.

4641. On the whole they have worked very well?—Yes.

4642. And that is the best agency, in your opinion and that of the Director of Agriculture of the Bombay Government, for propaganda work?—Yes.

4643. Do you think Taluka Development Associations organised with reference to a smaller area would be desirable if the right type of men could be secured for such organisations?—I would really have preferred to have Supervising Unions, if we could be sure of their being well run, in preference to the Taluka Development Associations; but I was so certain that we should not be able to find enough organisers, that I jumped at the idea of the Taluka Development Association when it was first mooted, and I think in the actual existing circumstances, whatever the future may produce, the Taluka Development Association is the best method we can adopt.

4644. Do you think in the very near future the time will come when it will be desirable to organise the Taluka Development Associations on a smaller basis, that is to say, in groups of, say, 10 villages instead of in groups of 100 or 200 villages?—I certainly hope so in the future, but I should not say it would be very soon.

4645. In order to get the best results out of these associations, whether they be on the larger or the smaller basis, is it in your opinion desirable that

there should be people in the villages preaching the gospel of rural development generally? —Staying in the area, yes.

4646. In every area of 20 or 30 villages?—Yes, I think so certainly, if it can possibly be arranged.

4647. One ought to work in that direction?—I certainly think so.

4648. And organise a body of such people, preferably non-officials, to carry on the work of general rural development?—That is certainly what I should like to see.

(The witness withdrew.)

The Commission then adjourned till 10 o'clock on Wednesday, the 27th October 1926.

सत्यमेव जयते

Wednesday, October 27th, 1926.

POONA.

PRESENT:

The MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.
Sir THOMAS MIDDLETON, K.B.E., C.B.
Rai Bahadur Sir GANGA RAM, KT., C.I.E., M.V.O.
Sir JAMES MACKENNA, KT., C.I.E., I.C.S.
Mr. H. CALVERT, C.I.E., I.C.S.
Raja Sri KRISHNA CHANDRA GAJAPATI NARAYANA DEO of Parlakimedi.
Professor N. GANGULEE.
Dr. L. K. HYDER.
Mr. B. S. KAMAT.

The Hon'ble Sir CHUNILAL V. MEHTA.
Dewan Bahadur A. U. MALJI } (*Co-opted Members.*)

Mr. J. A. MADAN, I.C.S.
Mr. F. W. H. SMITH. } (*Joint Secretaries.*)

Mr. V. H. NAIK.

FURTHER ORAL EVIDENCE.

4649. *Sir Ganga Ram:* On page 137 you give a number of irrigation schemes. May I know the reason why they have not been taken up? Is it for want of funds?—Government has taken up bigger schemes in other districts.

4650. Are they estimated to pay a return of 4 or 5 per cent?—These schemes have still to be investgated.

4651. They have not been investigated?—Not entirely. There may have been preliminary surveys.

4652. According to the Irrigation Commission, no scheme which pays less than 6 per cent. is regarded as paying its way. I understand that in Bijapur, of which you are Collector, there are frequent famines?—Yes.

4653. During the last 20 years, how many famines have there been?—There was a famine in 1899, one in 1911-12, one in 1918-19, one in 1920-21, and one in 1923-24.

4654. Five famines altogether?—Four in the last 15 years.

4655. And yet, Government has not awakened to the necessity of taking up these irrigation schemes?—These are smaller schemes which are now being suggested. Government has taken up bigger schemes commanding larger areas in other districts, equally liable to famine.

4656. How great an area would be commanded by all these schemes that you mention?—I understand that each will command about 10,000 acres, at a cost of about Rs. 10 lakhs. That is what I have been told by a competent engineer.

4657. Do you think it will not pay if you can cover an area of 10,000 acres for 10 lakhs?—It is understood that these smaller schemes will provide only water for *rabi* crops and not for perennial irrigation.

4658. For these 10,000 acres, what would you charge for the water?—The ordinary *rabi* rate for 4 months is Rs. 4 to Rs. 6; not more.

4659. Say, Rs. 5. It ought to pay anyhow about 5 per cent.?—It will pay about 4 per cent., I think.

4660. Government has not taken it up as yet?—The matter is under consideration now. It has been submitted to the Commissioner and the higher authorities.

4661. Then you say that there are tanks also for irrigation, and that the Superintending Engineer has got a number of suitable sites for such work?—He is investigating them.

4662. Would they not command any land?—It has yet to be seen. He is investigating the sites.

4663. When you refer to wells for irrigation, how many acres would each well command?—It would depend upon the well. It might command only 4 to 5 acres.

4664. What would the wells be worked by?—Bullock power.

4665. How can a well be made to pay which only covers 4 or 5 acres?—It does pay; these are not very deep wells.

4666. At what depth is the water from the surface?—It all depends on the locality. It will be 25 feet, 30 feet, 40 feet, and so on. It will not be more than 40 feet.

4667. Four to five acres can be covered by a well like that?—It depends on the crops. If you put in crops requiring less water, you will have more area.

4668. What do they put in?—In certain parts cotton is irrigated; that is *neglectum roseum* cotton.

4669. You say that the use of cowdung as a fuel should be penalised, with proper safeguards. If you penalise it, what are the people to do? Is there no other remedy? We ask you to propose remedies which would stop the evil, not to penalise it?—You can pass legislation not to burn cowdung as fuel.

4670. What are they to do, if there is no cheap fuel?—We have firewood.

4671. But they have to buy firewood?—It does not matter. They can buy it. They can also collect it from their own fields.

4672. Can they afford to buy?—They can collect it from their own fields.

4673. What do they do with the cotton stalks, when they reap the cotton?—They use it for fuel.

4674. You say that this year the total quantity of fodder stored is 65 lakhs of lbs.?—Yes.

4675. That is not very much; about 80,000 maunds. Is that the Government scheme?—Yes.

4676. What kadbi do they store? Kadbi of bajri?—Kadbi of juar; what you call sorghum.

4677. In the Northern Punjab, where the produce of the land is not enough to provide a livelihood to the landholders, they supplement their income from agriculture by service in the army. Do not the people from your district go into the army?—Only a few, not many, from the Karnatak.

4678. Are they considered unfit for service in the army?—No. There is a certain amount of recruitment in Bijapur for the Mahratta battalion.

4679. History teaches us that the Mahrattas were a very warlike people?—Bijapur is not altogether Mahratta. It is Karnatak. But a few Mahrattas and Deccani Mahommedans are recruited.

4680. If some of them go into the army, will not that be a subsidiary occupation for them?—I do not know about that!

4681. *Dr. Hyder:* How many people are in your charge in Bijapur?—Nearly 8 lakhs.

4682. That would mean 200,000 families?—About 2 lakhs of families.

4683. You want to penalise the use of cowdung as fuel?—Yes.

4684. How many police would you require for it?—We do not require police for that. I would penalise it under the Village Police Act. The village *patel* might punish the offender.

4685. Will the village *patel* go round the houses?—He can go round and advise the people not to use cowdung as fuel.

4686. Can you name any agricultural countries which have, to use your phrase, agriculturalised their educational system?—I cannot give you any instance of that, but I think in Denmark the education is very much agricultural in every way. If general education is not altogether agriculturalised there is at least supplementary education in the form of what are called people's high schools, and so on.

4687. That is very general?—Yes, but there is a very strong agricultural bias there.

4688. *The Raja of Parlakimedi:* Is Bijapur entirely an agricultural district?—Yes.

4689. What is the population, roughly?—About 8 lakhs.

4690. Out of that, what percentage would you put down as cultivators?—Most people are cultivators there, and agricultural labourers.

4691. Are all of them cultivators?—Most, I said. There is a certain proportion of people carrying on different professions, but most people are agriculturists or agricultural labourers.

4692. Are there many Government agricultural farms spread over the district?—There is no Government farm in the Bijapur district.

4693. Is the department doing something in any other way for the improvement of agriculture in the district?—They have got 3 agricultural Overseers, who carry on propaganda, and recently the department has also appointed for the district an officer called a bunding officer. I think they have also got a Cotton Assistant. That is all the agricultural organisation that exists there.

4694. Can you tell us what work the Overseers actually do?—They supply seed to ryots, carry out experiments on ryots' fields, and hold demonstrations at central villages. Recently, they have also been helping the Collector and his staff in investigating schemes for field embankments and preparing plans and sketches and so on. That is, of course, in connection with the development of the *taccavi* policy which Government have sanctioned for the Bijapur district very recently.

4695. What are the important crops of the district?—Half the area, 14 lakhs out of 28, is *jowari*.

4696. Is that the staple food of the people?—Yes.

4697. What other crops are there?—Then comes cotton, about 8¼ lakhs.

4698. Do they grow tobacco?—No.

4699. As regards irrigation, how do you fix the charges? Is it according to the number of crops, or the nature of crops, or what?—At present there is not much irrigation in the Bijapur district.

4700. Are there no tanks at all?—There is only one tank, which does not fill in a year of scarcity of rainfall, and there is practically nothing in the way of canal irrigation at all.

4701. How do the people manage to get money for carrying on their agricultural operations?—They borrow from *sowcars*. There is a certain number of co-operative credit societies; and thirdly, there is the *taccavi* system.

4702. Have the co-operative societies made any progress in that area?—Yes; they are making fairly good progress.

4703. Do the moneylenders charge almost as much as the co-operative societies?—The moneylenders' rates are higher than the co-operative societies' rates.

4704. In that case, why should not the cultivators go to the co-operative societies?—They should. But cultivators do not always understand their own

interest. They have not organised societies everywhere, and the societies that have been established are not all fully developed. Thus ryots still go to *sowcars* for money.

4705. Is the movement not very popular?—I said it was fairly satisfactory. There are other neighbouring districts which have made more progress than Bijapur. We have got, in Bijapur, one society for every 8 villages, whereas in the neighbouring district of Dharwar there is one society for every two villages.

4706. *Professor Gangulee:* You want to penalise the use of cowdung for fuel. Have you any draft Bill prepared for the purpose?—If you want me to make a specific suggestion in the matter, I would penalise it under an Act called, in the Bombay Presidency, the Village Police Act. I would give power to the village headman to fine the person who uses cowdung for fuel purposes. Matters kindred to this sort of thing are penalised in that way, and the village *patel* takes cognisance of such offences and inflicts a small fine, or detention for a short period of time.

4707. Are you of opinion that such a method would work?—It may not bring about immediately all the success that we want, but I think in the end it will work.

4708. With regard to animal husbandry, is the indigenous method of storing *kadbi* quite successful?—In Bijapur district, my staff was able to import the method from a neighbouring district.

4709. You describe here the method known as *Kilbanavi*. I take it that is indigenous?—It is indigenous in the neighbouring district, which is a more advanced district.

4710. It is not indigenous to the district to which you belong?—It is not indigenous to the district in which I work.

4711. Have they any other method of ensilage?—No.

4712. With regard to co-operation, I want to ask you one or two questions. Please refer to page 139. Have you taken any active part in the co-operative movement?—I have.

4713. You say here that honorary organisers of co-operative societies may be replaced by a paid staff of Government officials. Why?—A body of honorary organisers was more essential in the early days, when the movement had to be brought home to the people, and the suspicions, if any, removed by non-officials. But now, of course, co-operative work is becoming very technical. Supervision is very necessary, and the organisation of long-term credit and other societies is very complex. I am afraid this work cannot be done by laymen who cannot devote their whole time to the work. I have, I may say, some experience of this sort of work.

4714. Are you aware of the developments of co-operative societies abroad?—Yes, I am.

4715. Are there any Taluka Development Associations in your district?—There are two.

4716. What can you tell us of their success or failure, as the case may be?—One outstanding feature of these societies is that they are very small and their operations are on a very minute scale; and if agriculture is to be improved, their work has to be on a good scale. That is the reason why I have tried to outline a district organisation for the purpose of supplying agricultural requisites, such as manure, seed, implements, and so on.

4717. Do you think that these Taluka Development Associations could be the unit of organisation in a village area?—They may be in some places; not everywhere. Personally, I would like to have a district organisation in my district to command sufficient capital, to enlist the energy of the best men in the district, and to have a better status for the whole thing.

4718. Do you personally take an interest in the Taluka Development Associations?—I do to a certain extent.

4719. Have you attended any of their meetings?—Yes.

4720. Do they come to you for any suggestions?—I am very much in touch with these people, and either I go to them or they come to me. There has been an exchange of ideas between us.

4721. Do not the organisers come to you for any specific help, direction, or guidance?—They come to me for help, and I secured some help from the Director of Agriculture in the case of one society.

4722. On page 137, with regard to irrigation, you make a few suggestions, and you give 6 sites which are suitable for investigation. Do you mean to suggest that these sites have been overlooked by the irrigation officer?—It is not that they have been overlooked. Some years ago all the suitable sites were investigated and recorded, but I believe that priority was given to more promising and bigger schemes in other equally deserving areas.

4723. With regard to *taccavi* loans, you say a great deal about them, and you suggest the development of the Government system of *taccavi*. Have you any definite idea how that development could be brought about?—Yes, I have. In fact, in my own district, I have recently got a *taccavi* scheme of development which has been sanctioned by Government. Government have been pleased to allot Rs. 2 lakhs this year for financing the construction of wells and the construction of field embankments, what are called "Thals" or "Wads" in this part of the country.

4724. Are *taccavi* loans popular among the cultivators in your district?—Yes.

4724a. The management of the *taccavi* loans is now in the hands of the Revenue Department?—Yes.

4725. You suggest here that it should be in the hands of the Collector. Do you think that system would enhance its popularity?—Yes; in my district, at any rate, it is popular.

4726. With regard to the general trend of the whole memorandum, you suggest that the Collector should be able to control a great deal of the work?—In my opinion, the Collector should be organically connected with the agricultural organisation and improvement of the district.

4727. Do you think, in addition to his other duties the Collector is able to interest himself in the work of rural development?—Of course, he will require special staff for it. He will require another branch of his office. Collectors are able to turn their hands to anything in an emergency.

4728. Is it your idea to centralise in the hands of the Collector all the work of the district?—Yes, with sufficient staff to help him.

4729. You think he can do that in addition to his other duties?—I think he can bestow the necessary oversight.

4730. *Mr. Calvert:* On page 137, on the subject of finance, you suggest a plan for land mortgage banks. Were you thinking of any very special model?—Not any special model, but I have suggested one or two special things, which seem to me to be essential if the land mortgage bank system is to be developed as an efficient organisation.

4731. You have no objection to the co-operative land mortgage bank?—I have no objection to the land mortgage bank being registered as a co-operative society.

4732. Have you any objection to a land mortgage bank organised on co-operative principles?—No objection whatever.

4733. In this little note, were you thinking of the agricultural land banks of Egypt?—No.

4734. Please refer to page 137, indebtedness. In your district, is the Usurious Loans Act made full use of?—No, it is not much used.

4735. Is it known to the people?—That Act does not seem to have much effect in my part of the country, on account of the Deccan Agriculturists' Relief Act. That comes in the way, and with that Act taken together with

the Hindu law, under which interest equal to principal only can be claimed, I think the Usurious Loans Act, which is an All-India Act, has not much application.

4736. Do I gather that in your district moneylenders do not actually take more interest than the equivalent of the principal?—He may take more, but when he goes to the courts, he cannot claim more than that.

4737. Does he not take more than that in the course of a life-time?—He may take more, but he cannot claim more than that when he goes to court. That is the rule of *damdopat*.

4738. On page 139, co-operation, you suggest a paid staff for organising co-operative societies. Would you also use that paid staff for educating the people in the principles of self-help, thrift and other economic matters?—Yes, for the whole work. I want to have paid men. Incidentally, they will do all sorts of duties.

4739. I understand at present there is no organisation for teaching the villagers to manage their own affairs entirely by themselves, without any outside help?—Propaganda, according to our present organisation, is the function of the Institute; but the paid staff, in addition to organising difficult types of societies or societies in backward areas and supervising them, will also do all they can to teach managing committees and so on.

4740. Could members of societies answer a question as to the meaning of the word credit?—If you put it in an intelligible form, I think they could answer it. It would depend upon the way in which the question was put.

4741. *Mr. Kamat:* On page 136 of your note you state that there is no major port of international importance on the whole coast between Bombay and Colombo and you suggest that Bhatkal in North Kanara would be a suitable port for development. It is a far cry from Bijapur to Bhatkal. I do not see what bearing the opening of a port at Bhatkal has on the agricultural development of Bijapur and the Eastern Deccan?—I have not taken Bijapur alone into consideration in making that suggestion; I have taken the whole Karnatak area of which Bijapur is part. Bhatkal has a bearing on the whole of the Karnatak and also the tract round the Karnatak.

4742. Is not there a port at Marmagoa?—Yes.

4743. And another down the coast at Cochin which is big enough?—They say Bhatkal would be better.

4744. At page 137 of your note, under the heading "agricultural indebtedness" you make a suggestion that the best way to help agriculture is to investigate the liabilities of the ryots and to pay off the same with an advance carrying a lower rate of interest, the funds required coming either from Government direct or from land mortgage banks?—Yes.

4745. Have you got any rough idea as to how much Government will have to find if they were to make advances like this and investigate the liabilities of all the people in the district?—That suggestion may be considered along with my suggestion about land mortgage banks. The Bombay Government may start the work in certain areas and the banks will take it over.

4746. Have you considered the feasibility of that suggestion?—Yes. If Government was to take over the whole thing themselves it would mean an enormous amount of money.

4747. Would it be possible?—No; the finances of the country would not be able to bear it, but Government finance would be able to help in the beginning, at any rate in the formation of the banks.

4748. What roughly would be the indebtedness of the Bijapur district?—I could not tell you. I have made no estimate.

4749. Do you think it is a feasible proposition?—Government can help the banks in the beginning to a certain extent.

4750. In how many years would they be able to recover their advances, 30 or 40 years?—30 or 40.

4751. Could Government possibly do it?—Not the whole business. They can help in the beginning to a certain extent and see that the work is started; then the banks may take it over. You must not take that suggestion as separate from my proposal as to the banks. Government will help the special land banks. Government itself does some land mortgage business now, in the shape of *taccavi* loans and the extension of *taccavi* loans from land improvements to redemption of debt is only a matter of change in the method. Government may do it in the beginning and then get the banks do it.

4752. Do you take any personal interest as Collector of the district in the welfare of the rural population and rural reconstruction?—Yes. I took a lot of interest in the removal of prickly pear in the four talukas of the Dharwar district. I have not been a long time in Bijapur, but all the same I have taken an interest in tackling the problem of providing drinking water in scarcity villages.

4753. Do you think, from your experience as Collector, that if Collectors take a personal interest in the question of rural reconstruction they can bring about reform in the villages by getting influential people in the talukas or villages to take the initiative?—I would even go as far as to say that the personal interest of the Collector in the whole scheme is an absolute necessity if the work is to be accelerated.

4754. But the motive power ought to rest with the non-officials?—The Collector can stimulate that motive power.

4755. That is to say, he should lend his influence to get things done by the non-official agency?—Yes.

4756. Or would you like to have your official agency to do the work of reconstruction?—The non-official agency should be helped by the official agency.

4757. The non-official agency should do it?—Yes, the non-official agency should be stimulated by the Collector.

4758. If the Collector takes a personal interest, then things can be improved?—Yes.

4759. *Dewan Bahadur Malji:* Mr. Naik, how old are the Taluka Development Associations in your district?—They are three or four years old.

4760. They are registered under the Co-operative Societies Act?—Yes. There are only two of them.

4761. Both of them are registered?—Yes.

4762. Have you had any occasion to attend any of the managing committee meetings or annual meetings of these associations?—I attended the meeting of one society.

4763. Who are the driving force of these associations?—A few leading ryots.

4764. Assisted by?—The local *mamlatdar* to a certain extent.

4765. Do you not think that the Registrar's department also helps them?—Yes, both the Agricultural and Co-operative Departments; both the Deputy Director and the Assistant Registrar.

4766. Have they taken to supplying loans in kind instead of in cash to credit societies?—No.

4767. Do you think that sort of thing would considerably help the societies and there would be less chance of misappropriation?—If it could be done, I think it would be a splendid thing.

4768. Have you got an efficient supervisor for these associations?—No. They have not got any yet. As a matter of fact there is one society at a place called Indi which has got a fieldman who goes round the villages.

4769. What does he draw?—I think he draws about Rs. 40.

4770. Do you not think an efficient man at the top is quite necessary; a man holding a B.Ag. or something like that?—Yes. If you could afford that, that would be a very good thing.

4771. You can supply better seeds also through these agricultural associations?—Yes.

4772. Do you not regard these associations as having in the back ground potentialities for conducting export and import business if properly developed?—In fact the bye-laws provide for that sort of work. The purchase of agricultural requisites and the sale of agricultural produce are allowed by the bye-laws.

4773. May I take it then that that work has not properly commenced in these associations? They are yet in their infancy?—Yes, but some years have passed since they were started.

4774. Has any attempt been made in this direction up to now?—No. Nothing has been done.

4775. You said the training classes were conducted by the Institute?—Yes.

4776. Is there no district branch of the Institute in Bijapur?—Yes; there is one.

4777. Is not the district branch interesting itself in this training work?—Yes; in fact the training is done by it.

4778. They are holding some secretaries' classes also?—Yes.

4779. And managing committee training classes?—I do not know whether they have held managing committee training classes in Bijapur, but I did attend a meeting of the secretaries' training class at one place.

4780. This is arranged through the district branches?—It is always done through the district branches.

4781. I think you were personally responsible for helping the Institute in the very beginning?—I tried to help it as far as I could.

4782. And if the district branches could be run properly there would be no difficulty in training officials as well as non-officials?—There should be no difficulty. The Institute could do it all.

4783. You say that honorary organisers should be replaced by paid ones?—As the work becomes more complicated the necessity for better supervision increases.

4784. But you limit it to backward areas?—Yes, especially to backward areas.

4785. As regards urban areas you do not think it so necessary?—For our urban banks there is no necessity of paid or honorary organisers.

4786. As regards the complicated work of auditing and organising societies, the business ought to be undertaken by the paid agency of such an institution?—That would be a matter of detail. It should be a paid agency, either Government or non-official.

4787. You do not require a paid agency for each district?—It will depend upon the amount of work. If there is plenty of work in the district you will require it.

4788. You say that the Assistant Registrar and the Deputy Director should be partially subordinated to the Collector?—Yes.

4789. Is not the Collector a very busy person?—Very busy.

4790. Will he find time to look after this work?—Provided he is given assistance, yes.

4791. Do you not think he will have to maintain a small secretariat?—The Collector's work will not be one of giving attention to details: he will have a general oversight.

4792. Otherwise, nothing better than passing instructions over the telephone could be done. If the Assistant Registrar is to receive instructions from the Collector, that is what it will amount to?—It is not my idea that the Collector should issue instructions to these people.

4793. So far as that matter is concerned that is what it will amount to?—My idea is that all these different movements for the rapid advancement of the district should be under the general supervision of the Collector.

4794. Perhaps what you mean is this; that the Collector should not be ignored in such matters?—You may take it in that sense.

4795. One question about these village *chavdis*. Whose property are they? —Government's.

4796. Are they used for public meetings?—Yes.

4797. Are they not used as residences by village officers like headmen, etc.? —No, not as residences, but if officers of lower grade come to the village they put up there.

4798. Do marriage parties from outside stations make use of the village *chavdis*?—I do not know.

4799. Are there any restrictions on the use of these *chavdis* which have led you to make the suggestion you have made?—My suggestion is simply that the village *chavdis* might be improved and made more decent.

4800. Who repairs them?—The cost of repairs is borne by three bodies: one-third by Government, one-third by the villagers and one-third by the Local Board.

4801. Is it not your experience that in many cases the annual repairs are neglected?—Yes, on account of lack of funds and on account of contributions not forthcoming.

4802. In some places the village *chavdis* have been razed to the ground?— Some are in a very bad way. That is why I am trying to do something for them.

4803. *Sir James MacKenna:* I am told that you originally belonged to the Agricultural Department, and that you went to England as a member of the Agricultural Department?—I was sent as a scholar.

4804. As an agricultural scholar?—Yes.

4805. And wisely while in England you studied also for the bar at the same time?—I became a barrister after I had put in 10 years' service in the Agricultural and Co-operative Departments, and not before.

4806. You took advantage of being in England to add another string to your bow by studying law?—I went to England on furlough, and while I was in England I interested myself in various branches of study and I got myself enrolled as a barrister.

4807. And then you became a member of the Civil Service from the Agricultural Department?—Yes: I was transferred to the Civil Service.

4808. Do you not think it is a most excellent training for a Collector to have this agricultural experience?—I beg to support you.

4809. It would be of great benefit if all members of the Civil Service had similar advantages?—I think it would be.

4810. That is to say, in an agricultural country like India a Collector with an agricultural training is in better touch with his district?—Yes.

4811. Have you any agricultural demonstration farms in your district?— No.

4812. Do you think they are desirable or necessary?—I think there should be at least one farm in the Bijapur district.

4813. Have you represented that to the Director of Agriculture?—Yes, and the matter is now under consideration.

4814. Have you much time to keep in touch with what is going on at present in agricultural matters, since you became a Collector?—Yes: I find some time. At any rate I hope I am keeping myself abreast of the general activities of the Agricultural Department.

4815. Do you discuss agricultural problems with the cultivators when on tour?—I do, so far as I can. As a result of our activities recently we got a *taccavi* scheme sanctioned which I have brought to the notice of the Commission.

4816. *Sir Henry Lawrence:* In addition to what Sir James MacKenna elicited from you about your agricultural training, had you any opportunity

to study agriculture in the Continent?—I went to Denmark, and there I studied the organisation of the agricultural co-operation system.

4817. You suggest that the use of cowdung for fuel should be penalised?—Yes.

4818. Do you know that cowdung was at one time used in England for fuel?—I do not think I have come across such a statement.

4819. And its use as fuel was stopped by penalisation?—I do not know, Sir.

4820. You should look up your text-books for the Cambridge course again?—This is a suggestion which I put forward and I suggest it can be worked if it is made an offence under the Village Police Act under the charge of the village headman or police *patel*.

4821. What is the total area which could be irrigated by the schemes of irrigation you suggest?—The Irrigation Engineer's estimate was that at a cost of 10 lakhs each scheme could irrigate at least a *rabi* area of 10,000 acres.

4822. Sixty thousand acres in all?—Yes.

4823. What is the total area cropped in your district? About 28 lakhs of acres.

4824. Still, it would be of material assistance to have 60,000 acres irrigated?—It would be of very great assistance, in my opinion.

4825. At the end of your note you suggest that the Parliament should pass some statute. Have you any definite view as to what the various provisions for the better development of agriculture that Parliament might decree should be?—I have one or two ideas about that matter. I have referred to section 26 of the Government of India Act, and of course the statute would be in the way of amplification of that statutory obligation which rests upon the Secretary of State for India.

4826. Could you tell us what special provisions you have in view?—At present the Act only lays down that there should be a report, an annual report on the material and moral progress of India. The specific lines of that report may be laid down. The duty of developing different lines of improvement may be imposed upon the Government of India and also upon the Local Governments, and if possible certain broad lines of financial assistance also may be indicated.

4827. Any statute made by Parliament would be in very broad terms, just as section 26 itself is?—I do not know whether it would be possible to expect the Imperial Parliament to extend any financial aid to Indian agriculture.

4828. Are you a member of the cultivating classes yourself?—Yes, Sir.

4829. Your familly hold land?—We hold some land.

4830. In what district?—In Kanara.

4831. Irrigated land?—Yes: we have got shallow wells in Kanara.

4832. *Sir Ganga Ram:* I find from statistics that your district stands at the top of the Presidency in the matter of cultivable area per head; you have 3·37 acres per head?—Yes.

4833. How much of your area is well-irrigated and how much canal-irrigated?—There are no canals in Bijapur: there are minor tanks, called second class irrigation tanks. The area they cover is about 1,100 acres.

4834. And well-irrigated?—That is about 24,000 acres.

4835. That is about 25,000 acres of irrigated land, that is to say, land not depending on rainfall?—It would not mean that, because in a year of famine, even these wells and second class irrigation tanks will not be filled and even when they are filled it would not be perennial irrigation in most of them and it is difficult to state what the actual protection is.

4836. Do you know the formula which the Famine Commission has laid down, that ·4 acre was enough to make one adult's food if it is well irrigated?—I had not heard it before, but I can understand it.

4837. I cannot understand, then, why you cannot produce food enough for the people in this area?—If the Bijapur area produced a proper crop in one year it would suffice for three.

4838. Do you never get a proper crop?—When the rains are good we grow the best crops in the southern part of the Presidency.

4839. Is there any commercial population in your district?—There are two towns.

4840. They are engaged in commerce?—Yes.

4841. Are you President of the District Board?—No, I am not.

4842. He is a non-official?—There is a non-official President.

4843. Are your roads and communications very good?—Fairly good.

4844. Metalled or unmetalled?—Our main roads are metalled; the others are just *kutcha* roads—mere tracks.

4845. Are these *kutcha* roads bridged all right?—Yes.

4846. Motor cars can go over the unmetalled roads?—Yes, in the fair season.

4847. There is no difficulty of cross channels?—Motor cars can go over these cart roads, although they are not metalled.

4848. For how many years have you been a Collector?—I have been Collector only for a year; I was promoted only a year ago.

4849. How many years have you been in Bijapur?—Only a year.

4850. You advocate the burning of prickly pear. I read an article published by the Agricultural Department in which prickly pear was highly recommended as cattle food?—I am aware that the department recommends it.

4851. If you burn it, you destroy something which might be useful in time of famine?—Government have a more important alternative, *i.e.*, storing *kadbi*.

4852. Storing of *kadbi* would be very expensive. That would cost money. If you burn your prickly pear, you destroy a source of food in famine time. Do you not think that should be avoided?—Prickly pear has many other drawbacks. It is the cause of a lot of insanitation in the village sites.

4853. In your district there is no fruit growing?—Only a small quantity.

4854. What is your level above the sea?—I could not give it you exactly at this moment.

4855. Have you no industry of fish-curing in your district? You are near the sea?—We cannot get any fish in Bijapur. There is no fish in Bijapur district.

4856. You talk about land mortgage banks. At what rate of interest will you lend money?—All that has to be worked out in detail.

4857. I want to know the rate of interest?—Government *taccavi* loans are advanced at the rate of 7·29 per cent.

4858. Do the people who take the money ever repay it?—They do repay in good years.

4859. What rate of interest would you suggest for the land mortgage banks? That is a matter of detail.

4860. Would it be something like 8 per cent.?—Yes. Even that would be profitable to the ryots.

4861. What rate do moneylenders demand?—12, 15 or 18 per cent.

4862. Can they ever pay it back?—They can.

4863. *Dr. Hyder:* Your district is an insecure one from the point of view of rainfall?—Yes.

4864. You mentioned in reply to Sir Henry Lawrence that 60,000 acres of land are waiting for irrigation?—I have been assured by the Engineer of my district that if these six irrigation schemes are carried out at a cost of 60 lakhs they will irrigate 60,000 acres, at least in the *rabi* season.

4865. Have you worked out any figures as to the cost of the scheme and the annual return as compared with the cost to the tax-payer of famine relief and so on?—We have not as yet made any headway. The matter is under consideration.

4866. You have no definite figures?—We have not made any headway. We are only at the beginning. The irrigation branch of the P. W. D. has yet to work out the figures, but the matter has been placed before the proper authority.

4867. The Irrigation Department will work out these figures?—Yes. They will have to survey the whole area, prepare a project and if it is really suitable it will go forward.

4868. *Sir Chunilal Mehta :* Apart from the six irrigation schemes that you have mentioned there are possibilities of small irrigation schemes of the nature of bunding streams and so on?—Yes. The Superintending Engineer is investigating them.

4869. Have you any idea as to the possible acreage which may be covered in that way?—We have not as yet arrived at that stage.

4870. Roughly how many acres does a well irrigate?—It is rather difficult to answer. If the crop is a perennial one it will irrigate 4 to 5 acres. If it is only for *rabi* or maturing *juari* crops by giving them a watering it may irrigate 20 to 30 acres.

4871. Is there any scope for the extension of well-irrigation in your district?—There is scope in three or four well-defined parts of the district, i.e. in the northern part, but not elsewhere.

4872. On page 139, you say that there are weavers of coarse cotton cloth in your district. Have you studied their method of marketing?—Not in any detail.

4873. I suppose there is a Taluka Development Association in the Indi taluka which you mention on page 137?—Yes.

4874. Has that association been of any assistance to you or to the Superintending Engineer in matters like small irrigation works, village water-supply, irrigation wells and so on?—Of course, in an informal way I have consulted them on all matters concerning them, but not officially. They are alive to the work. They are keen about it.

4875. They are very much interested?—Yes.

4876. Consequently they may have been of assistance both to you and the Superintending Engineer?—Yes.

4877. I suppose your preference for a larger organisation, a district organisation, is in consonance with your scheme of making the Collector responsible for all good things to be done in the district?—More or less.

4878. Would you like to go lower down than the taluka for these development associations?—My idea is this. There may be one district association with taluka branches, but somehow they ought to be organised into one. Of course the district society with branches should open seed depôts, etc., in all big villages of the district.

(The witness withdrew.)

Mr. G. F. S. COLLINS, I.C.S., Registrar, Co-operative Societies, Bombay Presidency.

Replies to the Questionnaire.

QUESTION 4.—(*c*) (*i*) I think that considerable development in Veterinary Services is needed.

(*iii*) I should like to see more roads in forest areas which provide grazing and produce grass for storage against famine, *e.g.*, the Satpudas.

QUESTION 5.—(*a*) The main step must, in my opinion, continue to be the spread of the co-operative movement both as regards short term and long term credit.

Regarding the progress made in financing agriculture through co-operative credit societies as regards short term loans, there are now 239,134 members of agricultural primary credit societies, which is about 12 per cent. of agriculturists occupying land. The loans made to them may be calculated at slightly over ⅓rd of what they require (total loans in 1925-26, Rs. 2,04,92,604 or an increase of 40 lakhs over last year. Total requirements say nearly 3 crores). The best means of satisfying the total demand is by an orderly system of assessing the credit of each agriculturist by normal credit system. The increase in finance this year is chiefly due to the progress made in this line. At present the movement is getting all the funds it requires and technically the only limits to financing every member of a society—and they are serious ones—are the efficiency of the society (bad ones cannot be financed) and the financial position of each member (some have heavy overdues). The other general condition which at present makes against complete and efficient finance is the incompleteness of the link between the Central Banks and primary societies. The banks must employ a larger and more efficient staff especially of Inspectors and open more branches, the societies must universally adopt the normal credit system, and there must be an intermediate link between the two in the form of Supervising Unions (or possibly Taluka Development Associations).

The development of upcountry banking, chiefly through co-operative banks and branches of them will also be a means of improving the financing of agriculturists, whether members of co-operative societies or not. In this connection the everpresent menace of facile credit must be guarded against (discussed under question 6).

As regards long term credit there can, I think, be no better system than land mortgage banks. A few of the A and B societies with large reserve funds have taken up the system of reducing the debt of their members but the amount so far advanced is insignificant. A scheme of land mortgage banks is now before Government. The main points for consideration in this connection seem to be; the pace at which we should proceed; the question as to how far Government should make direct provision of finance for the present; whether the system should be controlled entirely from Bombay or partly through district banks; whether separate district banks should be formed for the purpose or whether we can utilise the existing District Central Banks.

There is undoubtedly a demand for institutions to provide long term credit, whether for debt redemption or long term improvements. Often the first question asked in a credit society is when shall we be able to get money to redeem debts. Land mortgage banks are open to the criticism that they are only to a very limited extent co-operative. Granted this, the system is very much superior to the *taccavi* system, and in my opinion, the only one to guard against the dangers of spoon-feeding and facile credit.

Another line in which fuller financing is required is to enable agriculturists to retain their crops till the best time for selling. This is in my opinion one of the great needs of agriculture. It applies to almost every crop and especially to crops like cotton, ground-nut, etc.

(*b*) I am not in favour of extending the system of *taccavi* advanced through the Revenue Department direct. The development of the system of *taccavi* through co-operative societies should be continued. The exceptions should be, areas where co-operation has not developed, and special forms of improvement such as development of irrigation in famine tracts. I should like to see a time when ordinary loans through societies will altogether supersede *taccavi*. The main objection to *taccavi* is the danger of facile credit.

QUESTION 6.—(*a*) The chief causes are—

(*i*) Inherited debt.

(*ii*) Lack of education combined with mental inertia.

(*iii*) Usury with the accompaniment of lack of credit and finance.

(*iv*) Caste, religious, and social customs.

(*v*) High and ever-increasing rents.

Lesser causes are—

(*vi*) In some cases facile credit.

(*vii*) Lack of market facilities.

As regards (*v*) I think that agriculture will not be safely established until there is tenancy legislation. A simple Act based on the new English one is required, providing for limits to the enhancement of rent and for proper notice to quit.

As regards (*iii*) the enormously increased value of land since the first revenue survey and settlement has to some extent given more scope for the accumulation of debt. At the present day the increasing desire to buy land at fancy prices does not make for an improvement in rural economy and should be discouraged.

(*vi*) needs some explanation. As far as criticism can be levelled against the co-operative movement the chief one is that in the more prosperous areas it has afforded too facile credit. The chief objection to State banks and joint stock banks and to the *taccavi* system is facile credit, and it was hoped that the co-operative movement would provide finance and at the same time minimise this objection, but it is to be feared that in some parts of the Presidency the burden of debt has been increased. The chief of these are the Nira and Godavari canal areas. The matter has been discussed in the Sugar-cane Committee's Report of 1920. There it was noticed that the outstandings at that time in the Nira Societies were 4 lakhs. They are now unfortunately greater, and it is to be feared that some agriculturists will find it difficult to extricate themselves from their present position. It is true that these societies began with a large accumulation of Government debts which were taken over by the societies but even so the finance since then has been made available on a somewhat exaggerated scale to individuals who were not suitable for the scheme. Where as an agriculturist of that area used to think in hundreds of rupees he now thinks in thousands. The same causes have operated in the case of the bad societies near Poona which are now causing so much anxiety. These half-educated agriculturists have, it is feared, been financed beyond their means and they are now in danger of losing their lands.

Too facile credit must always therefore be guarded against.

(*b*) Some of the remedies have been indicated in stating the causes. It must be assumed in applying remedies that productive debt is not by any means an evil.

Apart from the general spread of the co-operative movement the institution of land mortgage banks, the improvement of market conditions, the development of subsidiary occupations and the spread of education are in my opinion the most promising remedies.

I do not advocate any stricter application of the Usurious Loans Act or the Deccan Agriculturists' Relief Act or the passing of any further Acts of this description.

(*c*) No further restrictions than those regarding transfer already in existence should be introduced. I do not think that non-terminable mortgages should be prohibited.

QUESTION 7.—(*a*) I think that the prevention or the regulation of the sub-division of holdings by law is undesirable as it is contrary to public opinion and involved too much interference with present customs and conditions. Measures should be undertaken to remedy the fragmentation of holdings through schemes for voluntary consolidation by restriping whether undertaken by Revenue Officers or by co-operative societies formed for the purpose on the analogy of the Punjab societies. The latter is preferable as Revenue Officers cannot give sufficient attention to the matter. Consolidation of this description has been supported by non-official opinion as represented by the Provincial Conference held by the Co-operative Institute in 1923, and by local meetings of co-operators. A scheme for voluntary consolidation by a co-operative society has been started at Umbergaon in Thana on the recommendation of the Konkan Divisional Board but the work has not yet begun. There 232 persons hold 1,877 acres in 1,640 fragments. The Joint Committee consisting of the Director of Agriculture and the Registrar has agreed to most of the conditions proposed by the people as follows (*i*) free survey by Government, (*ii*) grant of Rs. 200 for preliminary expenses, and (*iii*) disputes to be referred to an Arbitrator.

(*b*) The chief obstacles are:—

(*a*) the variations in the kinds and qualities of lands found in most villages (compared with, *e.g.*, the Punjab),

(*b*) the diversities in castes and types of people,

(*c*) how far a small minority which holds out against the scheme should be coerced by law,

(*d*) whether similar legislation should be undertaken to provide for the cases of mortgages, minors and widows, etc.

(*c*) The Provincial Conference decided that an enabling law was necessary but this is not the universal opinion of co-operators.

A beginning may be made by trying to work societies without enabling legislation but I consider that it would be inevitable in the end.

QUESTION 11.—(*a*) (*iv*) It has now been definitely decided after years of enquiry that the only permanent form of protecting crops against the majority of wild animals is permanent fencing. There should therefore be no relaxation or variation in an established policy for encouraging the erection of fences and walls, whether by communal or individual effort. It has rightly been decided that Government cannot undertake the financing of such schemes but the provision of easy loans should be the policy for some years to come.

There is also perhaps room for a further relaxation of the game laws such as has been adopted in Kanara.

The granting of gun licenses should be systematised. There is probably room for a larger number of licenses if every area is to be properly provided for.

QUESTION 17.—MARKET GARDENING AND POULTRY-KEEPING.—These seem to me to be two of the most promising secondary occupations which need developing. They are specially suitable for co-operative effort, but as regards the former the chief difficulty would be the provision of land as generally the formation of a society which included persons as yet without any permanent occupation would mean the provision of land for them. An endeavour is being made by the Co-operative Institute to start a poultry breeding society in the Satara district near Sangli.

QUESTION 18.—(*a*) The areas to which this problem applies of which I have had personal experience are the forest areas of Kanara, and the semi-forest Mallad tracts of Kanara, Dharwar, Belgaum and Mysore, where there is a large though insufficient yearly temporary migration of labour to the spice gardens of Kanara and Mysore, and where everywhere there are large areas

of uncultivated land; and Khandesh where there is an aggravated shortage of labour at harvest times. As regards the uncultivated areas of the Mallad tracts the best measures for attracting labour seem to be the grant of big areas to single persons of large means on favourable terms, which is a better scheme than trying to attract small cultivators by similar concessions (an attempt to attract them by such concessions and by loans and monetary grants has signally failed in Mysore); and campaigns against malaria and pig evil. The seasonable shortage of labour in other areas will not usually, I think, be remedied by migrations whether permanent or temporary. It must, I consider, be remedied by an ordinary readjustment of conditions the chief part of which would be better and more intensive farming, the use of more economical and labour-saving implements and an increase in the skill, energy and endeavour of the ordinary cultivator.

(*b*) There is a general shortage, and it appears to be due mainly to the undoubted improvement in the status, and a decrease in the poverty (if not increase in prosperity) of the labouring classes since the War, the influenza epidemic and migration to towns.

One of the causes why in my opinion it is difficult at present to tackle the labour question is the insufficiency of knowledge and statistics on the subject. A recent inquiry by the Labour Office on certain main features, *e.g.*, how many days in the month an agricultural labourer worked, how often he was unemployed, the movement of labourers into or between districts, the proportion of work done by agricultural labourers only and by cultivators who work as labourer in their spare time, revealed, I believe, much ignorance on the part of local officers on the subject. We want a systematic collection of data before we can decide whether action should be taken and whether in fact the chief solution is not a readjustment of conditions or better and more intensive farming.

QUESTION 19.—(*a*) I think that, speaking generally, forests are being put to their fullest use in this Presidency for the purposes of agriculture. There is in fact evidence that they are being drained in some areas.

The question is largely one of privileges. I think that almost everywhere the privileges are as liberal as they can be, and in Kanara they are probably more liberal than anywhere in India. Where they fail to achieve their object it is generally not because the privileges do not exist on paper but because they are imperfectly understood or exercised in practice, whether on the part of the people themselves or the Forest and Revenue Officers. The establishment of village committees which will advise and work with the Forest Department is a suggestion worth consideration.

As regards policy the question as to how far the forests immediately adjoining cultivation should be controlled by the Revenue or Forest Department so as to ensure the greatest benefit to agriculture is often under discussion. I think that except for outlying portions they should invariably be retained under the Forest Department and the placing of them under the Revenue Department as Revenue Forests is usually false economy. Supervision by the Revenue Department invariably means imperfect management or no management at all. Outlying portions should be disforested and turned into revenue waste. Another question is that of payment for forest produce. The policy is apt to err on the side of liberality, and this leads to waste, not to say imperfect appreciation, and is economically bad for agriculture.

An instance where forests could be developed is in the case of good grazing areas adjoining intensively cultivated or famine tracts which are only particularly accessible owing to the absence of communications. I think money could be usefully spent in developing these.

(*b*) As regards fodder the matter largely depends on the attitude adopted towards the question of communal grazing *versus* private grazing or grazing land held by co-operative societies and other organised bodies. The Cattle Committee of two or three years ago decided for the latter and I am unreservedly in favour of it. I think it is the only solution of the economic evil of surplus half-fed cattle, and for the improvement of grazing as a

whole. It must of course be limited according to areas. Where there is a heavy agricultural population or a large surplus of semi-agricultural or non-agricultural population, as in the Konkan or on the Kanara coast, it is usually impracticable as likely to cause undue hardship. Elsewhere it should be put forward as an established policy. Village forests form a possible remedy in some cases. Thus on the Kanara coast, I as Settlement Officer, proposed this as the solution. They have up to now been started on a limited scale only because there is too much opposition on the part of people, mostly non-agriculturists, who have from time immemorial been used to a system of uninterrupted enjoyment of forests by the individual each for himself. This is also to some extent a solution for the increase of fuel in rural areas. Please also see my answer under (*e*).

In East Khandesh the preparation of a working plan of outlying forests interspersed between intensively cultivated areas which will regulate both grazing and supply of fuel is under preparation. It may meet with local opposition, but it is, I think, a sure method of increasing the supply of both in the near future.

(*c*) This is more a question for Forest Officers to decide, but I think soil erosion has resulted. I think the curtailment or better regulation of the disforestment and giving out of land in the foot-hills is a remedy. Another is better regulation of forest grazing in such areas.

(*d*) The answer has been indicated above.

(*e*) I have not personally seen any areas where there is scope for such afforestation except in so far as outlying portions of revenue forests or revenue waste lands can be taken into working plans introduced for the better regulation of agricultural supply as indicated under (*b*).

I have noticed small private plantations springing up in some parts of the Kanara coast. In Madras it is the accepted policy that plantations near villages are usually better left to private endeavour. I think there is scope for the introduction of such plantations, such as *babul* or casuarina plantations in waste lands near villages, and that the people should be encouraged to do this by the advice and help of both the Forest and Revenue Officers.

(*f*) The answer has been indicated above.

QUESTION 20.—The report on marketing made to Government for the purpose of the Royal Commission by the Director of Agriculture was made in consultation with me and I am generally in agreement with it. This answer consists of any additions or variations I wish to make.

(*a*) I think that the improvement of the market facilities is one of the chief necessities for rural development. The bulk of the agricultural produce is at present marketed through small dealers at small local markets or shops or sold to them by the cultivator on the spot. These markets leave everything to be desired in fairness of dealing, information about prices, grading, competition and market facilities in general. Instances are some of the smaller cotton markets in the Dharwar district. I would advocate the system of open markets for the chief forms of produce as suggested by the Cotton Committee of 1920, and the improvement of local markets whether through Government or local agencies. The other main line of improvement is through co-operative sale societies [*vide* answer to question 22 (*b*) (*iii*)]. It is not strictly accurate to say that all such societies have been failures except some for cotton and *gul*. One line of possible development is in fruit marketing. Thus in the case of mangoes it is calculated that the producer gets only 25 per cent. of the ultimate price.

(*d*) One of the things most to be desired is a complete study and complete statistical information on the marketing of every form of produce in all its stages as indicated under sub-head (*b*) of this question. The information is now sadly lacking. It could be undertaken by the Agricultural Department or through the Professor of Economics or possibly by the branches of the Provincial Co-operative Institute. There would have to be division of labour.

QUESTION 21.—The sea freights and railway tariffs are in many cases unduly high. Cases have been brought to notice by the Divisional Boards of Agriculture. The question would probably best be tackled by the Commerce Department of the Government of India.

QUESTION 22.—(*a*) (*i*) The general policy must be one of decentralisation, that is of encouraging the non-official control of the movement. The consummation of this policy is however still at a great distance. Distinction should be made between the credit and non-credit sides of the movement so far as it affects agriculture.

As regards the credit side I think Government's chief duty is to see that the staff for supervision, audit, and to a lesser extent propaganda, increases with the growth in the number of societies. Standards were suggested in the Co-operation Committee of 1915, though these are to some extent out of date, the staff is generally insufficient. The other direction in which Government aid seems to be necessary on the credit side is the increased provision for banking facilities in outlying towns. An instance would be the system of payment by taluka sub-treasuries to approved banks or branches of banks against demand drafts.

As regards the non-credit side Government aid will still be necessary for some time to come. The suggestions of the Cotton and Sugar-cane Committees for the aid of expert Government Agricultural Officers for sale and other non-credit societies still hold good. Some of our cotton societies are reaching their most critical stage when they are beginning to compete seriously with the middlemen and *dalals* and they therefore need special sympathy and help from Government. Government give special grants for the development of the non-credit movement, *e.g.*,

Grants to sale and insurance society.

Loans to irrigation societies.

These should be continued and if necessary increased.

(*ii*) By these agencies I understand Local Boards. I consider that these bodies should feel it their duty to subscribe to the local branches of the Co-operative Institute and to non-credit societies such as Taluka Development Associations, cattle breeding and dairy societies.

(*b*) (*i*) *Credit Societies.*—The policy of allowing their growth to be spontaneous except in special cases has been successful and should be continued. Special cases should be societies for depressed classes and in areas where the movement has not yet reached. The main needs for the development of credit societies are education in management and in co-operative principles and closer touch with the Central Banks.

(*ii*) *Purchase Societies.*—By these I understand societies for the purchase and distribution of seed, implements and manure. The general experience has been that these cannot be run in single villages with success and the unit must be a larger one, *i.e.*, a taluka or a group of villages. Exceptions have been some manure societies, a few seed societies in Sind, and societies for the purchase and hire of implements in Ahmednagar. Another point for consideration is how far the demand is being or can be met through other forms of co-operative agency so as to avoid overlapping. Such other forms are (*i*) Central Banks. Some of them can undertake the work under their bye-laws, but this has not been done except by the Provincial Bank which has distributed oil-cake and other manure and implements and seed with conspicuous success the sales being more than all those of other agencies together. (*ii*) Sale societies, *e.g.*, cotton sale societies which have distributed pure cotton seed. (*iii*) Taluka Development Associations and Supervising Unions which usually supervise a single taluka. The bye-laws of both provide for this form of work. (*iv*) Primary credit societies might adopt this as another side of their work as is done in Madras. This would be by the indent system. Some of the primary societies in Khandesh have undertaken the distribution of seed.

(*iii*) Sale societies are both the most important of the non-credit societies and most difficult to manage. They have been developed to a considerable extent in the Bombay Presidency. Although the cotton and *gul* (including the shops run by the Provincial Bank) sale societies represent about 80 per cent of the successes, societies for the sale of produce in general and one for arecanut in Kanara have done well.

The societies may be divided into—

(*a*) those for the sale of a particular commodity,

(*b*) those for the sale of produce in general,

and again into,

(*i*) Societies standing by themselves,

(*ii*) Societies formed by the Union of Primary Societies, *i.e.*, Sale Unions.

As regards the first division those for a particular commodity are likely to be most successful. Those for produce in general are most likely to succeed in the form of Sale Unions and Sale Unions are probably best in all cases.

The difficulties in connection with the Sale Societies are, firstly and chiefly that as soon as they reach a considerable size a struggle with the existing trade agencies are represented by the middlemen, who can afford to disregard them in their early stages, is inevitable, and a greater degree of education than what is now found amongst agriculturists is required to win through. Secondly that, although expert agricultural help and advice, which is necessary in all cases, is sufficient in the early stages, later on they need expert trade experience. Until more non-official help is received State aid and sympathy will be necessary in this respect.

(*iv*) This is a line in which considerable success has been achieved and in which much development is possible. There are societies for the erection of walls and of dams. Schemes for co-operative excavation or repaid of tanks are pending. The chief difficulties connected with these societies are (*i*) finance, and (*ii*) expert advice. As regards (*i*) the schemes are not always simple enough or the visible security sufficient for Central Banks to undertake the finance and Government have to undertake the responsibility which need not however be considerable. As regards (*ii*) it is reported by local officers that for some of the schemes, *e.g.*, erection of bunds, excavation of tanks the ordinary local engineering staff is not sufficient to be available. There is also the difficulty of introducing some form of compulsion to bring in the small percentage of unwilling landowners.

(*v*) The formation of a society at Umbergaon in Thana district is under consideration. Please see answer to question 7.

(*vi*) There are a few power-pump societies in Gujarat, one ginning society in Gujarat and one in Khandesh. My predecessor was of opinion that the former kind tend to be unco-operative. They are apt to result in the selfish appropriation of water rights, it is often a case of each member for himself, and sometimes the society is merely a means to obtain cheap capital rather than a co-operative venture. It is for consideration whether the introduction of larger agricultural machinery is not rather a question for District Agricultural Associations and Taluka Development Associations than for societies formed for that purpose only.

(*vii*) *Joint Farming Societies* in their present form are not in my opinion likely to succeed at present. That is to say, societies in which the land belongs to the society representing all the members, the produce is marketed as a whole and the profits proportionately divided. Two such societies have failed (Bhambora, Arjunsonda) and one of them was entirely a one man business. A joint cultivation society by which some Waddars in Dharwar have brought a large area of waste land under cultivation has been a success to that extent, but the members cultivate separate areas and keep the produce separate and later on will take over as their own the areas each has been cultivating. Societies for a definite part of agricultural operations, *e.g.*,

for reclaiming salt land, removing silt, erecting a dam or wall, can succeed but the success of those in which the object is merely farming as a whole is in my opinion unlikely. The former kind are grouped together in the Punjab under the comprehensive term of "Better Farming Societies."

(*viii*) *Cattle Breeding Societies.*—Although these have not succeeded to any extent in this Presidency I think they should be developed. Their institution must depend largely on (*a*) the policy adopted as regards communal *versus* ordinary grazing land. (The chief criticism against them is that they are schemes for appropriating the village grazing land.) (*b*) The development of the Veterinary and Live-stock Expert's Departments.

(*ix*) Schemes for the formation of a milk supply and poultry society are in contemplation. Any form of society which will develop industries subsidiary to cultivation is desirable.

(*c*) Yes. But it should be sparingly used and persuasion should be the chief method. My predecessor has made proposals on the subject.

(*d*) Credit Societies have achieved their main object.

In making a comparison between the *sowcar's* rate and the society's rate distinction should be made between big agriculturists with substantial assets, those with limited assets, *i.e.*, ordinary agriculturists, and those with few or no assets. Credit societies are comprised ordinarily of the second class only with a few of the last class in some cases. The *sowcar's* rate for big agriculturists with large assets is usually slightly less than the societies' rates. In the case of the second class of ordinary agriculturists with which we are chiefly concerned the *sowcars'* rate used to be abnormally high thirty years ago before the coming of co-operation. For instance in the Karnatak it used to be about 24 per cent. At the present time it is generally slightly higher than the Societies' rate (an average of 12-15 compared with 9¾ to 12½ per cent.) and in a few cases it approximates. For the lowest class it is considerably higher. Where the rate approximates the members of societies profit by better dealing, as there are of course other incidental charges in *sowcar's* dealings. It may be explained that societies' rates vary in different districts and parts of districts. Thus in famine areas such as Nagar, Sholapur, parts of Poona, etc., it is two pies, in some parts of Gujarat and of Khandesh, Dharwar and Belgaum it is generally 1¾ pies, and in parts of Broach where the *sowcars'* rates are very low 1½ pies. The following are typical instances for comparison:—

Area.	Sowcars' rate.	Societies' rate.
Dharwar	12 to 15 per cent.	9¾ to 11 per cent.
Belgaum	12 to 18 „	9¾ to 11 „
Kanara (Coast)	9 to 12 „	9¾ to 11 „
Surat and Broach . . .	12 to 18 „	9¾ to 12½ „
Kaira and Ahmedabad (in general)	12 to 25 „	9¾ to 12½ „
Parts of Broach, Kaira and Ahmedabad.	9 to 12 „	9¾ „
Thana	12 to 15 „ (more for hilly areas)	about 11 „
East and West Khandesh . .	12 to 18 per cent.	„ 11 „
Sholapur, Satara, Poona . .	12 to 18 „	„ 11 „
Do. Famine parts	18¾ „	12½ „

Another noticeable feature is that in many districts *sowcars* are depositing their money in credit societies on a large scale preferring to get a safe 7 per cent. Much money is thus brought into the movement. In some cases *sowcars* have been enabled to recover their long-standing debts by transferring their dues to societies.

The question as to how far it will be possible to reduce the ordinary rates in societies in the future is now coming up for consideration. The general

policy is that well-run societies with large reserve funds can be allowed to reduce their rates by ¼ or ½ pie. See paragraph 16 of the Punjab Report on the working of Co-operative Societies for the year ending 31st July 1925.

QUESTION 24.—(*b*) One of the chief factors is the absence of any limit by which the landlord can raise the rents, and the extent to which the system of tenancy at will obtains.

QUESTION 26.—(*a*) (*i*) (*iv*) *and* (*v*). Owing to the heavy cost of the subordinate revenue village establishment the yearly enumeration of all the statistical information as regards crops and rents has had to be modified, and provision has in most areas been made for a more accurate and more exact enumeration under a five years rotation system. In this way minutely accurate statistics are obtained for one-fifth of the lands each year, those for the remaining four-fifths being approximate only. There has thus been to some extent a diminution rather than an extension in the amount of information available. The experience gained in modern resettlements has demonstrated that the statistical information recorded under the record of rights is often surprisingly accurate, and it should be more so for the future limited area. I think that the Land Records Department should work out some method of tabulating the statistics of rents recorded for this area. They should be useful towards estimating the incidence of land revenue. They should be periodically published.

The census statistics of agricultural population are, though useful, deficient in many respects. We want further sub-heads by which we shall know the numbers of cultivating owners, labourers sub-divided into local and migratory, etc.

(*ii*) Many of the local Agricultural Officers in charge of farms and agricultural stations are now undertaking yearly estimates of the yield of principal crops. This system might be continued and developed.

Oral Evidence.

4879. *The Chairman.* Mr. Collins, you are Registrar of Co-operative Societies, Bombay Presidency?—Yes.

4880. How long have you held this office?—For four months.

4881. Had you any experience of the co-operative movement before you took up this office?—Practically none.

4882. In what field had your service lain?—I had been a Revenue Officer until then with experience of revenue settlement work and forest settlement work. For a short time I was in the Secretariat.

4883. Have you had opportunity to apply yourself to rural economy in the broadest sense before you undertook the duties of Registrar?—Yes; I had considerable opportunity when I was a Settlement Officer. Apart from that my service was in a district which is rather different from the other districts of the Presidency. My study was to that extent rather limited by the local circumstances.

4884. Do you think that it would be to the advantage of the revenue official and the public if the study of rural economy was made a part of the curriculum? Would it be a good thing if a degree in rural economy in its broadest sense were regarded as a qualification for appointment to the revenue service?—I should certainly think so as far as promoting members of the Provincial Service is concerned.

4885. I am thinking of the Provincial Service?—I think certainly it would be.

4886. I do not know whether you would like to make any general statement before I ask you one or two questions on your very interesting written evidence?—No.

4887. Do you think at the present time the Agricultural Department and the Co-operative Department are working sufficiently in touch with each other?—Yes. From what I have been able to see I should say they were more in touch here than in almost any other Province.

4888. To what extent is the Agricultural Department making use of the Co-operative Department for the purpose of propaganda and demonstration?—Firstly through the non-credit societies (especially the sale societies) and secondly through Taluka Development Associations, which are mostly registered under the Co-operative Societies' Act.

4889. How does the Agricultural Department approach your department on questions of propaganda and demonstration?—I will begin from the bottom. The Agricultural Department has got in most districts officers known as Agricultural Overseers, and in order to work with the Co-operative Department they have appointed a similar type of officer called an Agricultural Organiser who is supposed to organise non-credit societies like the sale societies and so on. But apart from the ordinary duties given to these officers, the Agricultural Overseers must also interest themselves in the organisation of non-credit societies and the Agricultural Organisers in the spread of agricultural improvements.

4890. What I am trying to get from you is whether every advantage is taken of the opportunities offered by the Co-operative Department to popularise agricultural improvements?—I think that is being done.

4891. Let us come from the abstract to the concrete. What particular improved method of tillage or improved variety of seed is the Co-operative Department advocating at this moment?—They are doing a great deal to spread a pure type of cotton seed.

4892. How is that propaganda arranged for?—The cotton sale societies are advised to stock the seed and distribute it to their members.

4893. How about the touch between the Agricultural Department and your own department in this matter?—In our sale societies we have agricultural officers attached for that purpose only, and we have got special cotton graders for that.

4894. Is the touch only in the districts, or is it at the centre as well? Do you get official communications from the Agricultural Department asking you to do your utmost to encourage co-operative societies throughout the Presidency to do this or that?—Certainly, I think the whole organisation has been arranged with that intention. We start off with a Joint Board consisting of the Director of Agriculture and myself, and we work through the Provincial Board and the Divisional Boards down to the Taluka Development Associations; and every question comes before both of us. We meet four times a year.

4895. So you feel convinced that the opportunities offered are being utilised to the full?—Certainly.

4896. There are no improvements or suggestions you wish to make?—No. I do not know whether at a later date the relations between the two departments may not have to be reconsidered. The exact province of each officer with regard to purely non-credit work in the co-operative movement may have to be reconsidered at a later date.

4897. You have given us an interesting note on the question of credit in relation to the co-operative movement. It appears to me that the germ of the matter lies in the facts and figures you have given on page 200?—Yes.

4898. Do these figures show that the rate of interest charged to the cultivator for loans either by a *sowcar* or a society vary in the main with the intensity or otherwise of the risk of famine in any particular district?—That is my opinion; and with the extent of the education in that particular part of the Presidency.

4899. In the main the lower rates of interest exist in those districts where the risk of famine is lowest, and the higher rates in those districts where it is greatest?—That is so.

4900. The reason being that when famine comes no payment either in respect of principal or interest can be expected?—I think the reason is that in any particular year repayment is a very doubtful matter. You cannot expect to get repayment every year; once every two or three years there may be difficulty.

4901. On page 200 you say, "The *sowcars'* rate for big agriculturists with large assets is usually slightly less than the societies' rates". That is the nominal rate. Does it include the auxiliary charges which I understand the *sowcar* makes? Is it really a fact that there is a net advantage to the agriculturist to borrow from the *sowcar* as against borrowing from a society?—I think that is so in some localities, though in very few. I have heard it is so in some part of Gujerat.

4902. Where that applies it must pay the large cultivator to borrow money from the *sowcar* and not the society?—I am afraid that is so.

4903. Does this apply in many areas?—No, in very few indeed.

4904. Does the nominal rate of interest charged by the *sowcar* represent in practice the whole interest charged?—No, certainly not. It may do so in the case of the better educated agriculturists who can see they are not imposed on, but not in the case of the smaller cultivators.

4905. The first year's interest is usually deducted before the money is handed over?—Yes, and there are usually other conditions such as that the cultivator must sell his crop to the moneylender or buy his seed through him.

4906. In the matter of payment of interest charges, does the moneylender or the society give the greater elasticity?—The moneylender.

4907. That is a great attraction to small cultivators?—Yes. We insist on more punctual repayment at more definite periods, but the moneylender is much more willing to extend the time.

4908. If you could get punctual repayment in an important percentage of cases you could lower your rate of interest?—Yes.

4909. You cannot get punctual repayment owing to the uncertainty of the crop due to the failure of the monsoon?—Yes.

4910. So the uncertainty of the monsoon is again one of the root causes of debt in this Presidency?—That is so. There is also lack of education and the fact that loans are not made to the proper people.

4911. No doubt cultivators will borrow under any circumstances so long as their credit holds, but is it a fact that one of the great difficulties in improving the position of cultivators who are in debt is the uncertainty of the season?—Yes.

4912. Have you had any experience yet of the value of teaching the grading of produce to the cultivators?—I have in case of cotton sale societies.

4913. Do you think that a knowledge of that advantage is spreading amongst cultivators?—Very much, in cotton areas.

4914. Have you any views with regard to the advisability of attempting to spread by compulsion the adoption of improved varieties of cotton?—I have not considered the problem sufficiently on the spot to give any advice on that.

4915. On page 193 you say, "The banks must employ a larger and more efficient staff especially of Inspectors and open more branches, the societies must universally adopt the normal credit system, and there must be an intermediate link between the two in the form of Supervising Unions . . ." What does "normal credit system" mean?—The normal credit system means that the credit of every agriculturist is carefully prepared every year, the cost of his cultivation, the area of his land, his assets and debts and the expected income, and then by addition and subtraction you find out what his current year's requirements are going to be.

4916. That is a routine method of assessing his credit?—Yes. We have got printed forms for this purpose.

4917. I understand from your statement that it is not the universal practice?—No, but it is spreading gradually. It depends largely on the staff of the banks which advance the loans. Some of them have not yet got their Inspectors to do that. Very few societies can do it themselves.

4918. Then you say there must be a link between the Central Banks and the primary societies in the form of Supervising Unions or possibly Taluka Development Associations?—Yes.

4919. Are the Taluka Development Associations part of the co-operative organisation at this moment?—Some of them are registered and some are not.

4920. Before they can function in this direction they would require to be registered, would not they?—Yes.

4921. On page 193 you refer to the question of how far Government should make direct provision of finance for the present. I think you regard that as an open question?—Yes.

4922. Making direct provision for finance is in practice, apt to mean the hypothecation of funds provided by the general tax-payers of the country to the relief of particular individuals who have got themselves into debt?—I am afraid I have not put it correctly. I meant that Government must issue debentures. They are now spending a lot of money on *taccavi* which I think they should put into land mortgage banks.

4923. There is a tendency to look to Government for direct financial assistance?—Certainly. Practically every resolution is a recommendation to Government to help in that way.

4924. Schemes are advanced for the relief of people deeply in debt according to which societies backed by Government will take over the debt at a lower rate of interest than that claimed by the existing lender?—I would not go so far as that, of course.

4925. There is no general appreciation of the fact that the general tax-payer and the Government are one and the same thing?—No. That is what we are always trying to impress upon them.

4926. And that when Government funds are used to ease the position of debtors, what in fact is being done is to take money from those who manage their affairs well and give it to those who have failed to do so?—Yes.

4927. That cannot be too plainly understood or advertised?—I quite agree.

4928. Do you see any indication of the primary societies being in a position to offer long term credit, say for 15 or 20 years?—No. They have tried it on a small scale and I think it has been clearly shown that they cannot do it. It is too long a period and they have not got sufficient funds.

4929. You say on page 193, "There is undoubtedly a demand for institutions to provide long term credit. Often the first question asked in a credit society is when shall we be able to get money to redeem debts. Land mortgage banks are open to the criticism that they are only to a very limited extent co-operative." Have you any constructive proposals to improve that position?—I think we should start one or two land mortgage banks without delay. In certain areas you can start to-morrow if you can draw up a scheme.

4930. What do you say to the criticism that they are co-operative only to a very limited extent?—That is a criticism sometimes made. I certainly do not believe in it myself.

4931. You do not think there is anything in that?—It depends on exactly what is meant by "co-operative." There is not co-operation to the same extent as in the primary societies.

4932. I thought perhaps you wanted to make some suggestion about that? —I merely wished to anticipate criticism; that is all.

4933. You advocate the confinement of the system of *taccavi* to co-operative channels, where a co-operative organisation exists?—Yes, with certain exceptions.

4934. You do not go so far as to suggest that loans of that nature should not be given in all districts except through co-operative associations? —No.

4935. Some well-informed persons regard such restrictions as likely to be an effective means of spreading co-operative credit societies, do they not? —They do. I simply want this to be done in areas where there are co-operative credit societies. As the rules are at present, they simply say "in areas where there are co-operative credit societies". It does not mean that every village has got to have a society and that a man in a village where there is not one will suffer.

4936. Supposing in an area where there was no co-operative organisation these *taccavi* loans were not available, would not people in that area form a society in order to get the advantage of *taccavi* loans?—I do not think so. I do not think they are capable of it.

4937. On page 194 you are talking about the causes that have led to excessive debt, easy credit having led to excessive borrowing, and you say, "These half-educated agriculturists have, it is feared, been financed beyond their means and they are now in danger of losing their lands". It has been suggested to the Commission that in their case there comes a time when the extent of the loan altogether exceeds the value of the land on which the loan is secured, and when that time arrives the cultivator will be well advised to give up his land, clear himself of his debt, borrow a little more money, and move to another district, and settle there. What do you think of that idea?—No, I should not like that at all.

4938. It is done I suppose occasionally, is it not? You follow the argument?—Yes, I follow the argument. I think it is more likely they would become labourers instead of landholders.

4939. You do not think that practice would improve their credit?—No.

4940. On page 194 you do not advocate any stricter application of the Usurious Loans Act, or the Deccan Agriculturists' Relief Act, or the passing of any further Acts of this description. Are they, in fact, operative at all

in the districts you know?—In the districts that I know they are practically obsolete.

4941. Do you think the cultivators know anything about them?—They know a good deal about the Deccan Agriculturists' Relief Act. That is the only one that is used to some extent.

4942. I want a little more information about something that you have written on page 196, in answer to question 18 of the Questionnaire, with regard to attracting agricultural labourers in new tracts. You say "an attempt to attract them by such concessions and by loans and monetary grants has signally failed in Mysore". What experiment are you referring to there?—That was known as the Malnad tract improvement scheme. They have got a large area of forest and semi-forest on the edge of the Ghats, and they try to attract people by giving them these waste lands for nothing at all, and actually advance them loans to cultivate it. A very large number of them, as soon as they spent the money went away. A good many from our adjoining districts went there, and I should think about 50 per cent. of them have come back again debtors to the Mysore State. They will never be able to recover the money.

4943. Are there any other reasons than these you have suggested? Are there any particular reasons for the failure of the scheme?—I think all schemes in such malarious forest areas are very risky.

4944. Then you refer to campaigns against malaria and the pig evil. Does that refer to malaria and the pig as a pest of agriculture?—Yes.

4945. On page 196 you say "There is a general shortage and it appears to be due mainly to the undoubted improvement in the status and a decrease in the poverty (if not increase in prosperity) of the labouring classes since the War, the influenza epidemic and migration to towns". Have you noticed any tendency on the part of those who are agricultural labourers to become small cultivators?—I have seen a certain amount of it. I should like to say that I think the reason why some of these figures can be used to support almost anything is that they are not properly collected at present, figures showing who are really labourers and who are really landowners.

4946. On the same page you say: "As regards fodder the matter largely depends on the attitude adopted towards the question of communal grazing *versus* private grazing or grazing land held by co-operative societies and other organised bodies. The Cattle Committee of two or three years ago decided for the latter and I am unreservedly in favour of it." Has its adoption any effect on the rates paid for grazing?—It has not been adopted yet to any extent.

on the rates paid for grazing?—It has not been adopted yet to any extent.

4947. It has been tried in certain districts, has it not?—They have given out small areas to village committees.

4948. Do you know whether where it has been the rate has varied?—No, but they have not adopted it to such an extent that they have taken away all the communal grazing land. It has not affected grazing rights at all.

4949. It appears to be your view on the question of marketing that a great deal cannot be done until the essential data have been collected?—Yes.

4950. Do you think that should be the first step?—Emphatically so.

4951. And until that is achieved, is it your view that it is of very little use discussing it on the basis of mere impression of the share received by the producer of the raw material, of the agricultural produce?—Certainly.

4952. You are strongly of opinion that a survey of this nature ought to be made at the earliest possible movement?—Yes; we are doing a little in our movement.

4953. On page 198, in answer to question 22 (*a*) (*i*), you say, "As regards the credit side, I think Government's chief duty is to see that the staff for supervision, audit, and to a lesser extent propaganda, increases with the growth in the number of societies". So you then advocate that propaganda and supervision other than audit should be carried out by Government officers?—No. I have perhaps not put it quite clearly. I mean that the

officers who are doing audit, do, to a certain extent, propaganda as well, and that is bound to continue until the movement is more advanced than it is at present. I would not have special officers for propaganda. If I may be allowed to explain, we have now got only the Registrar and the Assistant Registrars. That is all the staff we have at present. If we want any propaganda work, or any enquiry made other than pure audit, we have to ask our auditors to do it; so that it is very necessary to have the audit staff increased as the number of societies increases.

4954. But you would rather see the advisors and propaganda work where possible carried on by a non-official agency?—Certainly. I had the opportunity of hearing what the last witness said; I should not agree with him at all.

4955. Then, on the same page, you say, "Some of our cotton societies are reaching their most critical stage when they are beginning to compete seriously with the middlemen and *dalals*, and they therefore need special sympathy and help from Government". What are the weapons used by the middlemen, when they decide the time has come?—There are many weapons. They start selling at lower prices and they can hold out longer than we can in that respect. They bribe our men, they publish pamphlets, and they go round the villages spreading all sorts of untruths; they make it difficult for us to get accommodation. At present, it does not matter what commodity you consider, we certainly would not control more than a fraction of that commodity in any particular market place.

4956. Could you send us a complete story of one of these struggles between established middlemen and societies?—I could.

4957. If you could state one or two in full detail, I think it may be very helpful?—The one I have in mind is the cotton sale society at Gadag.

4958. Perhaps you would let us have the whole story in writing?*—Yes. Perhaps, I may be allowed to say that Mr. Madan knows it entirely.

4959. Of course, these economic struggles are tests of the efficiency of the societies, are they not in the main?—Yes, that is so; and it comes back to what we were saying before: we have not got enough men with knowledge of marketing. If we want to establish sale societies we have to look round for a manager, but there are hardly any such people available at present.

4960. Adventurings into the distributors' business are apt to show, among other things, that distribution is not quite as easy as it looks?—Yes, that is so.

4961. On page 199 you say, "The societies may be divided into those for the sale of a particular commodity, and those for the sale of produce in general". Do you think the single purpose society, so far as sale societies go, is the right type, or do you think a multiple purpose society is good?—As far as one can give a general rule it is, but I should not like to be confined to that entirely. In a district where you cannot say that any particular crops predominate, you would have to have a general sale society.

4962. Are you familiar with the history of co-operation in Denmark?—No.

4963. *Sir James MacKenna*: Is the basis of your structure the primary society, the unit society, at the bottom?—Yes.

4964. Then the Central Bank?—Yes.

4965. Then the Bombay Central Co-operative Bank which is the apex bank?—Yes.

4966. How is your apex bank financed?—It is financed by shares, by debentures, and by deposits.

4967. Deposits by the general public, or by societies, or by both?—Both.

4968. Are any reserve funds of societies deposited with the apex bank?—Not the reserve fund

4969. Where do you keep your reserves?—They are kept with the societies themselves and they are put into the working capital.

---

* *Vide* Appendix.

4970. What is the amount of money subscribed by the general public to the Central Bank, roughly?—I should say of the deposits, I cannot give exact figures but I think it must be somewhere about a half to three-fifths, about 50 lakhs.

4971. What is the method of finance from the apex bank downwards? Does the apex bank finance the Central Banks?—It gives loans to those Central Banks that are not self-supporting. A good many of them are self-supporting.

4972. And then the Central Banks do the same thing to the primary societies?—Yes.

4973. Has this apex bank any right of questioning an advance to a Central Bank or a District Central Bank, or must it pay an advance on the order of the Registrar?—The apex bank questions it. The Registrar has nothing to do with it. There is a rule in this Presidency by an agreement between the Secretary of State with the Provincial Bank, that all loans by the Provincial Bank must go through the Registrar. He must see all loans by the Provincial Bank; if he thinks any loan ought not to be made, then he can say so, but it is for them to say whether they are prepared to make it; that is all he can do.

4974. He cannot insist on the apex bank giving a loan to a particular bank?—Certainly not.

4975. Has the apex bank any power of inspection of the District Central Banks?—No.

4976. What guarantee have they of the stability of those banks?—I suppose the Central Banks would not be against their inspection, but they have no technical right to do so.

Mr. Calvert: They have a legal right to insist on inspection.

4977. *Sir James MacKenna:* Is there much Government money in your apex bank or not?—None.

4978. Yesterday, Mr. Rothfield was very emphatic on the retention of Government audit right through. Do you agree with him on that point?—Most emphatically.

4979. In the present condition of the movement?—Always. The Registrar is the registering and cancelling authority, and the only means that he has got is the yearly audit statement.

4980. *Mr. Calvert:* In the new Bombay Act there is a discretionary right in the Registrar to insist on an inspection of the Banks' affairs; the word used being 'may'; but in the Co-operative Societies Act, the word 'shall' is used?—I was asked whether the Provincial Bank had a right to insist on inspection: not whether the Registrar had a right to inspect.

4981. *Sir James MacKenna:* I am very much struck by the low rates of interest charged by *sowcars* in the Presidency, I am quite unfamiliar with such low rates from the professional moneylender in my Province. Your lowest rate would only be obtained on the deposit of gold or jewels. Are these low rates due to the integrity of character of the people?—They strike me as being extremely low. I have said it is chiefly due to the spread of the co-operative movement.

4982. But even so, the previous rates are not very high?—There are three types of persons. These are the rates to the ordinary agriculturist. With people who have no credit at all, they may go up to anything they like.

4983. But this is the ordinary rate on the security of land and personal reputation?—Yes.

4984. I think they are extraordinarily satisfactory. Can you tell me one point about land mortgage banks? Is it your idea to develop land mortgage banks under the existing Co-operative Credit Act?—Yes.

4985. Going further than that, it becomes a central subject, and that is the reason why, for land mortgage banks, you have decided to go on under the existing Act?—Yes.

4986. Will it not somewhat restrict the issues of the land mortgage bank?—I think nothing has been done yet; it is simply before Government. Our idea is to let it grow as the movement expands, we are not going to start off with any legal organisation.

4987. Just as the co-operative movement has grown?—Yes.

4988. *Professor Gangulee:* You have given us a very good account of the credit societies, but you will agree with me that the second phase of the co-operative movement, that is non-credit societies, is equally important or perhaps more important?—Equally important; I will not say more.

4989. Now, these societies are capable of extension in this Presidency?—Certainly.

4990. In what direction would you extend this movement? The non-credit side has so many aspects; which would you emphasise?—Sale societies, implements and manure supply societies, cattle-breeding.

4991. Is that in the order of importance?—Yes.

4992. That is, co-operative marketing is of the most importance?—Yes.

4993. You have made a statement here that the producer gets only 25 per cent. of the ultimate price?—That is in the case of one particular commodity, that is mangoes.

4994. You have stated in answer to the Chairman's question that you would start these co-operative marketing societies after an exhaustive enquiry into the marketing conditions. Am I right?—Yes.

4995. Do you not think that these co-operative marketing societies could be utilised for collecting the necessary statistics and data?—No, I am afraid they would be complete failures long before they got that information.

4996. You feel you cannot proceed to organise these co-operative marketing societies unless and until you have satisfied the first requisite which is the collection of data with regard to marketing conditions?—Yes.

4997. Should these non-credit societies be independent organisations or connected with the credit society?—They should be entirely independent.

4998. They should have nothing to do with the credit society?—Their organisation has nothing to do with it at all.

4999. How would you finance these non-credit societies?—They should be limited by a share system, and the members should be as far as possible societies themselves. Then they would have to get funds from the Central Banks against the produce which they hold. These sale societies will be of no use unless they can give advances to their members against the produce. Then there is the question of holding the produce for so many months in the year, and they want finance for that.

5000. For that finance you would not go to the credit societies?—No, certainly not; they have not enough funds.

5001. What would be the machinery?—The District or Central Banks.

5002. Do you recommend financial assistance from Government for the purpose of starting non-credit societies?—No.

5003. You attach, and rightly so, very great importance to the development of subsidiary occupations as a means of improving rural economy?—Yes.

5004. Do you feel that the general current of economic tendencies is against rural industries? The point I want to make is this; at the present time, there is mass production of things of that kind coming into the market. The economic pressure from outside is so great that perhaps rural industries, as we understand them in this country may not survive. Do you consider that such tendencies exist?—I should like to consider a specific instance like weaving. I do not think it is true to say that it is being driven out of the field by the manufacturing processes. I do not think the current is against it to that extent.

5005. But what scope is there for the revival of rural industries? Do you hold out any prospect of a revival of rural industries?—I would rather not commit myself on that; I do not think I have studied it sufficiently.

5006. You will agree that the hope of their revival in any way is based on two important factors; local markets and the use of local materials?—Yes.

5007. Granted these two factors, can you really develop subsidiary occupations that would be beneficial to the population of the particular area?—I should say yes.

5008. Is it possible to apply co-operative principles to most of these industries? A list of subsidiary industries has been placed before us, including lac, weaving, and so on. Do you think it is possible to apply co-operative principles to most of these industries?—I should say it was essentially suited to them.

5009. Is there any urgent demand for societies for cattle-breeding and dairy farming?—Unfortunately there is not and that is where we want agricultural propaganda. There is no spontaneous demand from the people at present.

5010. In famine tracts, do you advocate the establishment of grain banks as a guarantee against famine? Are there any such banks?—No, there is no such bank that I know of. I am afraid I have not studied that subject.

5011. The primary purpose, of course, of co-operative societies is economic, but in most countries the economic results of this movement have been accompanied by various forms of moral and general improvement, such as mutual confidence amongst the villagers and close touch with one another? —Yes.

5012. Do you find such tendencies in India?—Very much so.

5013. With regard to the credit side of the question, on page 198, you make a very interesting suggestion, which impressed me. You say, " The other direction in which Government aid seems to be necessary on the credit side is the increased provision for banking facilities in outlying towns ". What do you actually mean? You would have the banks, recognised co-operative societies. Am I right?—Yes, to recognise them so that they can be given facilities with regard to Government Treasuries and sending their funds to and fro.

5014. The banks honouring co-operative paper, is that what you mean?—Yes, that is what I mean.

5015. *Mr. Calvert:* I gather that you have, in the Presidency proper, 22,800 villages, and about 3,300 agricultural societies?—Yes, you have got the 1925 figures. We have issued the report for this year but I am afraid you have not received it.

5016. That leaves about 19,000 villages without a society?—Yes.

5017. Is the spread of the movement dependent upon the discovery of a kind-hearted philanthropist who is willing to guide and control?—No. In many areas the villagers are coming forward themselves and asking to have a society established in their village. We find that the chairman of a society in one village will establish one in the next village.

5018. Why is the movement so limited to a small number of villages?—I would not say it is limited to a small number of villages; it is limited to certain areas. In the Dharwar district it is in 48 per cent. of the villages, but you get a district like Kolaba, where it is 2 per cent.

5019. It is merely a question of time?—Yes.

5020. *Sir Chunilal Mehta:* Is it a question of time?—I should say, in most cases, it is only a question of time. You get definite forest areas and isolated areas, where it will take a long time indeed. Take, for instance, the interior of the Konkan.

5021. *Mr. Calvert:* On page 193 you say that the only limits to financing every member of a society are the efficiency of the society and the financial position of its members. Do you not consider that character, education, and a knowledge of the proper use of credit are also important factors?—Yes. Did I not convey that? I mean, we have got enough money in the movement to give everybody a loan, but he may not be a proper person to give a loan to.

5022. A proper person in the sense of understanding the use of credit, and whether he has any debts already?—Yes, and whether he is a defaulter.

5023. You do not suggest the limiting of loans to people with property?—Certainly not.

5024. Then you advocate that Central Banks should employ a large and more efficient staff of Inspectors?—Yes.

5025. I suppose you are aware that in one large Province that system has broken down?—No, I do not know that.

5026. And they have finally decided to adopt the Punjab system of co-operation by education?—I am not aware of that. I do not mean that they should employ Inspectors to go round and teach the people. The only way of watching the disposal of their money by societies is by District Inspectors. You have some districts where the bank only meets once a year and decides these matters. They make dreadful mistakes because they have not got any local knowledge; they must rely on the inspections.

5027. You do not have a general meeting of all your societies which fixes the credit limits of all the socities?—No, we have not got to that stage.

5028. On page 193, you discuss the question of whether the system should be controlled from Bombay or partly through district banks, etc., I cannot understand why the system should be controlled. Why should not it control itself?—That is because I have not made myself clear. I mean, if you establish a land mortgage bank in a particular district, should all the funds and the business be conducted through the District Bank of their district or should it be conducted from the Provincial Bank in Bombay. Our idea is that probably to begin with, it all ought to be done from Bombay; the local agency will be simply for collecting the share and transmitting the information, but scrutiny of the loans and the money will actually be provided from Bombay through the apex bank.

5029. You say on the same page that mortgage banks are open to the criticism that they are only to a limited extent co-operative. What exactly is your meaning?—I shall have to put it in a concrete way in order to explain what I mean. Supposing you establish a land mortgage bank in a taluka. It will be composed of borrowers perhaps spread over all the villages. There may be one borrower in one village and another borrower in another village. The only thing that unites them is their common purpose of taking loans from the central institute. There is no unity such as you get in a primary society. I do not think A will care very much whether B at the other end of the district uses his money properly or not as long as he (A) gets what he wants.

5030. But surely A has given his credit to the society?—Yes, he has given his credit to the extent of one share, which may be one-tenth of the amount he borrows. I do not think he feels that if B misappropriates his money he will be in such affected danger as if they were both members of a primary society.

5031. They have not been educated up to it?—There is not sufficient contact between the two. They are not so closely connected. If you put it in another way; in some countries I understand there are ordinary land mortgage banks established by Government. The only difference between a bank of that description and a co-operative land mortgage bank is that there will be a certain number of people united together in the district in a society. That will be the only co-operative connecting link between the two.

5032. You have not pushed co-operative education yet to such an extent that the people of the district feel that they are all of one common brotherhood?—No. I do not think so.

5033. On page 194 when you are dealing with the main causes of borrowing you omit cattle mortality. Would you include that?—In definite areas I would but I would not put it as a chief cause.

5034. Is that not one of the major causes?—No, I should not put it as a chief cause.

5035. Litigation?—Yes, I should agree as to litigation, I think.

5036. Have you examined your income-tax returns to see whether there is any marked increase in the amount of capital put into this moneylending business?—No.

5037. Have you examined your census figures to see whether the number of moneylenders is increasing?—You mean statistical tables of moneylenders?

5038. Yes?—I do not know that we have such things.

5039. You have statistics of occupation?—I do not think we get those figures.

Dr. Hyder: He would not get them; the income-tax officers would have them.

5040. *Mr. Calvert:* Would you regard as one of the chief causes of debt the increased capital available for lending?—Yes, I would in some areas.

5041. And the lack of alternative forms of investment in the villages; that is to say a villager who has money, wants to nvest it near his own home?—Yes.

5042. He has no means of investing it outside the village?—No.

5043. *Dr. Hyder:* If the rate of interest in a particular village shows a tendency to go down, will it not indicate that the moneylender lowers his interest because he has no other source of investment?—He lowers it; but not because there is no other source of investment. The only reason is the existence of a co-operative credit society. I do not think the fact that he has got no other source of investment will make him charge lower rate of interest.

5044. *Sir Thomas Middleton:* Surely, competition of money offered will have some effect on the rate of interest?—You can go back as far as you like in history, he has not had any other form of investment. Therefore, why should you say now that the rate of interest has gone down because he has no other source of investment?

5045. *Mr. Calvert:* In the early days he had not got the money?—No.

5046. On page 195 you say, " I do not think that non-terminable mortgages should be prohibited." Are there any economic advantages to the countryside in these non-terminable mortgages?—No, none at all. I have no great experience of them. I should like to correct that if I may; I think they ought to be prohibited.

5047. On the same page I have not quite understood why you recommend that Government should make a grant of Rs. 200 for preliminary expenses?—I do not recommend it generally. These are only the terms that were given in this particular case. This was a particular instance where Government did give Rs. 200.

5048. Actually the Punjab Government pays the whole cost of consolidation. Would you object to that?—All the staff for measuring and mapping out ought to be paid by Government, yes; but my instance is entirely out of date because I did not know of the existence of this Bill.

5049. There is a small matter mentioned on page 195 about gun licenses. Is there any limit in this Presidency to the issue of licenses for guns of half barrel length for crop protection?—There is certainly a limit to the issue of gun licenses. I do not know the particular form of license.

5050. We cut off half the barrel in the Punjab and it goes without license?—We have no such system.

5051. *Dr. Hyder:* What do you kill with them—birds?. You cannot kill pigs with them.

Mr. Calvert.—We do not kill anything with it; it merely makes a noise.

5052. On page 195 and elsewhere you refer to dairying as a promising secondary occupation. If dairying is economically profitable, why is it that your kind-hearted philanthropist does not take on dairying? Does not the fact that he carefully avoids dairying suggest that it is not profitable?—I can only say that dairying is an extensive industry throughout certain parts of Gujarat.

5053. Not in such extensive way as in Canada and America?—Not on such a big scale; of course it wants organising.

5054. It is not capitalistic. Where do they send the product?—All the milk goes to Ahmedabad or Bombay.

5055. *Dr. Hyder:* Does it go to all parts of India?—I think it does; but mainly it goes to Ahmedabad and Bombay.

5056. *Mr. Calvert:* In two places you refer to the need for collecting data. Would you advocate a standing board of economic enquiry?—No. I think it could be done without a board.

5057. How can you have systematic collection of data unless you have somebody to do it?—I should rather do it through the non-official agency of our Institute at present as far as we are concerned.

5058. Is it undertaking detailed village enquiries?—Yes, they are just beginning to do it.

5059. On page 198, you say that the policy must be one of decentralisation, that is of encouraging the non-official control of the movement. You are aware of course that at the last Conference of Registrars we decided that no society should be regarded as an " A " society unless it received no help from either official or non-official agencies?—I do not remember that particular recommendation that class A societies should receive no help from official or non-official staff other than the annual audit.

5060. If you are going to have official control you can never have a class " A " into which to put a society?—I think that will depend upon what you mean by control. Do you contemplate a society which no one ever visits except at odd times?

5061. Societies which receive no visits at all except for the annual audit, purely self-governing societies?—I think that is an ideal that may be worked up to, but it is not possible at present.

5062. Taking that as the ideal do your non-officials put before themselves the aim of getting rid of themselves, and making themselves unnecessary? Do they adopt the principle that self-elimination is the first law of nature?—Not at present, but we should like them to do that: we want to eliminate our Honorary Organisers as far as we can.

5063. They are working to make people independent of themselves?—Yes, or rather, have their own organisation for inspection through Supervising Unions.

5064. Supposing now you had an annual general meeting of your Institute, and the primary society members simply turned out all the honorary workers, would your honorary members rejoice in it as being a great victory for self-government or would they take umbrage?—No; they want to continue.

5065. Their own ejectment would be the greatest victory that their own teaching could achieve?—That is so, but they do not see that at present.

5066. Then on page 198, you suggest grants from Government. Is not that another case of public money being handed over to private bodies?—You mean taking away from one section of the taxpayers to give to another?

5067. Taking the money of the general public and placing it at the disposal of private bodies?—Yes, it is.

5068. Do you not object to that?—I object to that on principle, but not in exceptional cases.

5069. It is not a goal to aim at?—These grants are very small; I do not think there is any objection to it.

5070. On page 199, I am very glad to see that you say that a greater degree of education than that which is now found amongst agriculturists is required to win through. I take it that what you mean by that is that a greater degree of education than that now given by your philanthropic controllers is required?—No, I mean ordinary education in the three R's.

5071. Not economic?—It comes to the same thing. The people are not sufficiently educated.

5072. In economics?—Everything.

5073. You can train the peasant to a right appreciation of sound economic principles without his being literate?—I do not mean that exactly.

5074. On page 200, with the greatest deference I suggest that there is some confusion between the rate of interest and the cost of borrowing. The *sowcar's* rate of interest may be lower than that of a co-operative society, but the actual cost of borrowing from a *sowcar* is really very much higher?—You mean because there are various incidentals which do not come in the rate of interest?

5075. Yes, and in the co-operative society a certain balance of interest goes back to the common fund?—Yes, that is certainly a point; it goes into reserve funds.

5076. The rate of interest is not the sole criterion?—Certainly not; that is very important.

5077. In answer to the Chairman, you mentioned that your insistence on punctual repayment was not quite so popular as the elasticity of the moneylenders?—Yes.

5078. But your insistence on repayment is solely due to a desire to get the people out of debt?—Yes.

5079. That is why you insist on repayment?—Yes.

5080. The moneylender has not that object?—No, he wants them to remain in debt.

5081. Is there any rural thrift movement system in Bombay? You have got a very fine urban thrift movement?—We have tried to do something, but the results have not been very good up to now.

5082. In Sind you have?—Yes. They will not take any interest at all at present. Not a pie of interest is being paid in Sind. Being Mahommedans they will not take interest. We use the reserve fund to decrease the rate of interest.

5083. *Sir Henry Lawrence:* You are speaking of Sind?—Yes.

5084. *Mr. Calvert:* On page 200 you say: "In some cases *sowcars* have been enabled to recover their long-standing debts by transferring their dues to societies." Is this your idea of non-official control and guidance?—Yes. It is rather naive, but it is so.

5085. *Mr. Kamat:* At page 194, you say: "I do not advocate any stricter application of the Usurious Loans Act or the Deccan Agriculturists' Relief Act or the passing of any further Acts of this description." Is the class who invest their money in land increasing or decreasing in the Bombay Presidency?—As far as my experience as a Revenue Officer goes I should say it is increasing.

5086. You mean outside men making money in business and investing it in land or in doing moneylending business?—Not moneylending business, investing money in land.

5087. That has increased?—As far as my experience goes, yes.

5088. Are those who do moneylending as a business on the increase or decrease?—The village moneylending class is on the decrease.

5089. At the present rate of spread of the co-operative movement do you think at the present moment we have been able to touch the problem of finance or borrowing, say even to one-tenth of its seriousness?—I have given figures.

5090. You say 12 per cent.?—Yes.

5091. And you hope that if the spread of the co-operative movement goes on like this you will be able to oust the moneylending classes in a short time?—No.

5092. That is to say, the moneylender with all his evil ways will remain? —Yes, as he has in other countries.

5093. If he has his evil ways and he will remain, do you not think that an attempt should be made by legislation to improve him?—No, not more than what has been done at present. I think a lot of this legislation is obsolete, and we do not want any more shocks to credit.

5094. Was there any attempt made to find out the fraudulent ways of the moneylender as to how far he is himself under disabilities such as delays of law, which induce him to be fraudulent towards the cultivator? Was there any attempt made to find out why he has recourse to fraudulent ways and whether it is possible to check this by legislation?—I have no knowledge on that subject.

5095. Is it true that the present method of litigation leads to enormous delay, and that is one of the reasons why the moneylender raises his rate of interest?—It causes delay, that is certain, but I cannot answer that question.

5096. He has also difficulties in promptly recovering the money from the cultivator. Is that one of the reasons why he raises his rate of interest?— That is quite obvious; that must be so.

5097. In the light of that then, was any attempt made to find out the cause and to check his evil methods, by legislation if necessary?—I am not aware of it; I have no knowledge on the subject.

5098. Suppose an enquiry like this were made with a view to checking the bad methods of the moneylender, would you not advocate any legislation to check these methods?—There would have to be very strong reasons in my opinion for any legislation at all.

5099. You say that the moneylender will remain for years?—Yes.

5100. Would you allow his evil methods to go on like this for all time? —But he can remain without his evil methods. I do not object to his remaining: but I object to his evil ways.

5101. How would you check them?—The general spread of the movement will check it.

5102. You mean education will check it?—They will be eliminated naturally and gradually in that way.

5103. You are not then in favour of legislation?—No.

5104. *Dewan Bahadur Malji:* You have been a Revenue Officer in the Presidency for some years?—Yes.

5105. During your tours have you found that the condition of roads is very bad speaking as a whole? I mean internal communications; I am not speaking of Provincial roads?—Yes, I should say so.

5106. And in order to advance the condition of the people all round, it is necessary that they should be provided with better roads and better facilities of transport?—Yes.

5107. Similarly arrangements for veterinary assistance are in some parts altogether unknown. There are no hospitals or touring veterinary assistants in some parts?—Yes, that is the case in many parts.

5108. Therefore, veterinary arrangements have not received adequate attention?—Yes : I have used Veterinary Services as a specific instance.

5109. Then, you are in favour of civic surveys?—You mean surveys of the economic condition of the people?

5110. Yes, and also of the potentialities?—I am.

5111. Would you recommend such surveys in rural areas at the expense of Government?—No. They should as far as possible be done without expense to Government.

5112. What is the state of things in other countries in regard to these surveys?—I do not think I have sufficient general experience to say.

5113. In any case, if such a survey is made it will considerably help you in administration?—I agree: I think lack of knowledge is one of the chief obstructions at present.

5114. The question of the efficiency of inspection has been insistently brought to the notice of the District Banks both by you and the Provincial Bank?—Yes.

5115. The same remarks would apply to the Supervising Unions and Development Associations: that there should be good efficient supervision?—Quite so.

5016. Would you employ a man on Rs. 40?—It depends on the standard of living in the different districts. I think so many people are over-paid nowadays that Rs. 40 might not be so bad as it sounds.

5117. I am talking of Supervisors?—Yes; from Rs. 60 to Rs. 80 is about what we recommend.

5118. They are trained Supervisors?—Yes.

5119. The gentleman in Kanara about whom I talked, it seems to me, is a man without any qualification. Would you recommend a man to be put on the Development Association management unless he is a B.Ag. or L.Rg.?—I should prefer men with those qualifications if one can get them. An uneducated man is a positive danger.

5120. On page 194, you speak of the error of over-finance. Would you like these failures to be included as lessons in co-operation?—They would serve as good illustrations—Certainly.

5121. They could be published?—Yes; there are a good many of them I am afraid.

5122. As regards audit, such complicated societies as power pump, cotton sale and housing require different types of audit?—Yes.

5123. And auditors have to spend a longer time on them?—Yes.

5124. In spite of the fact that the auditors are paid for their time, the forms, etc., still require your attention?—Yes.

5125. There are not sufficient forms drawn up to specify the appropriate type of management?—Yes.

5126. But as development proceeds these difficulties will soon be remedied?—Yes, that is a matter of detail.

5127. *Sir Henry Lawrence:* You came quite recently to the Co-operative Department?—Yes.

5128. Are you satisfied that it is on the right lines and is doing some good to the country?—Yes, perfectly satisfied.

5129. What is the amount of money you get for your co-operative budget?—It was something between 5 and 6 lakhs last year.

5130. That represents about 1 per cent. of the ordinary land revenue?—Yes: the land-revenue being about 548 lakhs, I think.

5131. You have given figures on page 193, which show that 12 per cent. of the agriculturists occupying land are being financed by co-operative credit societies?—Yes. My figures are based on Mr. Rothfield's estimate of requirements being Rs. 20 crores. It depends upon the accuracy of his statement.

5132. You have made no study of that figure yourself?—I have not made any calculation of it myself. I think it is based on particular types of lands for different kinds of cultivation.

5133. The total cropped area is about 28 million acres and that would be about Rs. 8 per acre?—Yes.

5134. That is rather a low estimate?—It is a low estimate.

5135. You wish to see an expansion of the movement till it is able to finance a much greater proportion of the agricultural operations?—I do.

5136. Have you got in view any large expansion of your own department?—No, I do not think so at all. All we want is a sufficient number of efficient auditors and inspecting officers in the form of Assistant Registrars.

5137. Those are officers to be paid by your department?—Yes; and Agricultural Organisers for non-credit societies.

5138. All that comes from your budget?—Yes.

5139. What is the increase to your budget which you think will be required in that short time?—An immediate increase of at least 25 per cent. is required.

5140. Do you anticipate any difficulty in getting this amount?—I do.

5141. Do you think that the attention of Government to the importance of this work might be definitely drawn?—I think so certainly.

5142. As regards *taccavi* the proportion of agricultural operations financed by *taccavi* is very small?—Yes.

5143. In times of famine I believe the figure may go up to 1½ crores in a year?—Yes.

5144. But ordinarily it would not be more than about 20 or 30 lakhs, would it?—I am afraid I cannot give the figures.

5145. So that the greater part of the financing of agricultural operations must be carried out through these co-operative credit societies from money derived from the agriculturists?—Yes. If I may supplement what I said before; we are given 3½ lakhs every year. We have never used more than a lakh or two lakhs by way of *taccavi* through the co-operative movement. That shows the very small extent of it compared with the total loans and we are supposed to do most of the *taccavi*.

5146. *Sir Chunilal Mehta:* Is *taccavi* to be for long term?—Yes.

5147. *Sir Henry Lawrence:* Some work is being done to encourage the use of water channels through operations effected by Mr. Lowsley?—Yes.

5148. Have you been in touch with any schemes of that kind?—I have not actually seen them on the spot but I have read about them and I know fairly well what has been done.

5149. Would your co-operative societies come in for the purpose of distributing this water and arranging finance of schemes which Mr. Lowsley may devise?—I said that in exceptional cases *taccavi* should be given. This is a good instance of an exceptional case where you should give *taccavi* loans.

5150. I do not quite understand?—*Taccavi* should not be given except in exceptional cases. These water channel schemes are a good instance of an exceptional case.

5151. Government are very largely interested in the success of these schemes and therefore should provide the finance, is that your point?—Yes, that is so. We cannot do it through the co-operative movement at present.

5152. You say on page 198, that the railway levy unduly high tariffs and that cases have been brought to the notice of the Divisional Boards of Agriculture and that the question would probably be best tackled by the Commerce Department of the Government of India. Is there no room for settling the question on the spot with the railway authorities?—I should think it would be rather difficult, being a Central subject; it ought to be tackled by the Central authority.

5153. Could not the co-operative societies bring the matter to the notice of the local railway authorities?—I suppose they could, but I do not think it will be of very much use.

5154. To use the Commerce Department to alter the railway rates from Loni to Bombay would be using very heavy machinery to crack a small nut?—Certainly, but they should make general enquiries to find out how far this

statement can be substantiated or not. I tried to collect some information and I found it very difficult. People make these general statements but it is very difficult to collect any specific instances of products that are being penalised in this way. One case I can tell you of at present is that mango pulps on coasting steamers are charged high tariff; but we have no information. I think that would be better tackled by the Central Government.

5155. But you see no objections to local associations taking action in conjunction with the Advisory Board that have been established for railways in Bombay?—No objection at all.

5156. You have not yourself made any application to that Board?—No.

5157. I think that might be considered. A statement has been made to this Commission that cattle-breeding and dairy farming cannot be an economic success. Do you accept that view?—Generally I do. In most areas they are not paying. In certain areas they can be made to pay.

5158. Have you got any co-operative societies specially established for this purpose?—In cattle-breeding there are about a dozen societies in Dharwar and Belgaum and 3 in Thana; that is all we have got. Those in Dharwar are doing fairly well; those in Thana are no good; and elsewhere we have not been able to do anything up to now.

5159. Do they receive the advice of the livestock expert?—They do. I think that is a line on which we ought to do something.

5160. There are rather remarkable demonstrations of the improvement of cattle-breeding in the Agricultural Show here?—Yes.

5161. *Sir Ganga Ram:* Can you give me an authoritative definition of long term and short term loans? People talk of long term and short term but what do they mean? How many years would you call long term?—I would call anything over five years long term.

5162. Anything beyond five years?—We advance loans in our societies up to a period of one, two, three, four and five years.

5163. Up to 5 years it is short term; beyond five it is long term?—Yes. I should not like to be tied down to any figures.

5164. Do you give loans to zamindars on simple interest or compound interest?—Simple interest.

5165. If simple interest, at what rates?—Yearly.

5166. Therefore if he does not pay after a year his debt is carried over to the next year in the capital account?—I think it is simple interest only. If the society goes into liquidation then it would not be simple interest, but ordinarily it is simple interest all the way through.

5167. Next year you do not charge compound interest?—No.

5168. Up to how many years do you do that? Even if he does not pay it for 20 years you do not charge him compound interest?—If he does not pay in 20 years I should think the society would have been cancelled long before that.

5169. What is the rule I want to know?—The rule is simple interest. But the society has power to impose penal interest. If a man is not paying his loans back properly, the other members can impose penal interest on him.

5170. On page 195, you pin your faith to fencing. I had a conversation with a zamindar yesterday and he said the fencing did more harm than good, because it opens one hole for the pigs to get in and when all the villagers get up these pigs do not know how to get out and they destroy the whole field. The zamindar told me "For heaven's sake do not give your opinion in favour of fencing." Is there anything in it?—I think he has got a poor idea of co-operative effort.

5171. It stands to reason that it what will happen if the pigs do not know how to get out?—They never ought to get in.

5172. What is the nature of the fencing you have recommended? Is it laid in cement?—No, the walls are just stones laid on top of each other.

5173. A couple of pigs will knock them down?—I have had a lot to do with these walls; I can tell you they are most successful.

They will make a hole in one place and most probably destroy the whole crop before the villagers get up.

5174. *Sir Thomas Middleton:* You said that your limit for a short term loan is five years?—About 5 years on short term, and they are very rare.

5175. Do you use the term " intermediate loan " here?—No.

5176. So that you classify credit exclusively into short term and long term?—Yes.

5177. I see on page 197, of your notes that you yourself as Settlement Officer have taken considerable interest in the question of village grazing and you have made proposals for village forests. These forests were grazing reserves, were they not?—They were common grazing land coming under what we call minor forests.

5178. But so thinly planted that grass was the main crop?—Yes.

5179. Your difficulty arose chiefly because non-agriculturists refused to agree to an enclosure?—Yes.

5180. Has there been any attempt made to separate the population of the village into agriculturists and non-agriculturists and to allocate to the agriculturalists an enclosed area which they might look after leaving a certain portion of the waste open to other villagers? Have you attempted what one might call a partial enclosure system?—No, we have not. The idea sounds a very good one, but we have never done anything so complicated as that up to now.

5181. On page 193, you say that the land mortgage bank system is much better than Government *taccavi*. When I first read that sentence I thought your point was that from the point of view of the Government it was superior, but I see it is from the point of view of borrowers that you regard it as being much superior?—Quite so.

5182. Because *taccavi* leads to spoon feeding and facile credit?—Yes.

5183. Are there any other objections to the *taccavi* system?—It does not always get to the right people and it is not always used for right purposes. There is a lot of payment of bribes to small officials and difficulty in getting it.

5184. On page 200, there are comparative figures illustrating the difference in cost in borrowing at the *sowcar's* rates and at the society's rates. I take it these figures are not strictly comparative figures, that is to say, they do not represent the cost at which a particular individual could borrow from the *sowcar* or from a society?—No.

5185. They merely show the prevalent rates?—Yes.

5186. If they show the prevalent rates then one is rather puzzled to know why the minimum rates of the *sowcar* somewhat exceed the minimum rate of the society, unless Mr. Kamat's suggestion is correct, and the explanation is that the *sowcar* is open to certain disabilities in collecting his money?—He is open to a good many disabilities.

5187. And is that the reason for the higher rate of interest?—No, that is only one of the reasons. I mean if you take a moneylender anywhere in the world, he is a moneylender by profession.

5188. But he is a moneylender in competition. He is out to make a maximum profit. If he cannot in favourable circumstances reduce his rate of interest to the minimum charged by competing societies there must be certain disabilities from which his business suffers?—Yes; he squeezes whenever he gets a chance; but he has to squeeze sometimes when he does not want to.

5189. Would you distinguish between the *sowcars* of this country in the way we might distinguish in Britain between a private banker and a moneylender? Are there *sowcars* who would correspond to the private bankers and

are there others corresponding to moneylenders as we know them in Britain? —I should distinguish, yes. There are some moderately honest *sowcars*.

5190. We want to classify *sowcars*?—Yes.

5191. Another figure puzzled me. In reply to the Chairman you mentioned that the maximum rate of interest was highest in a famine area?—Yes.

5192. But I find the maximum is 25 per cent. in Kaira and Ahmedabad. Compared with the Deccan one would not expect to get that high rate? Is there any reason for the high rate?—I said in places where education is very poor and the development is much less. There are certain parts of Kaira and Ahmedabad which are not at all prosperous.

5193. I know, but you have spoken of Kaira and Ahmedabad together and you have added the words ' in general '?—I said parts of Kaira, Ahmedabad and Broach.

5194. Would you agree that in these areas the intelligence is quite as high as in any part of the Presidency?—Yes, but, strange to say, there are few people who are more racked by the usurers than in certain parts of Kaira. It is over-populated.

5195. Is it not that pure conservatism which has caused them to stick to usurers?—Our co-operative movement is very backward in Kaira.

5196. *Sir Henry Lawrence:* May not your remarks apply to a certain section of the population?—Yes, *patidars* in certain parts, I am told, can get loans at 6 or 7 per cent.

5197. The *dharalas* have to pay from 24 to 25 cent.—Yes.

5198. *Dr. Hyder:* In regard to the moneylenders you stated that their disabilities are great now. Are there disabilities under which moneylenders suffer? I was wondering whether you know that in days when there was no British rule the disabilities were there but now the whole machinery of the State is at the disposal of moneylenders. They advance money and through the machinery of the courts every pie is realised?—If there is anything to realise; yes, I see what you mean.

5199. You said that the progress of the co-operative movement in Sind is very slow and people in that part of the Presidency do not take any interest. Have you tried the method of giving them the money in a collective form rather than lowering the rate of interest and thus bringing to them copious draughts of facile credit?—I do not think there would be copious draughts; it is simply their own money which they have put by themselves.

5200. If loans were made easier by lowering the rate of interest there would be a tendency for applications for loans to increase?—It would only be their own money which they have put by themselves and I do not see why they should not have their money back at lower interest on a later date.

5201. You would not give back this money in other forms?—Yes, in any form they want it.

5202. Do you not think this giving of money to them by reducing the rate of interest would conduce to the evils of facile credit?—No. By facile credit I mean that a man who could formerly get a loan of Rs. 200, finds he can get one of Rs. 500 or 600. But in this case it is limited to the amount of money they put into the society.

5203. As regards the scheme for long term credit now before Government I was wondering whether you would explain it in detail, whether it is a scheme for specific improvement purposes, whether it is a scheme in connection with the equipment of peasants or whether it is a scheme which does not require any declaration as to the purpose of the loan or whether all purposes are lumped together?—No, certainly not. It is merely a scheme put up to Government. It was for two main purposes, the redemption of old debt and improvement of land. The redemption of

old debt is the main purpose. In any particular district, or in any more convenient area if you like, people collect together who want to redeem their debts: they should put up a definite security in the shape of their lands and they will be given loans up to 33 per cent. or 50 per cent. of the value of their lands. They will form themselves into an association in this particular district and they should be required to take up shares to, I think it was, 5 per cent. of the loan they want. The main finance should come from the Provincial Bank. All these schemes should be sent to the Provincial Bank for consideration. In order to check the scheme you must have an expert land valuer to examine the land which they offer as security, see whether it is encumbered or otherwise and what the real value is. The schemes would be put one by one to the Central Bank in Bombay through the District Bank.

5204. So that the applicant has got to be interested in the land mortgage bank to the extent of 25 per cent. of the value of his assets and the loan he would get would be to the extent of 33 per cent. to 50 per cent. of his real property?—Yes.

5205. In other countries they advance money up to two-thirds?—There is a difference of opinion in India. In Burma they are considering two-thirds. We are rather in favour of 50 per cent. at present because you have got to go into the question of encumbrances, where it is easy to make mistakes, and land values alter rapidly.

5206. Have you got large landowners or are you concerned with small substantial farmers?—We are chiefly concerned with small substantial farmers.

5207. *Sir Chunilal Mehta:* In answer to the Chairman you stated you were satisfied that there was adequate co-ordination between the Agricultural Department and your department?—Certainly.

5208. It might be of interest to the Commission if you could supply them with copies of the three Government Resolutions* which state exactly how that co-operation works?—Yes, I will do that.

5209. With regard to the limited extension of co-operation in various parts of the Presidency you said it was only a question of time. No doubt it is, but there are peculiar difficulties in certain tracts. In the Konkan the question of land tenure is a serious handicap to the extension of co-operative movement there?—Yes, I am trying to meet that by having societies on the share system.

5210. Similarly in the Panch Mahals, where the Bhils are moving from place to place, it is difficult to get anything done?—Yes.

5211. You would then consider the question of land tenure must be seriously taken into account?—Yes.

5212. Some system may be a great hindrance to the spread of co-operation?—Yes, certain systems are.

5213. You say on page 193, that the loans made to agriculturists may be calculated at two-thirds of what they require?—Yes.

5214. You say that the loans made in 1925-26 were two crores and the estimated requirements were three crores. Why do you fix it at three crores?—That is simply based on the figure of Mr. Rothfield. He gave 20 crores for the Presidency. Then you calculate the number of members compared with the total agriculturists in the Presidency, and by the rule of three you get 3 crores.

5215. Three crores required by the members of the societies?—Yes.

5216. *Mr. Calvert:* You are speaking there of cash requirements?—Yes.

5217. You are not referring to the costs of cultivation?—Of course, many loans are made in the shape of manure.

---

* (1) Press Note No. 2962, dated the 21st October 1921.
(2) Government Resolution No. 3378, dated the 5th June 1922.
(3) Government Resolution No. 8266, dated the 26th January 1924.

5218. This is for cash requirements; the cost of cultivation would be five times as much?—Yes.

5219. This is the actual cash required?—Yes.

5220. *Mr. Kamat:* For the existing members of the societies?—That is so. If you want to buy manure, you call that a cash requirement.

5221. *Sir Chunilal Mehta:* You have been asked about the arrangements for the proper inspection of Central Banks and primary societies. Although the new Act says the Provincial Bank may do the inspection, there is at present an arrangement whereby it employs a certain number of Inspectors, the cost of whom is borne one-half by the Provincial Bank, one-quarter by Government and one-quarter by the Central Banks?—Yes.

5222. That, I take it, was necessary because we want to be quite satisfied that the loans taken by individuals in primary societies are used for the purposes for which they are taken?—Not only that, but to see that the societies do not misappropriate the funds.

5223. It is very necessary to see that the loans taken by members of co-operative societies are properly utilised? If they take a loan for land improvement it is necessary to see it is used for land improvement and not for a marriage ceremony?—It is very necessary to do that, and also to see that they do not take loans which there is no prospect of their paying back. That is even more important.

5224. I see you are in favour of an unofficial agency to inculcate this point, so I suppose you consider that some kind of organisation in addition to the development of the Primary Societies themselves would be desirable?—Absolutely essential for impressing on the people what we may call the moral and thrift side of the co-operative movement.

5225. Have you considered any such organisation?—Yes. If we had Supervising Unions throughout I do not think we should want Inspectors, but each must move towards the other by some form of intermediate agency, and until one of them is complete we shall have to use both.

5226. Have you considered the further extension of the idea of Taluka Development Associations in the form of smaller units of organisation?—I have not considered that, but I feel convinced that it would not be a good thing to make it any smaller.

5227. Until you get the right type of men?—Yes.

5228. Have you had an opportunity of looking into the draft Bill that has been suggested for dealing with the sub-division of holdings?—I saw it yesterday.

5229. Do you think that your objections to legislation in the matter of preventing these sub-divisions still hold?—I think the Bill is a very fine piece of work, and I want to withdraw them all.

5230. I suppose you are aware that some 2 or 3 years ago the Government asked the Registrar of Co-operative Societies and the Director of Agriculture to take one or two villages in hand and see whether consolidation could be achieved by voluntary effort?—Yes.

5231. Have you seen any results of that?—I have only read the literature available in Government resolutions. The result seems to be nothing so far.

5232. Your predecessor said that it was not possible and nothing further was done?—We have not tried very hard yet. We are still trying in the Umbergaon taluka.

5233. So that some kind of legislation is desirable?—It would be desirable, but I should still like to go on attempting it by means of voluntary effort, and your new Bill will still make it possible for us to go on doing it through co-operative societies if we want to.

5234. Have you had any information collected by co-operative societies with regard to this sub-division and consolidation question?—I do not think they collected it but the subject has been considered at conferences of co-

operative societies. They considered it in Gujarat, for instance, and have decided that something should be done, but they are divided on the question of whether they should have an enabling law or not.

5235. Did you notice that objections often came from the legal element, the lawyers?—No, I have not noticed that.

5236. You will perhaps find that is so from the record of the Belgaum Co-operative Conference. With regard to the co-operative dairy societies, have you considered what is the minimum limit of finance for a large dairy society, which has to supply milk to a town, for instance?—No. We considered it with regard to the establishment of a milk supply society in Anand, and that is all.

(The witness withdrew.)

APPENDIX.

The Gadag Cotton Sale Society and the Middlemen.

The society described in this note is the Gadag Co-operative Cotton Sale Society and it was established in 1917. Gadag is a centre of the cotton trade of the Karnatic, and is situated in Dharwar district. The Society has a large membership amongst the agriculturists of Gadag taluka.

2. It may here be explained that the policy of the Agricultural Department as regards the spreading of improved cotton seed in the Southern Division is to distribute this through cotton sale societies. The Gadag society is the sole grower for the improved Gadag No. 1 Cotton, and an area of 5,000 acres owned by its members has been selected and is known as a reserved area. The cotton so grown is inspected and *rogued* by the officers of the Agricultural Department, and the society contracts to sell back to the department all the seed so produced, which is again distributed as pure seed of the next generation to the society and to the public. In order also to preserve the type the pure cotton grown by members of the society is graded by a special officer of the department before it is sold.

3. The society's business prospered from the beginning, and by 1919 it had aroused uneasiness amongst the local *dalals* or middlemen. That year they organised a boycott as a result of which the society had to suspend business for 10 days, and ultimately the society had to agree to certain conditions the chief of which were (1) that it should like the *dalals* charge 1 rupee instead of 4 annas as before and (2) when selling cotton to an agriculturist financed by a *dalal* it should deduct the latter's dues from the sale-proceeds and hand them over to him. [It may be explained that *dalals* also act as financiers to agriculturists. They advance money to them and often make it a condition that the latter shall sell their cotton through them.]

4. The society's business however continued to flourish. The *dalals* then formed an association and later on from 15th June 1925 they organised the boycott which is still continuing and threatens to extinguish the society. They had in the meantime left no stone unturned to convince the Bombay merchants and mill agents through their local agents that the society was a bad thing and was dealing dishonestly. Some of the methods adopted in this boycott have been :—

(*i*) They tried to prevent willing buyers from bidding at the society's auctions.

(*ii*) They held rival auctions soon after those of the society and deliberately offered higher prices for small lots in the hope of misleading the cultivators who are the society's members. But the latter remained loyal although the prices they got were less than those of the former year.

(iii) They organised boycotts amongst the society's cartmen and *hamals;* and later a boycott of the society's cotton by ginning and pressing factory owner and merchants.

(*iv*) Subsequently certain *dalals* with a party of 25 men trespassed on the society's premises, forced open its office room and threw out some of its furniture and books on the pretext that one of them had a share in the ownership of the premises and that the society had been given notice to vacate but did not do so. An arrangement was subsequently made for the society to continue to occupy till the coming April.

(*v*) They spread a rumour that the Assistant Registrar who has been actively helping the society was to be transferred.

5. The society was thus much hampered. It had to sell its seed at cheaper rates, to enter into a contract with a ginning factory on unfavourable terms, and to buy a piece of land at Rs. 15,000 to hold its auction sales.

6. Eventually the Registrar (Mr. Madan) approached Government and a Conference between the mill-owners at Bombay, cotton buyers and cotton sale societies and Government officers was held at Bombay in February 1926. At this Conference the views of both sides were freely discussed. Against the society it was urged that it had been selling non-members' cotton and selling cotton of inferior kinds by auction. Eventually it was decided that the society should observe the following two conditions and that in that case the buyers from Bombay would instruct their local agents to buy from the society.

(1) The society to restrict its operations to cotton grown by members only.

(2) Cotton of improved seed only to be sold by auction and the rest by private treaty.

7. It is not pretended that the society has always been well-advised or blameless in its actions. There are some less principled persons amongst its members. On the whole too the selling of non-members' cotton was not a good move, though it was done only with the object of building up the business.

8. The auctions of 1926 were then held but unfortunately owing to various causes, some of which are not fully clear, none of the agents of the Bombay firms bought except one of Messrs. Tata Sons & Co., although the society has strictly observed the conditions. The *dalals* have continued to spread pamphlets against it mostly inaccurate. Tata's agent bought the whole lot, otherwise the society would have failed.

9. Since then the boycott has been continued more vigorously than before. Some of the society's members have become disheartened and this has produced internal dissensions which however have been set right up to now. Nevertheless the whole position will turn on this year's auction sales. The Registrar intends to approach the Bombay buyers. It would seem that if their agents do not bid this year and the cotton is not sold, the society may have to close down. Another serious feature is the situation with regard to the price of American cotton, which is out of parity with that of Indian cotton. For that reason many firms are buying American cotton this year instead and may not want the Dharwar cotton which the society sells to any appreciable degree. This will result in the probable collapse of the most promising experiment in the selling of the agriculturists' produce by co-operative venture, at any rate, in the Southern Division. The following figures show the progress of its business. By last year it had come to control ⅛th to ¼th of the cotton brought to the Gadag market.

Year.	Value of cotton sold.	Profit.	Share Capital.	Number of members.	
				Individuals.	Societies.
	Rs.	Rs.	Rs.		
1920-21 . . .	3,52,450	119	13,353	995	6
1921-22 . . .	3,94,309	5,590	13,762	1,005	27
1922-23 . . .	6,83,347	8,987	15,589	1,069	29
1923-24 . . .	18,20,318	18,847	19,467	1,111	63
1924-25 . . .	6,93,283	13,184	37,914	1,327	70
1925-26 . . .	15,17,696	16,565	41,976	1,697	85

Mr. C. C. INGLIS, Executive Engineer, Special Irrigation Division, Bombay.

Replies to the Questionnaire.

Introductory Note on Irrigation Agriculture.

Before replying in detail to the Questionnaire I must point out that agriculture and irrigation are dealt with as two separate subjects.

20 years of irrigation experience, the last 10 of which have been on special research work, with experimental agricultural farms in my charge, have demonstrated that when questions of irrigation agriculture are considered from the purely agricultural or purely irrigational point of view, little or no headway is made. In irrigated tracts the aim must be to mould irrigation facilities to meet agricultural requirements and to modify agricultural practice to meet irrigation limitations.

For years past the Agricultural and Irrigation Departments have been working at cross purposes; but the reason for this is not perversity but lack of appreciation of the problems and limitations of each others' media.

The Agricultural Department sets out to solve agricultural problems without realising and therefore without avoiding irrigation limitations; while the irrigation staff on the other hand are apt to condemn agricultural proposals, which though useless in their original form are capable of useful modification.

When new methods are being introduced, human nature being what it is, failures are attributed by the Agricultural Department to shortcomings in the irrigation management; while the irrigation staff are over-keen to impute the blame to the unpractical methods of the Agricultural Department. Unless there is a single controlling authority inefficiency must result. This is being gradually recognised. Thus in America investigations are carried out by a team of men working together, a method which as pointed out by Mr. A. Howard in his presidential address to the Science Congress at Bombay last year is not likely to be so successful and is certainly more expensive than work done by a single Research Officer in undivided authority, with special knowledge and experience of all sides of the problems involved (with irrigation and agricultural staff working side by side under his guidance).

The Scientific Research Officer attached to the Public Works Department in the Punjab is Mr. B. H. Wilsdon who realises both sides of irrigation agricultural problems, as he was hitherto Agricultural Chemist, Lyallpur, and there carried out exceedingly valuable researches into soil problems in irrigated tracts—notably the movement of soil moisture and the reclamation of barren and salt affected lands. He is associated with Mr. E. S. Lindley, Superintending Engineer.

In the Deccan the Special Irrigation Division was opened in 1916 to investigate problems which the Agricultural and Irrigation Departments had hitherto been investigating from different view points with little or no success.

These problems included—

(*i*) investigations into soils and subsoils which led to a solution of the problems of drainage and soil selection;

(*ii*) the movement of subsoil water and its effect on the yield of wells in irrigated tracts;

(*iii*) water requirements of crops under field conditions;

(*iv*) improved methods of irrigation—both as regards distribution of water by modules and measuring devices and the layout of lands for irrigation;

(*v*) the conditions which favour aquatic weed growth in canals; etc.

At first sight it may seem that the direction of such experimental farms should be in charge of the Agricultural Department. There are basic reasons, however, why this is not the case:—

(*i*) "*Irrigation practice should be based entirely on the greatest good of the greatest number, not on the greatest good of the individual cultivator.*"

The Agricultural Department has very naturally viewed agriculture from the standpoint of the individual. That, I consider to be the basic cause of misunderstanding.

(*ii*) *The greatest good of the greatest number and efficiency are synonymous terms; so are efficiency and revenue.*

In other words irrigation efficiency as judged by revenue (if we neglect rise and fall in crops rated) corresponds with the greatest good of the greatest number. It is in other words to the interest of *the Canal Officer to do his best for the mass of the cultivators. The Agricultural Department* on the other hand very naturally base their experiments on getting the best return *for the individual cultivator.* This may be and often is, in opposition to the interests of the mass of cultivators.

(*iii*) The Irrigation Officer by his training is taught to see big; agricultural training naturally tends to concentrate on detail; but in irrigation it is the big view that counts.

(*iv*) Irrigation limitations are much more rigid than those of agriculture and only a Canal Officer is in a position to realise those limitations; or see how the limits can be extended.

(*v*) The Canal Officer's training brings him into daily contact with problems as they are in the field; whereas the Agricultural Officer has cases put up to him by the cultivators—generally extreme cases—and at best much of his information is one-sided.

(*vi*) Agricultural improvements can generally be greatly speeded up if they are pushed with confidence and understanding by the canal staff; thus in the Deccan though the advantages of terracing were long recognised little or no progress was made until the *bund* rules were introduced by the Irrigation Department.

These rules were fought step by step by the cultivators backed up by the Agricultural Department, yet they are now generally admitted to have been beneficial leading to terracing, levelling and standardising of areas, which in turn has reduced waste and damage and increased the area under crops.

(*vii*) If the farm were run by the Irrigation Department the canal staff would be much more anxious to push proposals which emanated from such farms; and would be in much closer touch with the work in progress.

It is not, of course, suggested for a moment that Irrigation Officers should staff these farms. The farm Superintendents would be agricultural men, while the staff on irrigation experiments would be engineers; but both would pool their ideas under a single Research Officer.

Such farms would naturally be run with an eye to meeting pressing needs rather than to carry out research for research sake. That the results would be exceedingly satisfactory is not merely to be expected; but has already been definitely demonstrated by the Special Irrigation Division, which has obtained in the past few years results of enormous importance to the mass of the cultivators.

The necessity of considering "irrigation agriculture" from the view point of the interests of the mass of the cultivators as opposed to the interests of the individual cultivator is of such vital importance that I must stress the point. Not merely does this alter the lines on which research must be carried out but it also completely changes the methods which must be adopted for introducing improved methods.

For example:—

The Special Irrigation Division have found that though slightly heavier crops of sugarcane can be grown with 125″ of water than with 75″ of water the increase in outturn is not at all in proportion to the extra water used. Thus when 125″ of water was put on one acre the average outturn of "gul" was 14,552 lbs.; whereas with the same quantity of water spread over 1⅓rd acres the outturn was 22,178 lbs.

Bearing in mind that water is our limiting factor the importance of reducing the amount taken is obvious; but it is not surprising that the Agricultural Department have been telling the cultivators that they will benefit by heavier waterings; because they are of opinion that the *individual cultivator will benefit by the heavier waterings.*

After all, the Agricultural Department must either win the individual cultivator to their side or else fail entirely. If they were to preach the use of less water to benefit another cultivator at the tail of a canal they would merely be wasting their breath.

The Irrigation Department, on the other hand, are in a very different position, because they have the interests of the mass forced on them at every stage; and they are in a position to restrict the supply to the individual in the interests of the mass.

QUESTION 1.—(*a*) Experimental farms should be separated from demonstration farms. The former cannot be expected to pay their way, the latter should do so or be closed down.

My experience is that a natural bent for research is an exceedingly rare gift possessed by not more than 1 man in 10. Of those who have the gift some have not got the necessary qualifications.

There should be one specially selected Scientific Research Officer in each Province, who should advise on the methods to be followed and should be in charge of the central experimental station.

In the Presidency and also in Sind there should be one Central Irrigation Research Station with a farm where both irrigation and agricultural research should be carried on concurrently.

In addition to this there should be a Central All-India Organisation for co-ordinating the work of the various Provinces and giving expert advice. I would point out that the cost of this scheme would be met many times over by an increase of even 1 per cent. in efficiency; because even experimental farms almost pay their way if they are run on business lines.

That the increase in efficiency to be expected is far in excess of 1 per cent. goes without saying—the figure for the Bombay Deccan may be put at 30 per cent when full improvements now in view are carried out.

I am in entire agreement that we should investigate the scientific value of the indigenous theory and traditional methods of agriculture; but I go very much further and say that we should also investigate the reasons for present practices whether they be good or bad.

In India you cannot afford to treat agriculture as a pure science and ignore the psychology of the people. The very same impulse or custom which impedes us in one case may assist us in another.

The longer I work amongst the irrigators of the Deccan Canals the more I realise that there is always some root cause for every practice; sometimes it can be overcome, sometimes it can be got round; but until we learn to diagnose the case we are not likely to be able to prescribe a remedy.

(*b*) The main cause of slow progress is not so much due to want of skilled workers or facilities as to lack of understanding and appreciation of the factors to be met.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) Any improvement which saves work or reduces costs—almost at once—will always be taken up, for instance, metal ploughs.

Improvements which only show their value after some years are rarely popular and hence have to be brought in by indirect methods and not by advice. If you advise a man to level his field he is not likely to do it; but if you were to refuse water unless his field were levelled it would be done to his lasting benefit.

What we need to do now is to make a much more careful study of indirect methods of attaining the end desired.

(*b*) If demonstration farms were run on business lines and all accounts were open to the cultivators little more would be necessary. If, however, demonstration farms do not pay their way they carry on weight with the cultivators.

Experimental and demonstration farms should be rigidly separated otherwise losses on demonstration plots will be imputed to experimental plots.

Demonstration plots should be restricted to fields of capable cultivators and "splash" should be avoided until the demonstration has been proved to be entirely successful. To start off with a "splash," and then to modify the method, or even withdraw it, does much harm. If the expert cultivators made a success of any method it will gradually spread; but if mediocre cultivators adopt a method and it fails through carelessness or bad management confidence will be shaken.

(*c*) Expert advice will be adopted provided it takes into consideration the local conditions and the psychology of the people. Success depends almost entirely on confidence, and consequently no practice should be recommended unless it is proved beyond question to be a considerable improvement.

(*d*) The introduction of metal ploughs is a case of conspicuous success for the Agricultural Department. The use of copper sulphate for preventing "smut" is another great success. The use of ammonium sulphate as a top dressing for cane is another conspicuous success.

Straining off impurities during the manufacture of 'gul' has also been generally adopted.

The substitution of the ridge method for the *Vafa* method and the reduction of sugarcane 'setts' for cane are other examples, but the latter changes are only being adopted very gradually. When irrigation methods are further perfected these improvements will be adopted generally; because then the stimulus to get the biggest crop with the restricted supply of water available will be very great.

Green manuring is just beginning to be adopted, and where the area of cane is big enough to make it profitable, multiple furnaces and power crushers are gradually being introduced.

The reason for the success of these is not any special demonstration or propaganda work; but is simply due to the fact that they have proved an immediate success; but in many cases the new methods were not taken up generally until low prices of produce forced the cultivators to adopt methods which were cheaper to make ends meet. Thus it was not until the slump in 'gul' rates in 1923 that the number of setts were reduced from 18,000 to 12,000 though the Agricultural Department had shown years earlier that 8,000—9,000 were sufficient.

A striking case of failure recently occurred when the Agricultural Department tried to introduce monsoon *juar* in the Matoba Tank area. This area is naturally a *rabi* tract and the water-supply is essentially a *rabi* supply; so that when the demonstration plot was planted the birds of the air congregated and concentrated on the one isolated crop of grain.

I do not want to enumerate failures; but can say that the reason for them has always been due to lack of appreciation of local conditions. A failure of this leads to lack of confidence.

QUESTION 4.—ADMINISTRATION.—For irrigation agriculture there should be a research station in every Province and in Bombay, two because the Deccan and Sind canal conditions are totally different. There should also be a Cen-

tral Research Station which should co-ordinate the work all over India and give expert scientific advice on highly technical points.

(*b*) It is unnecessary for instance to have a first class hydraulician at every experimental station, because the very advanced mathematics of hydraulics often plays a minor part. One such man for the whole of India would suffice and he could be lent to any Province temporarily requiring him and should always be available for consultation.

Similarly it would be unnecessary to have expert soil physicists for every farm because the need of India is not an excess of science, but an all round knowledge of local conditions and general agricultural practice.

The same applies to experts of agricultural chemistry.

(*c*) (*iii*) ROADS.—Irrigated tracts in the Deccan are badly in need of roads and field tracts. There is a cess of 2 annas in the rupee on irrigation rates which is handed over to the Local Boards. It was anticipated that a large part of this would be devoted to improving communications in the irrigated tracts, but for the most part the money is spent on schools and dispensaries outside the canal areas. A part of this cess should be earmarked for roads in the canal tracts.

In irrigated tracts roads are of essential importance to the irrigators. Sometimes the roads are in charge of the canal staff, sometimes the Roads Branch look after them, and sometimes they are in charge of Local Boards.

As the canal staff have to use the roads daily they are the people most interested in keeping them in repair and are in the best position to inspect them. Furthermore it is sometimes possible to carry out a combined scheme which benefits both the canal and irrigation. Finally the roads in charge of the irrigation districts are actually far superior to those looked after by the Roads Branch, and enormously superior to those looked after by the Local Boards. The Sangvi-Baramati road is a good example of a road with a chequered career. It used to be in charge of the Public Works Department and you could then motor along it. It was then taken over by the Local Boards and rapidly became impassable. It was then handed over again to the Public Works Department and gradually brought back to a useful condition. Government should by all means experiment with handing over roads to the Local Boards where the country is dry; but where the roads are of vital importance and become impassable so easily—as is the case in irrigated tracts—experiments ought to be avoided.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(*a*) In irrigated tracts fragmentation can be checked, and consolidation sometimes effected, by refusing irrigation water to fields which are less than a fixed minimum area; because if the land is excluded from irrigation its value drops and hence it is to the interest of the owner to sell his land rather than let it drop out of irrigation. If the minimum area were put at 6 acres, that area would be standardised as the minimum holding over the greater part of the areas commanded by the canals.

Such a method would be simple and effective; but could, of course, only apply to areas in canal tracts.

QUESTION 8.—IRRIGATION.—(*a*) Mr. Beale's Report on the Surveys for Protective Irrigation Works in the Deccan (1909) goes into full detail as to the schemes to be taken up in the Deccan in years to come.

Extensions of the Mutha Canals, Godavari and Pravara Canals systems are now under consideration; and remodelling of the Nira Left Bank Canal is in hand. This is sufficient for the present.

The future of the Deccan Canals depends on whether sugar factories can be established or failing that whether Government is willing to finance unproductive schemes; because no Deccan Canal scheme will be productive unless a large part of the water available is used for sugarcane.

(*b*) Until recently an unknown quantity of water was given to an unknown area for an unknown time. Recently the areas have been unitised into half acre plots and we are not standardising discharges, so that only the

time factor remains. Under the Deccan conditions it has always been found to be impossible to fix periods of flow owing to the enormous variations in demand which occur from time to time. The Special Irrigation Division has been studying this problem for some years and it is believed that a method can be devised to fix the supply with some elasticity as to the time when the supply will be given. If this is successful the cultivator will be given a definite supply and allowed to irrigate as large an area as he can with the water supplied (subject, of course, to limits). There will then be a strong incentive to the cultivator to spread the water supplied over a larger area, which will lead to great economy.

At present conditions are such that we have to supply water according to the demand—as judged by the cultivator—and consequently there is no incentive to the cultivator to irrigate carefully. The objectionableness of this system is obvious; but for 20 years a solution has seemed to be impossible and it is only since the Special Irrigation Division has been opened that it has been possible to work out a scheme based on agricultural requirements and irrigation possibilities.

Tail outlets must take whatever water reaches them and hence must be of the non-rigid type. The efficiency of distribution does not, however, depend on the type of tail outlet used; but on the type of outlet used near the head of distributaries.

Where there is alternative silting and scouring of the distributary bed, causing fluctuations of the water level for the same supply—such as occurs in canals in Sind and Northern India—a highly rigid type of semi-module, or even a module is desirable. Lower down the distributary a less rigid type of module is desirable, because a module does not damp out fluctuations of supply caused by careless regulation or closure of watercourses, so that if rigid semi-modules were used all excesses and shortages would reach the tail and alternatively flood the tail or leave it short of water. As the lower sections are reached it is generally desirable to increase the proportionality of semi-modules, and as a rule the lower half of distributaries will have proportional semi-modules installed.

This is an exceedingly technical question, on which one cannot generalise. Different conditions must be met by using different types of outlets. Thus though in Northern India semi-modules are accepted as more suitable than modules, and many advocate proportional semi-modules; yet in the Deccan semi-modules are far inferior to modules; because we are distributing stored water and have to aim at giving a known supply to a known area *when required.*

This question is being studied in detail by the Special Irrigation Division; and I hope I will be given the opportunity to show the Agricultural Commission the Special Irrigation Division Hydraulic Testing Station at the Effluent Farm, where the various measuring and regulating devices in use all over India can be seen.

QUESTION 9.—SOILS.—(*a*) (*i*) The area of soils rendered unculturable by water-logging and salt efflorescence on the various canals in the Bombay Deccan is approximately 30,000 acres.

Drainage schemes have been completed or are in hand to protect 10,000 acres.

The preparation of estimates for further drainage schemes to protect 11,000 acres are nearing completion. The total area needing protection exceeds 150,000 acres. The question of how to finance such schemes is still under consideration; but no matter how the money is finally recovered the capital must be provided by Government in the first instance, because drainage should be done to prevent damage occurring. If it is delayed till the physical state of the soil is seriously damaged reclamation may be impossible, and will at any rate be much more expensive than if the work were done at once. Government should therefore provide funds now to enable a comprehensive scheme of drainage to be carried out in the Deccan Canals tracts.

The great secret of soil fertility in irrigated tracts is to keep the soil continuously in a good state of tilth.

The cultivators attempt to do this by putting on enormous quantities of manure. A large part of this manure goes towards neutralising the evil effects of over-watering, or is washed into the subsoil without doing any good.

Less than half the manure at present used by the cultivators would suffice if irrigation water were used with care. The trouble is that over-watering and over-manuring will somewhat increase the growth of a cane crop; but within a very short time soil deterioration sets in, and to counteract this deterioration still more manure is added and so the soil goes from bad to worse.

No amount of preaching will overcome over-watering, because immediate gain is more attractive to the cultivators than a delayed reward especially when the former needs a minimum of care while the latter necessitates constant watching and effort on their part. Even had the Agricultural Department constantly preached the use of only 75″ depth of water for cane they would have had no success, but when the Irrigation Department have perfected their methods of distribution it will be in the interests of the cultivators to extend their area with the restricted supply of water and we may confidently look forward to a 30 per cent. increase in cane area using the same supply of water with a reduction in cost of production; and damage to the physical state of the soil.

(*a*) (*ii*) In deep areas where the black soil overlies a layer of impermeable *chopan*, drainage will reduce the subsoil water level and so prevent further damage; but will not reclaim the damaged soil.

The damage in such cases is due to alkali salts (sulphate and chloride of sodium).

The soil is naturally of a heavy type (clay soil—like regur) and is deflocculated by the presence of soluble salts. Hence special soil treatments are required in this case. Several lines of investigations are in progress, which show that only sulphatic treatments are successful.

The method which seems to hold out the greatest promise of success is (1) by leaching out the alkali salts after dividing the damaged area into a number of suitable level plots, followed by constant flooding (3″ depth of water being maintained for about three months). Gypsum should be applied in the later stages of flooding—at the rate of 2 tons (Rs. 50) per acre, which will effectively leach out the alkali salts.

(2) After this treatment, flocculation of the surface soil can be brought about by the use of bulky or green manures in conjunction with sulphur. The latter (½ a ton per acre—Rs. 60) hastens the process of granulation and causes the soil to darken in colour indicating physical improvement.

(*b*) (*i*) The shallow soft murum areas on the Effluent Farm at Hadapsar has been turned into high grade sugarcane land by a system of ploughing, manuring, cropping and irrigation. The Special Irrigation Division is investigating the possibility of carrying out reclamation schemes of this sort in the canal tracts on a large scale. The cost of such reclamation will be small —as cropping is an essential part of the method—and land so reclaimed will not merely profit the owners enormously but will also improve the duty (and hence the revenue) of the canals, because soft murum areas are usually situated along the canals, so that losses of water in the distributary channels will be reduced.

Lands at first water-logged by the canals often dry out and as a consequence are reclaimed naturally.

While (*ii*) deep soil areas have in many cases become salt affected due to the rise of subsoil water. These very rarely improve again unless drainage and reclamation is carried out.

(*c*) So far as drainage is concerned, this can only be done and maintained satisfactorily by Government, because if neglected, drains are likely to become useless in a few months.

QUESTION 10.—FERTILISERS.—(*a*) Poona Sewage Effluent—after dilution with canal water—is being distributed on Distributary No. 5 of the Mutha Right Bank Canal for irrigation.

The charge for the effluent, apart from the water, is Rs. 120 per acre of cane. The dose given contains 300 lbs. of nitrogen.

The nitrogen as delivered to the field is not in the form of nitrates or nitrites; but ammonia.

Experiments show that 300 lbs. of nitrogen in the form of effluent is of equal value to 200 lbs. of nitrogen in the usual standard manures.

No bad effects to the soil have followed the use of effluent. In fact the shallow soils of this area have distinctly improved, since it was introduced.

At present the annual area of cane to which effluent is given is 390 acres; but it is eventually intended to extend the area to 1,700 acres.

Experiments as to the best dose show that 225 lbs. of effluent nitrogen are sufficient with careful irrigation, being equal to the standard Manjri manuring of 150 lbs. nitrogen (in the form of oil-cake, fish, ammonium sulphate).

Effluent is of little or no value for the first 6 weeks after plantation and must be cut off three months before the cane is to be crushed, as otherwise the cane will not ripen and continues to grow causing "lodging."

Almost all crops thrive on effluent; but sugarcane is much the most suitable because cane requires large quantities and so the distance to which the effluent has to be distributed is reduced and losses in distribution cut down.

Where conditions favour its use this exceedingly valuable manure should not be wasted.

Mr. R. G. SULE, Executive Engineer, Ahmednagar.

Replies to the Questionnaire.

QUESTION 2.—(*ii*) Yes. An extension of agricultural education is necessary particularly in the canal areas. At present there is only one school at Loni in the Poona district, which is situated in the irrigated tract. Multiplication of such schools is essential to train the young agriculturist to a better method of agricultural development. The present method of imitation and experience is one which is very slow. There is hardly any initiative (probably there are other reasons also for want of initiative but this is one of them), and it is expected that a mind trained to understand the causes and their effects may bring about a quicker development than is possible at present.

(*v*) So far as is seen at present, a greater portion of these trained people are seen in Government service than outside, and this leads one to believe that in most cases the incentive to the study of agriculture, is the opportunity it offers of entering into a technical branch of Government service, where such training is essential.

But a change is coming slowly, and I have recently come across two or three instances where agricultural graduates from Poona Agricultural College have started farming on the Pravara Canals.

QUESTION 3.—(*a*) Practical results as achieved by private agriculturists, influence the cultivator a great deal regarding the possibilities of any improvement.

(*b*) Private influential cultivators should be induced to carry out the demonstrations on their own farms with only just the necessary guidance from Government as is essential to bring out the main facts to be demonstrated.

QUESTION 4.—(*c*) (*ii*) Generally, yes. But extension of railways in the irrigated tract is necessary to enable the green produce to be taken to the nearest market as quickly as possible. As an instance, a railway line from Belapur on the Dhond-Manmad line, to any station near Nasik on the Great Indian Peninsula Railway which would open up the tracts now irrigated by the Godavari and Pravara Canals and would be a very great help in the development of these tracts.

(*c*) (*iii*) Generally, yes. But here also there is a scope and demand for further extension in the irrigated tract. It is expected that in a very short time, motor transport will be fairly common, and a system of feeder roads, connecting by a trunk road to the nearest railway station would help the cultivators very much.

QUESTION 5.—(*a*) There is no doubt that some steps are necessary for the better financing of agricultural operations. What is really wanted is the easier terms of a Government advance, with the easy facilities of getting it quickly as from a private financier. The difficulty is to get it. Probably rural banks may offer some solution but I would venture no opinion about it.

N.B.—(Replies refer to the Deccan.)

QUESTION 8.—(*a*) (*i*) I would advocate the adoption of new irrigation schemes in the districts of Ahmednagar, Sholapur, Bijapur, Poona (*i.e.*, in the parts of the Deccan which are always badly affected by famine). The schemes that are possible in this tract are mostly investigated by Mr. Beale. I would also suggest further extensions of the existing systems wherever it is possible. Non-perennial canals on a large scale are not likely to be a paying proposition in the Deccan. Even the perennial canals advocated above, will require careful investigations regarding their financial aspects. In considering the financial aspect due weight has to be given to the protective value of the work.

To make the adoption of the above works possible, it is necessary to find out means of making them pay their way. The works constructed so far, are not doing so. Means will have to be found to make them do so (cess, etc.). Unless this is done work on the future projects is likely to be held up.

(*a*) (*ii*) In areas where improvement in agricultural conditions by big irrigation works is not possible, irrigation by small tanks, should be considered and adopted. Financially the working of small tanks may not work out, even as well as the bigger irrigation projects. But they have their own advantages. They can be scattered over the country at suitable places. The areas irrigated by them being small, their requirements of labour and manure can be easily drawn from the adjoining unirrigated tracts. In famine times these small patches under irrigation may be able to supply fodder etc., and bring relief to the adjoining areas.

These small tanks will be very useful in producing a better quality of seasonal crops, and some garden crops to meet the requirements of the locality.

(*a*) (*iii*) The introduction of well-irrigation is strongly advocated in all areas, in the irrigation tract, where the subsoil water level is fairly high, say within 10′ from the ground level. I would advocate, even this, that in the irrigated tract where the water level is as high as within 10′ no irrigation by direct flow from canal should be given, and the cultivator made to use the subsoil water which is so easily available. Wells in such tracts should be encouraged as far as possible.

(*b*) Yes, as far as it goes. I would very much like to adopt the system of distributing water by measure by introducing modules. I understand, distribution by modules, is being experimented with on some canals and I believe when a practical system of modules is worked out, it will mark a great improvement in the present system of distribution.

QUESTION 9.—(*b*) (*i*) Light soils (overlying soft murum) have shown marked improvements when carefully worked and brought under irrigation. Green manuring seemed to have great effect on their texture.

Instance.—Some of the lands in the Belapur Company's areas, and at other places on the Pravara Canals.

(*b*) (*ii*) Heavy soils under constant irrigation show a tendency to deteriorate. When first brought under irrigation some of these lands allow 3 (or even more in some cases) crops of cane in succession. But after the tract is under irrigation for some time, the lands are not capable of giving good yields under constant irrigation, and need more rest.

Example.—In the older canals in the Poona Division, I understand that they cannot get good ratoon crops of cane. On the Godavari for the first few years after its start, the irrigators could easily get two ratoons from their cane crops. Now they complain that from the old lands (which have been irrigated for sometime) they cannot get the second ratoon so well. On the Pravara where the irrigation is started only 5 years back, the 2nd ratoon crop of cane is still quite a good crop.

QUESTION 10.—(*a*) In the irrigated tracts, the importance of manure is well realised by the irrigators. The difficulty is about getting it cheap. Greater use of these manures or fertilisers could be profitably made only if these could be had more cheaply. Advice to the cultivators as to the manurial values of the various manures and fertilisers, and their selection to suit the various crops would be useful.

(*c*) I would like to take the help of the various Irrigators' or Cultivators' Associations, and popularise the fertilisers through the help of these bodies.

(*d*) All the irrigated areas where cane is being grown (Godavari and Pravara).

(*f*) To make other fuel as easily and cheaply available. To encourage *babul* plantation where possible.

QUESTION 11.—(*a*) and (*b*) The improvements of existing crops and the introduction of new crops including fodder crops, are the two essential points

which require very careful attention in the irrigated areas and it is on these, that the success of the irrigation policy in the Deccan will ultimately depend. At present the main crops grown on these canals are:—

(1) Cane; (2) *juari;* (3) *bajri;* (4) wheat; and (5) ground-nut (cotton is just being introduced and is in the experimental stage, so also turmeric).

Of these, cane is the only crop which is given very careful attention by the cultivator. The other crops are raised mainly to utilise the residual effect of the manure from the cane field. The attention given to these crops is very passing and cursory. It is quite necessary to find out if any other crops with better food value or money value, can be introduced to replace some of these. I have rarely seen a man growing a *bajri* crop, or a large area of *juari* crop on his well. But under the canal, the demand for the seasonal crops in the *kharif* and *rabi* seasons is mostly made up of these crops. A man, with a well, does not think it worth his while, to raise a *bajri* crop on his well. He knows that if he has to lift his water, he may as well as utilise it for something which is more beneficial to him, and he probably grows some sweet potatoes or vegetables, or chillies, or any other thing that brings him a better return. Regarding *juari* also, he just tries to raise a crop (if he at all raises any) to give him enough fodder for his bullocks and enough corn for his family, but he would not raise a *juari* crop on well-irrigation to sell it. If he has to sell the crop he would always grow something which is much more paying than *juari*. But on the canals these are main seasonal crops for which water is demanded. I believe, an assured water-supply deserves to be better utilised. About the wheat crop on the canal, it also does not get the same attention, as a crop raised on well water.

It is necessary that these crops should be replaced as far as possible by other crops which can bring a much better return. But if from an agricultural point of view it is quite essential, that these crops should be grown in the irrigated tract on canal water, then investigation is necessary to see if the quality of crops can be improved by any means possible. More careful cultivation and better seed are necessary.

"Better seed" as an essential factor of successful cultivation, also needs attention. A number of distributing centres of good seed in the canal tract would be of very great benefit in improving the quality and quantity of crop raised. Probably the method that was adopted in introducing N. R. cotton in the Deccan, would suit very well.

(*c*) Efforts are being made by some progressive cultivators to introduce cotton, tobacco, turmeric, onions, etc., in the irrigated tract. But it is too early to say if they have been very successful. But they promise well. Fruit culture is also finding favour with some—particularly the well-to-do cultivators. In fruit culture the cultivator has to wait for a few years before he can expect a return and so the poor cultivator is slow in adopting it. From the present rate of progress of fruit culture on the canals, it seems, that that branch of agriculture will thrive very well.

Mr. C. C. INGLIS and Mr. R. G. SULE.

Oral Evidence.

5237. *The Chairman :* Mr. Inglis, you are Executive Engineer of the Special Irrigation Division?—Yes.

5238. And Mr. Sule, you are also Executive Engineer?—Yes.

5239. I understand that it is agreeable to you two gentlemen to be heard together by the Commission, and of course it is to be understood that if one of you is in disagreement with the views expressed by the other, he will say so. I propose to conduct the enquiry on Mr. Inglis' memorandum. I should like, at this stage, to say that the Commission is greatly obliged both to Mr. Inglis and to Mr. Sule for the trouble which they have taken to give us their extremely useful written evidence. We have read these through, and perhaps I may ask, at the outset, whether either of you desire to make any statement in amplification of his memorandum or whether you would like at once to proceed by way of question and answer. Do you wish to make any statement, Mr. Inglis?—No.

5240. And you, Mr. Sule?—No.

5241. Now, in this memorandum, there is a very interesting presentment of the view that the irrigation aspect of cultivation in irrigated areas does not receive quite the attention that it should in presenting matters of cultivation and tillage to the cultivator?—Yes.

5242. I think I may say that the paragraphs in question are extremely clear, and whether readers agree or do not agree with the conceptions there set down, after reading it through they ought to be perfectly familiar with Mr. Inglis' views. I should like, at the outset, to ask you whether you wish to suggest any machinery for the closer co-ordination of these two departments?—I think it is almost impossible for the two departments to work separately and work closely enough together for the purpose intended. The difficulty is that we do not understand each other's standpoint. I was Executive Engineer in charge of Irrigation for 12 years, before I took up this special work, and when I took it on, I found I knew very little about the agricultural side, and I found all through that the difficulty of the Agricultural Department is that they do not understand our side of the question. That cannot be remedied unless you get the two men working together, as they do under me. I have got irrigation men and agricultural men from the Agricultural College working under me. I hear both sides of the question, and then we try and work out a mean way to attain our results; and we have found all the time, even after so many years, new points cropping up which the other department has not understood or realised; and therefore you want something much closer than the two departments working together. Of course, I am referring primarily to the Deccan. The conditions are not the same in Northern India.

5243. I wonder whether you can conceive of any machinery which could be generally applied all over India to secure better co-ordination between the two departments?—I do not think that there is any alternative but to work under one department or the other.

5244. You think the whole volume of agricultural and irrigation matters should be placed under one department?—I should like to see only one department in irrigated tracts. I think the Irrigation Department are quite as much in the wrong, or misunderstand the other side of the question quite as much as the Agricultural Department. Neither of us understand the other side of the question.

5245. I can quite appreciate your view. You are not referring to agriculture in the dry tracts?—Yes. There is only about 1 per cent. of the Bombay-Deccan that is irrigated under Government canals. It is a very small area, and it is rather, I think, left out in the cold.

5246. Do you think there should be a special joint department for this 1 per cent.?—For the irrigated tract only, of the Deccan.

5247. Who is to be responsible for that joint control?—I think the Irrigation Department must be responsible, because they are the most affected and the most interested.

5248. Do you ever meet the Agricultural Department round a table?—Yes, frequently.

5249. On what occasions?—Lately, on the question of water-rates.

5250. You have had special meetings to settle a particular point?—Yes.

5251. What I may call statutory meetings?—Yes.

5252. Annual meetings?—No. As a matter of fact, we do meet almost every year; or the Revenue Department, the Irrigation Department and the Agricultural Department meet practically every year; but it is not definitely laid down that they must meet. But at those meetings we are mostly talking at cross purposes.

5253. Do representatives of your department attend the Provincial Board of Agriculture?—I have personally done so, I think, on every occasion. There are generally one or two of us.

5254. Has Mr. Sule done so?—No. I have been there on three or four occasions; I do not think anybody else in the department has done so.

5255. *Sir Chunilal Mehta:* Has not Mr. Gordon done so?—There are generally one or two of us; I cannot remember. Generally at these meetings, they are purely agricultural questions, as opposed to irrigation agriculture. It is a totally different subject and it is generally altogether outside our interests.

5256. *The Chairman:* I quite appreciate that, but short of the birth of this new joint department to deal with the Deccan, it does appear to me that closer touch by means of regular attendance at the Provincial Board of Agriculture, which might meet more often than does the present Board, would be an advantage?—I have attended most of these meetings, and I know more about agriculture than most of the people there, but there is very little that touches agriculture in the irrigation tracts, discussed at those meetings.

5257. Have you no hope of educating the Agricultural Department?—No. I have no hope of educating the Irrigation Department either. We are at cross purposes, one with the other.

5258. I quite appreciate it; they are at cross purposes one with the other. I want to get to the root of your views. On page 227, you say, "Irrigation practice should be based entirely on the greatest good of the greatest number, not on the greatest good of the individual cultivator." Is that part in inverted commas as being a quotation from some other document?—No.

5259. I take it that from the angle of any one cultivator there is an ideal and that ideal is to obtain the highest possible yield from his own land?—Per acre. The limiting factor is his area, not his water.

5260. It is however a fact, or is it not that practices in relation to the irrigation of a particular plot which may have the effect of substantially enhancing the yield in any one year will not increase the yield over a period of years?—With sugarcane that is so, because you will damage the soil.

5261. Presumably, the cultivator is hardly disposed, even to that extent, to take a long view?—No, and that is why we must adopt indirect methods instead of direct methods.

5262. To what extent are you in touch with individual cultivators?—In connection with their methods of cultivation, you mean?

5263. Yes?—The Canal Officer is in almost daily touch. He goes into the fields, sees the people, and knows their methods; our distribution of water is based on their methods, and our object is by indirect methods to induce them to improve their methods.

5264. Under existing conditions, is it part of your responsibility to explain to the cultivator that he must forego a large yield in any one year, partly for the sake of his own yield in future and partly for the sake of the general well-being of the neighbourhood?—It is not part of our work now, but the officers inform them accordingly; that is to say, I have told all the cultivators who come to meet me that my motto is the greatest good of the greatest number. That is fully appreciated. It is not our work to do so, but that is what actually in practice we do for them.

5265. *Sir Henry Lawrence:* Do you do that as an executive officer in charge of an irrigation canal or in virtue of your special irrigational research work?—I am speaking of my own case, which includes work in all the irrigated districts in the Deccan. That is to say, when the blocks were introduced all this had to be explained in detail. What seemed to the cultivators to be quite unfair had to be explained to them. It was explained to them that it was for the benefit of the mass of the cultivators. At first they thought we were making these rules simply to give them trouble, and it was explained to them in detail that all the rules were to force indirectly an improvement of the methods, so that the greatest number of people would get the advantage, and they have appreciated it.

5266. You have authority to alter the distribution of water?—Yes, with the Superintending Engineer's permission.

5267. You are not the officer directly responsible?—No.

5268. *The Chairman:* You, I take it, up to a certain point, can, by withholding the water, ensure that your views shall take effect?—Yes.

5269. Of course the Agricultural Department are not in that position?—No, that is my point.

5270. Do you think you can shoulder the whole responsibility in this 1 per cent. of the Deccan for agricultural administration keeping in as close and sympathetic touch with the cultivators as is the Agricultural Department at this moment, and also hold yourself responsible for withholding water?—Yes, because the advantage will be obvious to the cultivators. When they get less water, their crops will improve.

5271. You expect a difficult time I suppose at the outset of this experiment?—No, the more I have gone into this work, and the more I have spoken to the people, the easier I find it. The bigger cultivators are now getting educated up. We understand their point of view, and they understand ours, and therefore we talk about things and understand each other's difficulties. There is no question that the benefit to the cultivators if water was reduced would be enormous. Even they themselves will tell you that they know they are damaging their field by over-watering.

5272. And yet they have not got the strength of will to resist the temptation?—The trouble is that the big cultivators do not do it themselves. They have low-paid workers who are not skilled, to do it. It is considered rather undignified for a big sugarcane cultivator to go out into his fields and look after them himself, he engages help. Our trouble is not with the big owner and the big cultivator. The trouble is that he leaves the work to his servants, and the servants have no particular interest in conserving the water.

5273. How about the small cultivator?—The smaller cultivator is rather like the servants; he is not educated sufficiently to realise the effects of his practice.

5274. You see, my point is that the certain amount of unpopularity that attaches in this matter to the Irrigation Department is inevitable. I was wondering, if that is so, whether it would not be a little difficult for you to withhold water and keep in close and sympathetic touch with the cultivators?—I think a good deal of the unpopularity is there because the Agricultural Department are preaching other doctrines in the same area, other methods than we recommend.

5275. On page 228 of your note, Mr. Inglis, you say, "In the Presidency and also in Sind there should be one Central Irrigation Research Station with

a farm where both irrigation and agricultural research should be carried on concurrently." What irrigation research is being carried on in the Presidency and Sind?—None in Sind, and in the Presidency none beyond what you saw to-day.

5276. In addition you suggest that there should be a Central All-India Organisation for co-ordinating the work of the various Provinces and giving expert advice. Would you suggest who should be responsible for the direction of that Central Research Station?—If the Public Works Department is the responsible body of the Province it will be under the Public Works in the Central Organisation too.

5277. And responsible directly to the Government of India?—Yes. At the present time in several Provinces exactly the same work is being done and we do not know about it.

5278. While on the question of Central Organisation, do you think matters are satisfactory at the moment in respect of such machinery as for settling differences of view on irrigational matters between Province and Province?—So far as I know there is practically no Central Government at all for irrigation.

5279. Do you think there ought to be?—Yes.

5280. What form do you think it might take?—I should like to think about that.

5281. I wanted to know whether you had any scheme in mind?—No, I have not, I am afraid.

5282. On page 229, you say, "Demonstration plots should be restricted to fields of capable cultivators and 'splash' should be avoided until the demonstration has been proved to be entirely successful." In your experience is the Agricultural Department in the habit of advertising particular methods of varieties before they have satisfied themselves that they are suitable for the districts in which they are to be used?—In the irrigated tracts, yes.

5283. You do not think the Agricultural Department makes sufficiently close experiment?—It is the same problem over again, they do not know the difficulties. They do not know the irrigation limitations.

5284. *Dr. Hyder:* What do you mean by irrigation limitations?—The Agricultural Department are rather inclined to think that we should give water at any time a cultivator wants it. The distribution of water in the Deccan is extremely complicated. The Canal Officer is just in the same position as a General in charge of a big army; he has to regulate the supply of water according to the demands and needs of a large number of cultivators. Water is coming down the channel, and he cannot accelerate its rate; and he cannot slow it down. There is a certain amount of available water and it has to be distributed—not by any rule but where it is required most. He has to direct his water so as to do the greatest good. It is not like the Punjab where the demand is uniform. In the Deccan it is entirely different. It is an exceedingly difficult hydraulic problem. He has to meet the demand wherever it may be. If a mistake is made it may take a week before he can get the canal flowing again normally.

5285. *The Chairman:* What is the particular irrigational tract you are most familiar with?—I know all the Deccan tracts very well indeed. The Nira Left Bank Canal is the most advanced.

5286. How long does it take for the water from the storage reservoir to get to the lower part of the commanded area?—About four days, and in the Pravara Canals it takes about 6 days.

5287. So, you have to see ahead for six days?—Yes, six days ahead, and if we get a famine year we have to conserve the water and we have to look as long as two years ahead.

5288. On page 230 you discuss the question of roads. Do you wish to suggest that the mileage of roads in charge of the canal staff should be increased?—I think all the roads in the canal tracts ought to be under the

canal staff. We have them under the canal staff in certain cases, and they are a success, but in most cases the roads are not in charge of the Irrigation Officer.

5289. On page 230, you say, "In irrigated tracts fragmentation can be checked, and consolidation sometimes effected, by refusing irrigation water to fields which are less than a fixed minimum area; because if the land is excluded from irrigation its value drops and hence it is to the interest of the owner to sell his land rather than let it drop out of irrigation." Who decides what is to be the fixed minimum area?—At the present time the only minimum is that a block shall not be less than one and a half acres. Our unit area for irrigation is 20 *gunthas;* that is half an acre, and they have to have 3 times that.

5290. I suppose if two owners of contiguous fragmented parcels decide to work together you would regard their holding as one?—Yes, provided it was put in the Government register. (Record of Rights.)

5291. You suggest that the minimum area might be put at six acres?—It would vary with different canals. Mr. Sule would like to see it more on new canals, say, 10 or 12 acres. On old canals you probably could not go beyond 6 acres because on the old canals fragmentation has already taken place to a considerable extent.

5292. In irrigation areas where existing rights do not arise, that is to say, where by irrigation you make fertile an area which before you irrigated was uncultivable, would you advocate the insertion of restrictive clauses in the lease compelling the cultivators to adopt certain methods?—That does not arise in the Deccan because the whole of the land is occupied.

5293. You have no experience of that?—Not here. In Sind, certainly.

5294. You would also advocate compulsion in matters of improved crop varieties being planted?—Yes.

5295. You would go in for a more or less complete system of control in all those ways?—Yes.

5296. Is that done at all in Sind?—Not that I know of. It has been done in some of the Indian States I know. I am told that they have enforced the growing of only one variety of cotton, but I do not think anything of that kind has been done in Sind.

5297. You do not think it would be resented by public opinion or that the restrictions would render the land less attractive to possible tenants?—I do not think any tenant will stand out against his own interests.

5298. On page 231, you say, "Under the Deccan conditions it has always been found to be impossible to fix periods of flow owing to the enormous variations in demand which occur from time to time. The Special Irrigation Division has been studying this problem for some years and it is believed that a method can be devised to fix the supply with some elasticity as to the time when the supply will be given. If this is successful the cultivator will be given a definite supply and allowed to irrigate as large an area as he can with the water supplied." Is that based on the working principle of giving a man rather less water than the whole of his land requires?—Yes.

5299. So as to encourage him to make what he has so far as he can?—Yes, because at present the area is fixed and he is allowed to take as much water as he feels inclined to take. We want to cut down the supply so that if he spreads his water as well as possible he will be able to cover his whole area, but not otherwise.

5300. *Dr. Hyder:* In that case, would you base the irrigation rates on the area or on the quantity of water supplied?—I would distribute water by measurement and not sell water by volume unless we get some measuring device which cannot be tampered with. The trouble is that under the present forms of measurement it is possible to increase your water-supply without

being etected. The unscrupulous men who increase their supply would not pay for the extra supply. The result will be everybody else would suffer. We do not want to put a temptation in the way of th eunscrupulous.

5301. In that case would you carry your rates according to the area and the kind of crop grown?—Yes. I have got a note on that.

5302. *The Chairman:* Are you going to put that in?—Yes.

5303. Will you tell us what it is?—I will read it* out, if I may.

5304. *Mr. Calvert:* That only applies locally to a particular canal?—No; it is the principle in Northern India.

5305. You sell by cusecs?—It cannot be done, because the modules will be tampered with. There is no module in the world which measures water; it only gives the fluctuating discharge according to the water level in the distributary. If the distributary silts or scours, more or less water will go down that outlet and no account is taken of it; it is not measured. You must have either a meter or a module before you can measure your discharge. It can be measured within 5 or 10 per cent.

5306. *The Chairman:* Do you think the time is in sight when the distribution of water on a volumetric basis will be practicable in the country with which you are familiar?—Yes, I do; I hope to do it within ten years.

5307. You think it will come about within ten years?—Yes.

5308. What are the essentials before you can bring that method into practice?—To persuade the Irrigation Department to take it up.

5309. You think there are no practical difficulties in the way?—Only individual difficulties. It is ten years now since I started this, and it is working now on one distributary. In the last 18 months I have increased the duty for cane from 50 to 65 on that distributary. That is simply by distributing the water much more carefully so that the cultivator knows when he is going to get it and how much he is going to get.

5310. Does the distribution of water on a volumetric basis presuppose some co-ordination, co-operative or otherwise, between the cultivators to regulate the flow as between themselves?—It makes it very much easier if they do and we prefer them to do that, but at the present time they cannot do it. You can work to a definite programme much better if you have a known discharge flowing for a known time.

5311. You do not contemplate having a water-measuring machine for the land of each individual cultivator?—There is no such thing at present. The cost would in any case be prohibitive.

5312. I notice that you advocate immediate attention to drainage whenever land is irrigated?—Yes; otherwise the land becomes damaged, and the intensity of the damage is about proportional to the time that the land is damaged. If land has been damaged for five years it would take five times as long to reclaim it as it would if it were damaged only for one year. If, therefore, you do not drain the land immediately the canal is opened it may not be possible to reclaim the land at all; at least, it would be very much more expensive and difficult to do so.

5313. Is the damage in this area due to water-logging without hypersalinity, or is hypersalinity the result of water-logging?—There are certain water-logged areas but these are easy to deal with. Where there is difficulty is where there is salt efflorescence due to a high subsoil water level.

5314. You do get a water-logged condition without efflorescence?—Yes.

5315. Do you think it is only a question of time before efflorescence appears?—No; there are some soils that will never get salty.

5316. At the same time you can have efflorescence without water-logging?—Without water at the surface, yes; but you must have water within four feet of the surface.

---

* Appendix: Sale of Water by Measurement.

5317. I should like to ask you Mr. Sule one question. In your memorandum on page 234, you say that extension of agricultural education is necessary particularly in the canal areas. At present there is only one school at Loni in the irrigated tract. Have you any personal experience of the school at Loni?—(Mr. Sule) No.

5318. Do you know whether the school of the Loni type has made any impression on the cultivators in the immediate neighbourhood, which is an irrigated one?—I do not know.

5319. What you are concerned with is, therefore, the spreading of accurate information about the needs of agriculture in irrigated areas by the best means that can be devised?—Yes.

5320. You strongly advocate the method of demonstration by which the cultivators are encouraged to carry out improvements by experiments on their own lands?—Yes.

5321. The value of that being that the other cultivators and the cultivator in question are thereby convinced that it is really the method and not merely the expenditure of Government monies that has produced the improvement?—Yes.

5322. Have you any experience of attempting to get cultivators to adopt green manure?—Yes; that is now being taken up.

5323. Does that mean that in every case there must be a whole year fallow?—No. In the case of sugarcane what they do is to put in green manure in the cold weather, and after three months growth they plough it up and leave it there and in January or February they put in the sugarcane.

5324. It means giving up one crop of sugarcane?—No, they can put the cane in after one cold weather crop.

5325. If they do it after one cold weather crop, does it mean an important sacrifice of money to the cultivator for the moment?—It means some sacrifice, but not much.

5326. Have you ever known of cultivators adopting the practice of green manuring?—Yes.

5327. Do many of them use it?—Not many. Some of the progressive cultivators do it.

5328. Do those who use it continue its use once they have tried it?—I think when once they have got some knowledge of the thing they always try to keep to it.

5329. Is it usually the larger cultivators who do it?—Yes.

5330. The small man thinks he can hardly afford to do it?—They do not realise the importance of the thing.

5331. Have you had experience of propaganda carried on by co-operative societies?—No.

5332. Are there any co-operative organisations which work in the area in which you are most familiar?—There are one or two co-operative societies.

5333. Are they doing any propaganda work at all as far as cultivation practices go?—They are doing something, but it is hardly worth mentioning.

5334. Meantime I suppose that an Irrigation Officer says very little about methods of cultivation when he is going round to cultivators?—I think he says quite a good deal about it.

5335. When he goes round he says a good deal, you think, about improved methods of agriculture?—When he talks to the people about their irrigational difficulties the question of other agricultural matters always comes up.

5336. So that an Irrigation Officer has an opportunity when he goes round to put matters from the point of view of irrigated agriculture as well as from what Mr. Inglis would call the purely agricultural angle?—Yes.

5337. I do not know whether you agree in the main with the points put forward by Mr. Inglis?—I agree with him in the main.

5338. *Sir Henry Lawrence:* You gave us some figures with regard to the total cost of the canals in the Deccan and the return that Government get from them? What is the capital expenditure and present increment of the canals at present working?—(Mr. Inglis) The total expenditure on Nira Left Bank Canal was 63 lakhs; and the revenue we are getting from it now is 9 to 10 lakhs.

5339. That is paying well?—That is the only canal in the Deccan that is paying well. Mr. Sule can give you the figures for the newer canals.

5340. As regards the other canals?—(Mr. Sule) I can give only rough figures: 102 lakhs for the Godavari Canal and 138 lakhs for the Pravara Canal. That is the capital expenditure.

5341. What is the return to Government?—5 lakhs from the Godavari Canal and nearly the same from the Pravara. A gross return of 4 to 5 per cent.

5342. Are there any canals which pay less than that?—(Mr. Inglis) The Mutha canal also pays about 4 per cent. There are no other canals in the Deccan yet. The Nira Right Bank Canal has only just been opened, so that we have no figures for that.

5343. What has been the expenditure on that?—When completed it will be 4½ crores, roughly.

5344. The expenditure on that canal is more than the expenditure on all the other canals put together?—Yes; it is a very expensive canal.

5345. What is the return expected?—I cannot give the figure off-hand.

5346. Will you please find it out?—I will try to do so. Roughly it is anticipated to pay 2½ to 3 per cent., I believe.

Mr. Calvert: I have asked Mr. Harrison for this information.

5347. *Sir Henry Lawrence:* For sometime there has been a proposal to make the Irrigation Department give a better return by charging an occupier's rent or something of that sort—an irrigation cess. Have you had anything to do with preparing proposals for that?—Yes.

5348. What is the character of those proposals?—The areas under the canals are to be divided into three categories; those suitable for sugarcane, those suitable for *rabi*, and monsoon crops; and the cess was to vary from a maximum of Rs. 14 to Rs. 6 for sugarcane to Rs. 6 to Rs. 2 for *rabi* and a uniform rate of Rs. 2 for monsoon areas. The idea of that was that at present a large number of cultivators do not attempt to use irrigation water. If they have suitable land and have to pay that cess they will have to do something to meet the cost, and the idea is that if they do not cultivate it themselves they will let it out to tenants who will.

5349. At present the general tax-payer is paying for the benefit of the irrigated area cultivators something like 50 lakhs of rupees a year?—Yes.

5350. It is hoped that you will be able to recover this for the benefit of the general tax-payer by this special legislation?—Part of it.

5351. Only part of it?—Yes.

5352. Irrigation in the Deccan must always be a losing concern for the State?—At present rates, yes, but when the water cess is introduced it may be different.

5353. Even then we cannot recover the whole of the fifty lakhs, which Government is paying out on the canals?—It is anticipated eventually that with the cess all the existing canals will pay 6 per cent., and so pay their way.

5354. You mentioned the difference in the rates for sugarcane and *rabi* cultivation. Can you tell us what the rates are on sugarcane at present?—It is Rs. 45 per acre for sugarcane.

5355. And for monsoon cultivation?—Rs. 4 per acre.

5356. And *rabi* cultivation?—Rs. 8 per acre.

5357. In the whole of the Deccan, the area under sugarcane is roughly how many thousand acres?—Just over 30,000.

5358. Has that increased in recent years?—As the new canals were opened up, the area increased. The Pravara Canal was only opened 3 or 4 years ago, and the cane area there is gradually increasing.

5359. The success of the irrigation canals depends on the area under sugarcane?—Unless some other new crops can be found to take its place. The advantage of sugarcane over any other crop is the great amount of water it takes in a restricted area, giving a very big revenue return. Cotton might pay as well were it not for the fact that we would have to spread the water over such an enormous area that the losses on distribution would be too great.

5360. Is there any indication that sugarcane cultivation is decreasing following the recent fall in the price of sugar?—No. If anything it is increasing slightly each year.

5361. The present price of *gul* is not favourable to cultivators?—We believe that the *gul* market is almost flooded now, and that with any further opening of canals it will not be possible to sell all the *gul;* in other words, the idea is that the limit of sugarcane growing in the Deccan has almost been reached, unless sugar instead of *gul* can be made out of the cane.

5362. It has not been your experience that last year cultivators refused to grow sugarcane owing to the bad price obtainable for the crop?—No.

5363. Were not the rates for sugarcane decreased in consequence of that?—The rate has been reduced this year. It had been raised to Rs. 66 per acre, and it has now been brought down again to Rs. 45.

5364. Your principal difference with the Agricultural Department relates, I believe, to the amount of water to be used for cane. They advocate 125 and you 75 inches?—I think the differences of opinion are largely misunderstandings. I do advocate less water than the Agricultural Department.

5365. Is the difference as great as between 75 and 125?—I am not sure what the Agricultural Department advocate, but they have stated that my figure is rather too low.

5366. What do you advocate?—75 to 80 inches.

5367. What is the maximum tonnage per acre you expect to get with 75 inches?—We got 66 tons last year.

5368. Where did you get that?—At the effluent farm, not on effluent but on 150 lbs. nitrogen in the form of fish cake and ammonium sulphate.

5369. A very satisfactory outturn?—That was the maximum; the average was 44 tons.

5370. I did not altogether follow your statement about those modules? They have something they call an A. P. M. in the Punjab. Have you tried that here?—Yes, we have got it.

5371. It is satisfactory?—Very satisfactory, but no more so than Kirkpatrick's module which we have in Sind, and it is probably easier to tamper with.

5372. I asked Mr. Sangster about that and he said it could not be done?—An expert hydraulic man could do it. It can be done; there is a method for doing it which I will not give away. Any semi-module can be tampered with to a certain extent if you only know how to do it.

5373. I am not clear as to the meaning of your paragraph on page 232 in which you refer to enhancing the revenue of canals. Do you advocate sugarcane being cultivated on shallow soft murum areas rather than on deep soil?—No; I propose to make those shallow soft murum areas into good soil about 18 inches deep, and then allow them to grow sugarcane on that improved soil.

5374. That would give you a natural drainage?—Yes.

5375. And prevent water-logging and saline efflorescence?—Yes. The soil is much more suitable for sugarcane in reasonably shallow than in deep areas.

5376. *Sir Ganga Ram:* How many years' service have you?—Twenty-one.

5377. How much of that have you spent in Bombay?—I have spent 4½ years in Sind and the remainder on irrigation work in Bombay.

5378. Have you ever visited the Punjab irrigation works?—Several times. I know Mr. Crump, Mr. Wilsdon and Mr. Lindley intimately, and all their work.

5379. Have you some system of control by which you allow a man enough water for a proportion of his holding only?—The trouble in the Deccan is that you have to give out water according to what the cultivator wants.

5380. The cultivator has got a bottomless stomach; he will never be satisfied?—He has!

5381. I am a cultivator myself; but with us there is a strict rule and I am not allowed more than so much. You are at liberty to cut or increase the water?—We restrict their water as far as we can by indirect, not direct, methods. If we stop their water by direct methods and refuse to give a man the quantity he requires, then if anything goes wrong with his crop he says it is our fault, and the responsibility lies with us.

5382. Would you limit his cultivation in any way? We have a rule now (I do not know if you are aware of it) whereby if a man has 1,000 acres you deduct 25 per cent. leaving 750 acres. Divide that by 250, and that is what we get, and not an inch more. Have not you anything like that?—No. With you the soil is uniform and the rainfall does not affect the case; but with us we have to close the canal down every time there is rain.

5383. Do you charge anything for green manuring?—The charge at the present time is the monsoon rate of Rs. 4.

5384. We have remitted the whole thing. Supposing a man prepares his land for *rabi* during the *kharif* season, do you charge him anything for the first ploughing, and so on?—With us that is done on the rainfall. Practically all the ploughing is done on the rainfall and not on canal water.

5385. In what month do you sow sugarcane?—You should sow it in January or February; actually they sow it as late as April and May.

5386. Is there no rule about it?—No, it is very very difficult; you see the supply varies from year to year.

5387. Then they wait for the supply from the canal when they can sow; is that so?—If the supply is short then, in the past they have not been allowed to plant the new cane until the old cane is removed. It is not in the same field; it is in another field. That is one of the irrigation practices which is wrong and which is being changed.

5388. How much water do you lose by evaporation in your storing tanks?—About 5 feet in depth.

5389. How much per day?—·025 of a foot on the average. It varies from about ·015 to ·040.

5390. What is the duty?—The difficulty in working out the duty is that sugarcane takes enormously more water than any other crop.

5391. Is there a Bombay bulletin on sugarcane in which it is stated that after investigation it is found that 72 inches is the proper depth?—No.

5392. You are not aware of that?—No.

5393. There is a bulletin about it in the Bombay Presidency; 72 inches is the proper depth and that has been proved to be quite enough?—From the Bombay Presidency?

5394. Yes, the bulletin was issued by the Agricultural Department; I am surprised you do not co-operate more with the Agricultural Department?—But that is some years ago, when Professor Knight was here; it is not what they are saying now.

5395. Then has the world changed? Because sugarcane has become dear, does it therefore require more water, do you think?—I do not know.

That bulletin on sugarcane is issued by the Government.

5396. *The Chairman:* What year?—I am not quite sure.

5397. *Sir Ganga Ram:* Would you put the Agricultural Department under a Chief Engineer?—No, certainly not.

5398. Perhaps you mean that the Agricultural Department and Irrigation Department should be under one Minister; is that what you mean?—No, I want much closer co-operation than that; the co-operation must begin much lower down; it must begin with the men who are doing the work.

5399. I cannot understand. You say distinctly that both departments should be under one control?—No, there should be a branch of the Irrigation Department under the Irrigation Department with both agricultural men and irrigation men working together.

5400. Have you worked out data as to the requirements of all the crops?—Yes.

5401. Could you send me a copy?—Yes.

5402. How much for *rabi*?—I will send it to you.

5403. I am surprised to hear you say that the Agricultural Department have been advocating waste of water. Do you enforce the system we have in the Punjab by which one acre is divided into so many parts?—We have a similar system of half acres.

5404. Do you know that in the Punjab we have a system of one-eighth acre?—Yes, one-eighth acre, but that is not enforced in the Punjab now.

5405. On page 230 of your note you say, "It is unnecessary, for instance, to have a first class hydraulician at every experimental station, because the very advanced mathematics of hydraulics often plays a minor part. One such man for the whole of India would suffice and he could be lent to any Province temporarily requiring him and should always be available for consultation". What does the Hydraulic Engineer do?—He distributes water in this case.

5406. Would you not recommend a distinct rule, as we have in the Punjab, of so much water per gross acreage?—No, in the Deccan only some of the peasants want water. The soils vary enormously; there are deep soils which are totally unsuitable for some crops but very suitable for other crops; there are no soils suitable for all crops. We find that we do not want to distribute a proportional supply as in the Punjab. We want to give a definite known supply for which one requires a module. Mr. Gibbs' module is the one we are adopting from the Punjab.

5407. Are you aware that a meter has recently been invented which can be used by two or three people together?—For big enough areas it is quite easy to get a meter.

5408. In cases of flooding I see you recommend the use of gypsum. An enormous supply of gypsum would be required, would it not?—It does not follow it would be useful in the Punjab; it is useful here.

5409. You say it costs Rs. 50 per ton here. We can easily send it to you from the Punjab at Rs. 10 per ton?—I am very glad to hear it. It costs Rs. 25 per ton locally. Rs. 50 was for 2 tons.

5410. When I was Executive Engineer I used to pay 1 anna per maund to the contractor for collecting. It used to be As. 5 in Lahore including the railway charges. I do not think it should cost much more here than there?—I do not know where it has come from, but it has been purchased in Bombay.

5411. You say that in one case you have three rotations?—Our standard rotation for blocks is a three-year rotation.

5412. You emphasise the need for roads. Do you mean metal roads or non-metal roads?—Metalled roads.

5413. Who is to pay for it?—It would be on exactly the same principle as that on which they were run before; the money will come from the same source. It is only a question of who is to carry out the repairs.

5414. Do you make any use of all the rank grass which is growing beside the canals?—I would like Mr. Sule to answer that because I am not in charge of any canal at present.

5415. Do you make any use of that grass, Mr. Sule?—(Mr. Sule) No; we let it out for grazing.

5416. But I mean do you keep it in reserve for famine?—No.

5417. Do you make ensilage from it?—It would be hardly worth it; there is not much of it.

(*Mr. Inglis*). We have not such large quantities in the Deccan such as you have in the Punjab; there is practically no grass on the canals.

5418. We have a system by which if there is only an As. 8 crop a remission of the revenue is allowed. Have you any system of that kind?—On paper "yes", but one of our troubles is that we cannot afford to let a crop die and so remission has rarely to be granted.

5419. *Dr. Hyder:* But you have that system in Sind?—Yes, in Sind. We sanction areas here; we sanction the area we can irrigate.

5420. *Sir Ganga Ram:* Is there any rule or principle as to how much is to be irrigated and how much water is to be given, or does everything depend upon your will?—Yes, there is a principle.

5421. What is the principle?—The principle is that each owner has no right to water, if that is what you mean. The man who first applies for water has the first claim; it is "first come, first served".

5422. Do you mean to say that all the people round about have no right to water?—No. Most of them do not want it.

5423. Why do they not want it?—Because it is only a certain number who want to use irrigation water; some of them would not take it if you made them a present of it.

5424. Then how do they water the land?—There is sufficient rain in the Deccan to grow some crops in most years.

5425. Have you no independent Drainage Board or Drainage Engineer?—I am the Drainage Engineer myself for all the canals in the Deccan.

5426. Then you have nothing to do with the distribution of water or anything of that kind?—No, not now.

5427. Can you give me one instance; for example, how much water is required for *jowar*?—About 1½ feet.

5428. Is that *rabi* or *kharif*?—*Rabi*.

5429. Of that, how much do you think is evaporated, how much absorbed by the plant, and how much goes in the subsoil?—I am afraid I could not answer that straight off.

5430. Does the *kharif jowar* require more water?—There is rainfall which makes it require less.

5431. We will give credit for the rainfall separately; supposing there was no rainfall, how much water would be required? Whether the water comes from the canal or rain is irrelevant?—It would be about the same. Even if we ignore rain, the humidity of the atmosphere is considerable. The conditions are very different in the Punjab.

5432. *Sir Thomas Middleton:* You have just told us you are largely concerned with drainage?—Yes.

5433. And with the reclamation of land which has suffered from alkali?—Yes.

5434. What is your chief kind of alkali; is it the white or the black?—Sodium sulphate mostly; sodium chloride to a large extent also. The rest of the salts are a very small proportion. There is a very slight quantity of carbonate as a rule.

5435. So that you are free from the most troublesome kind of alkali?—Yes.

5436. You have found that the alkalis you describe can be cured or prevented from accumulating by washing out?—Provided you get the land in time before the physical state is utterly or practically destroyed.

5437. Early drainage is your remedy?—Yes; prevention is far better than cure.

5438. You have not got to tackle the black alkali problem in this Presidency at all?—No; there are small areas of black alkali, but we are leaving them alone up to the present time. Calcium chloride is a very bad salt which we sometimes get here, but fortunately not in large areas.

5439. You have told us that your motto was the greatest good for the greatest number, but you did not say numbers of what. Is it the number of agriculturists or the number of tax-payers?—I meant number of agriculturists.

5440. It seems to me that your motto and that of Dr. Mann must come near together in practice; he is thinking of agriculturists one by one, and you sum them up and arrive at the same result?—I can give you an example to show that Dr. Mann and I do not see eye to eye. Supposing an individual cultivator can get a slightly bigger crop with 125 inches than he can get with 75 inches, then the individual will take 125 inches; but if you spread that 125 inches over one and two-thirds acres the total benefit to the two cultivators will be enormously greater than the benefit to the one cultivator if he is allowed to take 125 inches for 1 acre.

5441. Your point is that Dr. Mann does not take that view and recommends that the individual should get as much as he can and not think of his neighbour?—On one occasion before the Sugar Committee he said that in so many words; it is in writing.

5442. Your experiments indicate that 75 inches is enough at the present time; but how long have these experiments been going on?—My experiments are really a continuation of the experiments of the Agricultural Department 10 years ago; I agree with what they said 10 years ago.

5443. Is it the result of a single year's experiment, or of the continuation of those experiments?—Our results are steadily improving under that treatment every year.

5444. How long have you been carrying them out?—Since 1918.

5445. The Irrigation Officer in charge of the canals sells water and takes his orders for water in order of application; that is to say, the cultivator who applies first is first served?—What generally happens in practice is that you say that applications must be in before a certain date. You generally do not get all the applications you want by that date. All the men who apply for water before that date get water, and as to the remainder, as they come in you take them in order of priority.

5446. So that it is really the late-comers who run the risk of not being supplied; the bulk of the cultivators are in the same category, they come in before a certain date and they are all equally entitled to water?—Yes.

5447. The canal officer does his best to distribute the water between them?—Yes. At the present time water is given on 6-years leases almost entirely, so that if a man gets in time in the first year, he gets water for 6 years. The man who is late does not get water for 6 years unless there is an excess supply.

5448. *Dr. Hyder:* You have the same system as in the Central Provinces?—The Central Provinces conditions are almost the same as our conditions but I am not quite sure of their system.

5449. The conditions as to rainfall?—Yes, and requiring water, and so on; but I have never been there so that I cannot tell you whether it is exactly the same.

5450. *Sir Thomas Middleton:* In describing the duties of the Irrigation Officer in charge of the canal, you said he had to look a week ahead and sometimes a season ahead in releasing water?—Yes.

5451. Is it possible to acquire experience that will enable him to do much better than he can do by chance when he has such a problem?—Very much so; it is extraordinary how the experienced man can do it.

5452. They acquire the gift of prophesy and can see a season ahead; but, looking at the rainfall tables, it looks an almost impossible task to prophesy a year ahead?—It is not so difficult as all that. The difficulty is that you may have rainfall in one part of the canal and not in another part of the canal; you must judge what effect that will have on the water required.

5453. The only question I was asking myself was whether, if the canal officer in addition to his irrigation experience had a wide knowledge of agriculture, he would be able to do any better than he does at present. It seems to me that his job is hard enough at present and I doubt whether any additional knowledge we might be able to give him would improve his efficiency?—I think the cultivators will tell you 'Yes'; their feeling is that when mistakes occur they may be due to ignorance of their requirements.

5454. That may be the cultivator's view?—It is obvious it must be true to a certain extent; the more you know about agriculture the fewer mistakes you are likely to make in irrigation matters.

5455. I wonder whether that is so when you are dealing with a problem of this kind. I think if you professed to know a great deal about agriculture you might more often be accused of making mistakes?—To put it in another way; for 12 years I was in charge of canals. We all know what the ideal of the Deccan irrigation is; that is to arrange to give a supply of water and to allow the cultivator to do as much as he can with that water; but for the 12 years I was in charge of an irrigation district I could not see daylight, and for about 6 years after I took up research I could not see daylight. Now I can and that is purely because I have been able to balance the problems of agriculture and irrigation.

5456. It is not because you have had experience as an Irrigation Officer?—No, I think it is agricultural experience essentially. My point is that the irrigation man is not competent to run a canal unaided and the agricultural man is not competent to run a canal unaided.

Certainly the agricultural man is not competent; I agree with you there; but I am not so sure about your other point.

5457. *Dr. Hyder:* A chart has been handed over to me and I ask you to see whether the rainfall presents similar features in the Deccan as in this district which I understand is in the Karnatic where you will find there are only 4 years in which the rainfall is above the average, there being a deficiency in the remaining 21 years?—If we were building a dam we would store the equivalent of these run-off in a bad year of rainfall; we would design on the supposition that the dam filled in all but famine years in that period.

5458. I was trying to ascertain the deficiency of rainfall; is the state of affairs in the Eastern Deccan with which you are familiar similar to that?—Yes.

5459. So that the Eastern Deccan is an insecure tract?—Very insecure.

5460. All these canals that have been constructed in the Eastern Deccan were constructed more or less as protection against famine?—Yes.

5461. Your problem, I understand, is that these canals do not pay their way?—Yes.

5462. But were they expected to pay their way?—No, most of them were not expected to pay their way even when they were constructed; they have all been protective works, with one exception.

5463. So that in the Deccan you have to compare the outlay by the State on these irrigation works and the cost of famine relief which would otherwise fall on the State?—Yes.

5464. If those two costs are equal, you would say there was room for the construction of a canal in the Deccan?—Yes, that is the present outlook.

5465. And if the direct revenue from the canals is greater than the expense to which the State would be put in famine relief if the canals did not exist, you would say that the State was making a profit on the canals?—Yes.

5466. You have enunciated the axiom with regard to irrigation that you should work for the greatest good of the greatest number. I am not quite sure that I have followed the application of that axiom in another science. You have got a limited quantity of water in the Deccan?—Yes.

5467. You want to make that limited quantity of water go as far as possible?—Yes.

5468. Now you come at once into conflict with the agriculturist; his business is to find out the exact quantity of water that is required to bring a certain crop to maturity?—To get the optimum crop, to get the best crop.

5469. To get the best results?—Yes.

5470. To bring the crop to maturity under normal conditions. You are always concerned with the maximum results. Your point of view is that the Head of the Agricultural Department and his officers are always concerned to get the greatest amount of produce, or how to bring the crops in an insecure area to maturity, never caring about the greatest results?—Yes, but there they have got the limiting factor of the rainfall, which is definite in these dry tracts.

5471. But since that knowledge is possessed by both departments, I do not see why there should be an incompatibility of views between you as Irrigation Officer and the Agricultural Department?—But the moment you get down to irrigation their statement is that the limiting factor is not water. To put it at its lowest, they want to be popular with the man they are teaching; they want to get him to say that they are doing the best for him. The best that can be done for him is to give him more water, if water is the limiting factor.

5472. Even in these insecure tracts?—No, because there the limiting factor is definite and you cannot get away from it; it is rain.

5473. I understand you would like the Agricultural Department to be more closely in touch with your department; do you want them to be under you entirely?—No, I want agricultural men and irrigation men to work together.

5474. You do not want to swallow the Revenue Department, do you?—No, certainly not.

5475. You would leave the work of assessing rates and proper charges to other people?—The actual preparation of the assessment papers is done by us now; it would be easy to collect the money.

5476. But the rates?—That is done by us now; we do all the assessing now. The Revenue Department, except for the village work and that sort of thing, does comparatively little work in the irrigated tracts. We do not do the collection. They have got land revenue assessment to do, of course; we should not like to take that on.

5477. I understand you would compel the cultivators of the Deccan to take up the particular quantity of water that you will give them, and you will compel them, further, to grow the kind of crop that you will help them to grow?—Yes.

5478. Do you not think that involves a large measure of compulsion?—We do not fix the area; we say, we give you so much water; with that you are to grow as large an area as you can of particular types of crops of which sugarcane is the most important.

5479. If you are going to adhere to your maxim of the greatest good of the greatest number, you will desire to spread your water over the greatest area. Would you like to compel the cultivators to grow the crops you think

they ought to grow, and then you will give them the quantity of water you think they ought to have? The Irrigation Department in those circumstances would certainly be a power in the land?—So as to bring in the biggest profit to the mass of cultivators. If we spread water right down to the tails of the canal, the area which can be irrigated is very much less than if we utilise the water at the head of the canal. We wish to utilise the water, which is limited, so as to bring in the greatest profit to all the cultivators; not to one individual.

5480. *Sir Chunilal Mehta:* Perhaps you would like to explain the principle of the greatest good to the greatest number of people. Owing to the fact that there is a very great demand for water in the Deccan by the cultivators everywhere, everyone wants water whether he gets it from canal irrigation or from rain?—Yes.

5481. The idea of your department is that the largest number of people should get water, even though a certain number may not get the amount they would like to use?—Yes; in other words, utilise the water as economically as possible.

5482. And for the largest number of people?—If there was a demand, yes; but unfortunately it would not be economical to give water to everybody along the whole canal. That is the trouble.

5483. But, subject to the amount of water you can possibly give, you like to distribute it over as large a number of people as possible in an economic way?—Yes. In this proposal for an irrigation cess there would be a uniform intensity in each parcel. If the rate fixed for a parcel were Rs. 14, that means the whole area would be under sugarcane; if Rs. 10, half would be under sugarcane. We are trying to get a uniform intensity in such areas as are suitable for that particular intensity.

5484. You told Sir Henry Lawrence that the Nira Left Bank Canal cost Rs. 63 lakhs, and you were getting about Rs. 9 lakhs revenue from it?—Yes.

5485. Are those revenue figures net or gross?—Gross.

5486. The net figures would be very much less?—Yes.

5487. With regard to the proposed cess, although you agree with the principle that Government should pay something out of the common purse, from the general taxpayer, towards these particular areas, still, the idea underlying the new cess is to do away with unearned increment for the future in the case of the fortunate people who happen to have their land close to where the canal runs?—Yes.

5488. That is the underlying idea of it; it is not designed to screw as much as possible out of the people who use the water, in an attempt to make the canal earn 6 per cent.?—It happens to work out to about 6 per cent., but there is no reason why you should not have the cess, even if it brought it to 10 per cent.

5489. *Dr. Hyder:* If your water rates are sufficiently high, you can get in the whole of the unearned increment in that way. If for a certain time there is a settlement still in operation in a certain district you can impose an owner's rate, but if your water rates are sufficiently high what becomes of the unearned increment?—In the first place, if the land is not irrigated at all you do not get any water rate; but you do get a cess, and by imposing a cess you can force a man either to irrigate his land himself or to let it to a tenant who will do so for him.

5490. *Mr. Calvert:* Your cess is what we call an owner's rate?—I am not quite sure what an owner's rate is.

It is what you call a cess.

5491. *Dr. Hyder:* They have an owner's rate in the Punjab, and we have it also in the United Provinces, because it was found there was a certain amount of unearned increment, but this disappeared when there was a revision of the settlement of land revenue?—That is because with you everyone has a right to a share in the water, but here they have not.

5492. *Mr. Calvert:* It did not disappear; it was merged in the land revenue, and indirect credit given to the Canal Department?—Everybody has put up the same argument that you have. The great difficulty is that we would have to put on a rate of about Rs. 45 an acre in the case of land suitable for sugarcane. If a man did not want or was unable to grow cane, that would be a ruinous charge. If you ask him to pay a water rate like that for water which he does not take, in a few years you would ruin him.

5493. *Dr. Hyder:* What is your rate at present for sugarcane?—Rs. 45.

5494. If you charge a man Rs. 45 he may or may not grow sugarcane; he may or may not take your water. Supposing he found it profitable, he would take your water, pay his Rs. 45, and have done with it. Where is the difficulty in imposing a sufficiently high water rate?—Raising the water rate always tends to discourage irrigation, whereas putting on a cess always tends to encourage it, because the man has to grow irrigated crops to be able to pay us.

The Chairman: One is on the water and the other is on the land.

5495. *Sir Chunilal Mehta:* In other words, since the canals came into existence the price of land has gone up enormously?—Yes.

5496. What was the price of land when these canals were started, and what is it now?—Before the canal came it varied from Rs. 30 to 50, or even lower, an acre; now it is up to Rs. 600, and in some sugarcane tracts as high as Rs. 1,000, an acre.

5497. Entirely due to the canal?—Very largely, at any rate.

5498. That was done at the expense of the general taxpayer, and there is no particular reason why an individual owner should get the benefit of what may be called unearned increment?—Certainly not.

5499. You said that about 10 years ago the Agricultural Department recommended 75 inches instead of the 125 which is now being talked about?—That is what I am told. I do not know the Agricultural Department advocate 125 now; all I know is that members of that department in the irrigated tracts have told the cultivators that the figure I have given them is much too low; and I am told by cultivators that the figure they give them is 120 inches. They take about that now, and they say the agricultural people tell them that is about right. I am informed the Agricultural Department's figure 10 years ago was 72 inches, and I know Professor Knight said 7 feet of water was sufficient, 84 inches.

5500. That is round about what you recommend now?—Yes.

5501. When Professor Knight recommended 7 feet, he was in charge of propaganda, was not he?—He was in charge of the Manjri farm. I do not know whether he was in charge of anything else.

5502. Did he not do agricultural propaganda, just as the Manjri people are expected to do now?—I think so.

5503. Apparently there was no conflict then between the Agricultural and Irrigation Departments?—Not on that point, but that is really a very minor point. It is not on the question of the quantity of water, but how to restrict the water, that the difference arises.

5504. Did he not take that into account also?—No. He also opposed indirect methods for reducing waste.

5505. At that time there was no conflict of propaganda amongst the cultivators, that is my point?—That is so on that one point, but my point is that propaganda in a case like that is of very little use, because if a man can get 5 tons extra cane by employing 125 inches of water he will do it. You have to introduce indirect methods, and that is where the clash comes.

5506. Do you know of the arrangements made in the Punjab, for proper co-ordination between the Agricultural and Co-operative Departments?—Is there the same difficulty there? The trouble between the Agricultural and Irrigation Departments is lack of understanding of each other's problems.

5507. You said that neither an Agricultural nor an Irrigation Officer is able to run a canal unaided?—Not as efficiently as he should, no.

5508. Not as efficiently as if the experience of both were combined?—Quite.

5509. Supposing you had an arrangement under which there was a Board similar to that instituted for the Agricultural and Co-operative Departments, and suppose on that Board the Irrigation Officer sat with, say, the Deputy Director of Agriculture, and all proposals with regard to agriculture in irrigated tracts were submitted through them jointly to the Superintending Engineer and the Director of Agriculture jointly, do you not think that would help?—The way I would put it is this: if one man speaks German and the other French, do you think sending anything through them would help?

5510. The Irrigation Officer speaks French?—He can learn German.

5511. Well, make the Agricultural Officer who speaks German learn French?—He can do something himself, but he cannot make the other man do anything.

5512. That is to say, you would abolish one or other of these departments? Do you think either the Irrigation or the Agricultural Officer is able to take in hand irrigation work as well as agricultural work and propaganda and regulation of canals?—I think that one head, with an agricultural man, an irrigation man and a propaganda man working under him, would make a very much better job of it than all these people working separately at cross purposes.

5513. Then that one head must know all these subjects?—Yes.

5514. The man at the head will require to be an expert both in irrigation and agriculture?—Yes. He must be trained in practical agriculture, not super-agriculture. He need not know agricultural chemistry and that sort of thing, but he must know the practical side of it.

5515. Can you get a man who is an expert in both subjects?—I think I am myself, and I know Mr. Wilsdon is in the Punjab.

5516. You would prefer such an arrangement to the co-ordination of agricultural and irrigation officers?—Frankly, I do not think such co-ordination is possible; their view-points are too wide apart.

5517. *Sir Ganga Ram:* Are you referring to Bombay or the Punjab?—In the Punjab your limiting factor, like your rainfall, is fixed, but here nothing is fixed; everything is in a state of flux. Even in the Punjab they have the research department under the P. W. D.—under Mr. Wilsdon—so even there they find there are some problems which can best be solved by a man who knows both sides of the question.

5518. *Sir Henry Lawrence:* Mr. Wilsdon is not in the Agricultural Department?—He was first of all in the Education Department. He was then made Agricultural Chemist at Lyallpur, but found he was losing Rs. 250 a month, which, though he liked the work very much, he could not afford to do. He is now under the P. W. D. He is a chemist and physicist.

5519. *Sir Chunilal Mehta:* This question of co-ordination has never really been considered?—The essential duty of my division is to co-ordinate the two.

5520. The system you advocate is being worked by your department now?—Yes.

5521. But this other system of getting the officers of the two departments to work together has not been tried?—I think we are trying it all the time.

5522. But not officially?—Yes; we have been brought together many times officially.

5523. And after experience you are convinced it is hopeless; it cannot be done?—For the Deccan, yes.

5524. Suppose you had one officer to handle both these subjects, would he be under the Minister of Agriculture or the Member for Irrigation?—The latter.

5525. Is the Minister of Agriculture to have no say in this matter whatever?—I do not know how that could be arranged; it would probably be very difficult. It should be under the Irrigation Department in any case.

5526. Your solution would probably be that irrigation and agriculture should be under the same Minister, that might be an ideal arrangement?—I think that would be desirable, but one is a Transferred subject and the other is not.

Sir Chunilal Mehta: It will not be a Reserved subject for ever!

5527. *The Raja of Parlakimedi:* Before taking up a big scheme, what arrangements do you enter into with the ryots to ensure your revenue?—None, in that sense. There is no guarantee to the individual ryot. They do not all want water. Those who do want water come and ask for it, but there is no definite guarantee to all the cultivators.

5528. You must have some guarantee of revenue before you push forward a scheme?—Yes. It is assumed that the canals will develop at a certain rate, as experience has shown in the past that they have.

5529. You do not advocate any agreement or arrangement with the ryots?—No.

5530. With regard to distribution of water, if there is an application from the ryots on a joint system, do you welcome it?—No. It must be in the name of the owner of the land.

5531. The distribution is done by officials, is it?—Yes, right down to the field.

5532. Suppose the headman of the village undertakes to carry out distribution and also undertakes to pay the revenue that has to be paid, do you not welcome that?—They have been offered that, but the difficulty is that unless we do the distribution we do not know the requirements. We cannot have the headman of the village coming and saying "We want so much water to-morrow;" we have to make arrangements 10 days' in advance, and we must know exactly what the requirements of each outlet are. We can only do that if we are managing the distribution of the water or working on some definite system like a proportional supply, which is impossible in the Deccan.

5533. Do you levy the water cess according to crop, or what?—It is on an area basis, but the various crops have different rates.

5534. Does it also depend on the type of source from which the water is given? In the Madras Presidency, for instance, there are first and second class sources?—Most canals have one rate, but in some cases where the tank does not fill every year and where the supply is not assured they have a lower rate. Each of the bigger canals has the same rate.

5535. *Sir James MacKenna:* Has any progress been made with lining the canals?—Yes. We have tried bitumen without success and we have tried concrete lining. We have found that all the linings are less water-tight than the natural silt deposited. Linings may be all right when first constructed, but then hair cracks appear in the concrete, and these grow bigger. As soon as the concrete begins to get porous the leakage is greater than it would be from the natural canal surface, because there is no silt deposit on the concrete itself.

5536. So it is the cheap, natural process of silting which is most successful?—Yes, except in special cases.

5537. *Professor Gangulee:* I do not quite understand your idea of the Irrigation Department being 'French' and the Agricultural 'German,' as if the twain can never meet. Irrigation has two aspects, the engineering and the agricultural. I do not see why there should be any conflict. Do Irrigation

Officers study the agricultural aspects of the questions with which they have to deal?—We do as far as we can.

5538. Where?—As best we can from bulletins and books, and from the agricultural officers themselves.

5539. When, as in the case of Poona, there is an excellent Agricultural College available, do you send your officers there or come in contact with the Deputy Director and the research workers who are working there?—We do not take lectures or anything like that, but we know what is going on and we see some of the work.

5540. You know the nature of the work there through the literature that is published?—Yes.

5541. You are not in direct contact with the officers working there?—To a certain extent, yes.

5542. Suppose Dr. Mann is carrying on experiments to find out the water requirements of sugarcane, and you are also concerned with that question (because, after all, it is an irrigation question), do you not think it is to the common interest of both departments to meet in direct contact, and not through literature, where there are facilities? Do you not think that would facilitate co-operation and co-ordination?—You mean, if I saw his work and he saw mine?

5543. Let us say he is carrying on laboratory experiments on a problem which is of common interest, like the water requirements of sugarcane; you are concerned to find out how much water that crop takes under field conditions. Now, it is as much to your interest to find out the water requirements of sugarcane as it is to his to find out how that amount could be properly utilised under field conditions. I do not understand, therefore, why your two departments cannot come together?—As a matter of fact, that is rather a straight-forward, easy case. Even there, however, his idea is to get the best outturn for the individual, while ours is to get the best outturn for the water. We could tell him that and he might agree; probably he does agree that our outlook and aim are different, but there are more difficult problems than that.

5544. I am not concerned with the question of maximum benefit to the maximum number of people; I am considering it as a scientific and agricultural problem. Here is a problem which concerns your department, and which is being investigated in the Agricultural College at Poona. Do your officers visit the place and come in contact with the research being carried on?—Yes, but they do not really know enough to be able to appreciate what is going on.

5545. Such an officer would not be able to grasp the nature of the scientific problem?—That is it.

5546. In considering this question of water-supply, you are chiefly concerned with the better utilisation of the water?—Yes.

5547. And you recommend this as one of the methods of increasing the revenue? You want to spread a certain quantity of water over a large area?—Yes.

5548. In this idea, are you actuated by any motive of increasing the revenue?—It is our duty, in my view, to get the greatest profit for the people of the country. Incidentally, happily for us, that also brings in the biggest revenue to us; but if there is any clash between those two things we have to consider the interests of the people of the country first and revenue second.

5549. Can you give us any idea of the sources of wastage of water? First, you say, there is the cultivator himself, who uses more water than he ought to. Are there any other factors?—There is percolation from channels.

5550. Any others?—Those are the main ones.

5551. Do the farmers object to the compulsory restriction to half an acre, so far as *bunding* is concerned?—Yes, they object to a certain extent,

firstly because it costs them money to put up the *bunds* we insist on, and secondly because if they use water carelessly it stagnates at the bottom of the field and damages the crop. Thirdly, it interferes with inter-cultivation.

5552. Is it your experience that an increase in the number of waterings means an increase in the yield? Take the rainy season?—The only experiments of that type are what you saw this morning at the effluent farm, where it has been found that provided the soil is kept in a very good state of tilth the quantity of water, the period between waterings and even the amount of manure put on have little effect. You can get a 60 ton crop with 75 inches of water and 150 lbs. of nitrogen and waterings at intervals even up to 15 days. None of those things has much effect on the return provided the state of the soil is good.

5553. I understand 9,000 acres on the Nira Left Bank Canal have been converted into useless alkaline land?—Yes.

5554. In your experience, if an excess of water is used it leads to water-logging?—Yes.

5555. In spite of these evil consequences the cultivators clamour for more water. Why?—Because in any one year a cultivator will get a larger return if he takes more water. He does not see far enough ahead.

5556. You recommend the volumetric basis of distributing water?—Yes.

5557. I think that was also recommended by the Irrigation Commission?—Yes.

5558. It has not been practised yet?—The trouble is we have not had the measuring and distributing devices to enable us to do it.

5559. Have you any efficient measuring device now?—Yes; we have a device which gives a fixed discharge, and provided the time for which it has been flowing is known the quantity is also known.

5560. Is there any possibility of extending irrigation by means of tube wells in this area?—No.

5561. Mr. Sule, on page 234 you say the extension of agricultural education is necessary, particularly in a canal area. That is, of course, a very important point. You particularly mention Loni, are you acquainted with that school?—(Mr. Sule) No. I mentioned Loni because it is the only school in an irrigated area.

5562. Do you know the Loni district?—No.

5563. In your note you refer to the practical results achieved by private agriculturists influencing the cultivator. What is the difference between the two?—None. I only wanted to differentiate between the private agriculturist and Government.

5564. *Mr. Calvert:* What is the capital cost per acre irrigated?—(Mr. Inglis). The cost varies from Rs. 90 in the case of the Nira Left Bank Canal (which was the cheapest) up to Rs. 250, but in working this out you must remember that sugarcane takes 8 times as much water as the *rabi* crop, so that unless all the figures are brought to *rabi* basis they are not comparable. It depends whether you have much sugarcane or not. If you have no sugarcane the rate would be much lower than the figure I quoted.

5565. That is the total capital cost per acre irrigated?—You cannot apply figures obtained from one canal to another, because the conditions vary.

5566. What is the cost of delivering the water per acre irrigated, including maintenance, staff, depreciation, etc.?—Rs. 3 to Rs. 6 per acre, as against a revenue of Rs. 10 to Rs. 17 per acre irrigated. That is for the period 1922-24; it is a little higher now.

5567. That cost excludes the interest charges?—Yes.

5568. Can you tell us the interest charges per acre irrigated?—I assume you want this information for the newer canals, and I have cut down 6 per cent., which is what you would have to pay now.

5569. I want the actual cost. You have had certain losses; you have not been able to meet your interest charges?—Yes.

5570. Those have been added to the capital cost?—Yes.

5571. So the interest charges per acre irrigated are now very high?—Yes.

5572. I want to know what they are?—I thought you wanted the figure for the new canals.

5573. No. I am not concerned with those?—Mr. Harrison can give you those figures better than I can; he has got them.

5574. What system of protection do you adopt? Are you trying to protect as many families as possible by giving to each family water sufficient to irrigate a portion of its holding only, or are you concentrating on irrigation of the best available land?—The best available land, subject to the demand for water. There is no demand for water when we first open a canal for *rabi* or seasonal crops of any kind, until sugarcane has developed the canal. The *rabi* crops follow sugarcane. You would imagine that in a famine tract the first thing the cultivators would irrigate would be seasonal crops, but the first move is for men from outside to grow sugarcane, and then gradually the ordinary seasonal crops are taken up by the local people.

5575. You do not arrange to irrigate one-fourth or one-third of each man's holding?—We do not do that at all now. Our canals are not profitable, but we try to get the maximum profit possible out of them.

5576. But even in the case of a new canal you only arrange to irrigate a certain proportion of that area, one-third or one-fourth?—Yes.

5577. What have you done in this particular case with your protection works? Do you arrange to irrigate one-third or one-half of the cultivated area?—That depends on the demand. If there is a big demand for water for sugarcane, there is very little water for anything else; if there is no such demand, we spread the water over a much longer length of canal.

5578. There is no definite scheme of protection laid down?—No.

5579. *Dr. Hyder:* These sugarcane people are leaseholders to whom you agree to deliver a certain quantity of water?—Yes.

5580. *Sir Henry Lawrence:* Can you say what will be the maximum area irrigated in a year in the case of the Nira Right Bank Canal?—About one-quarter; that will be the proportion of it. Speaking from memory 130,000 acres is the area to be irrigated, and 500,000 acres are commanded.

5581. *Mr. Kamat:* The older projects give a better return on capital; you instanced a capital expenditure of Rs. 63 lakhs and a return of Rs. 9 lakhs?—Yes.

5582. The later projects are not giving you so good a return as the older ones?—Nothing like so good.

5583. When these new projects are more fully developed, do you expect to reap a better return?—The Godavari Canal is now fully developed, but is not giving us so good a return as the Nira Left Bank Canal. The average return on all the canals would be about 3¼ per cent.

5584. Is the land revenue assessment for lands irrigated along the canal more than it is for lands in the dry part of the country, on account of the canal?—There has only been one revision since the canal was constructed, so that it could only have been put up one-third as a maximum. There has been a small increase of only a few annas per acre.

5585. The Revenue Department are getting something extra owing to the fact that the land is irrigated?—Yes.

5586. Possibly at the next revision there may be a further increase?—Yes, but it goes to the Revenue Department and does not help us, and the amount would in any case be almost negligible towards increasing canal revenues.

5587. Were not these canals intended as an insurance against famine rather than as a commercial proposition?—The Nira Left Bank Canal and the Mutha Canal were.

5588. Is it not correct to say the objective was to provide a protection against famine and not to construct a purely profit-making concern?—I think you are wrong in saying "a purely profit-making concern." The trouble is that if we did not give the water to sugarcane, most of it would go to waste. It is only in famine years that other people want water. Unless we guaranteed the water to the sugarcane cultivator he would not grow the cane. The best protection against famine is really to grow sugarcane, because it means more money and more work, and in a famine year people can come to the district where they are crushing the cane and earn wages to keep them going.

5589. I see your maxim is "The greatest good of the greatest number." As a general rule, is it not unsafe to administer a department by hard and fast maxims? If there is a fallacy in the maxim, the whole administration goes wrong?—After all, one has to work on some principle, and the interest of the cultivators is surely the highest one can work on.

5590. You yourself admitted just now that for 6 of the 12 years of your administration you were rather seeking light, yet you were all the time working according to this maxim?—No; that maxim was somewhat recent. Cultivators asked me what my principle was, and I had to think it out to tell them.

5591. Are you quite sure even now there is no fallacy underlying this maxim?—I should like to hear it.

5592. When you say "The greatest good of the greatest number," is it the greatest number of people or the greatest number of acres?—It is the greatest profit to the mass of the cultivators.

5593. In the case of a man who wants to grow sugarcane, say, five acres of it, is it a good policy to give him an insufficient amount of water which may result in his having a poor outturn, or to give him a very good quantity for 4 acres only, so that he may get a good return?—We found the average outturn of the effluent farm last year was 44 tons with 75 inches of water. Cultivators themselves will tell you they get 30 tons with 140 inches of water. One of the worst curses of the cultivator is too much water.

5594. True, but what minimum per acre is required for a good outturn of sugarcane? Has that to be determined by your department or the Agricultural Department?—By our department.

5595. That is where the conflict comes in; you say it is your department which should determine these things, but the Agricultural Department says it knows best?—I think the Agricultural Department would be in general agreement with what I say about the quantity of water.

5596. If in some cases they do not, what happens to the cultivator?—Whatever we state will be based on definite experiments.

5597. I will give you a concrete case, of which probably you are aware. In the case of these *bunds*, did you not promulgate an order that cultivators were to divide their fields into half acre plots, and round these plots certain *bunds* of earth of a certain size were to be provided?—Yes.

5598. Then there was some agitation against the size of these *bunds*, in which the Agricultural Department took part?—Yes, against us.

5599. Ultimately you reduced the size of the *bunds*, and promulgated a reduced size?—The original size was arranged before I came to the Deccan. It was reduced afterwards.

5600. That means there was some mistake in the first order promulgated by the Irrigation Department?—At that time they had not the agricultural experience which I say is essential.

5601. Is it not possible by some method to have co-operation between your department and the Agricultural Department on such questions?—It is

not so much a question of co-operation as of understanding each other; we talk different languages.

5602. It is not a question of talking different languages; you are talking the same language. It is a question of research in which both of you are interested. For instance, on Manjri farm Mr. Knight was conducting a research as to how much water was necessary, whether *bunds* were necessary and what size they ought to be. Could you not have deputed a man from your department to watch it, and to co-operate with Manjri farm, and until some conclusions had been arrived at by the two of them you could have withheld the promulgation of any order? Was not that possible?—The conditions after the *bunds* were put in were enormously better than they were before, even if they were not what is now believed to be the best. The damage to the canal tract was reduced enormously by the *bunds*. Members of the Agricultural Department themselves testified to the improvement due to the *bunds*, and to the fact that the advantages following their introduction were very much greater than the disadvantages. That has been admitted now generally even by the cultivators.

5603. I accept the general conclusion, but you have not caught my point. While your department was trying to find out the exact sizes and amounts necessary to prevent waste of water, whether it should be 2 feet by 2 or 2 feet by 1, before you promulgated as your definite conclusions that the size should be so much, I ask, could you not by common consent with Dr. Mann's department have made certain experiments at the Manjri farm first of 2 feet by 2 size and then 2 feet by 1 size?—During the 5 years that that would have taken were we to let the conditions go from bad to worse?

5604. You accused the Agricultural Department of making a splash, but you were, it seems, making a "splash" because you wanted to be ahead by 5 years?—There is no "splash" about that at all; that is not what I mean by a "splash."

5605. At any rate, you had to modify your conclusions about the sizes of these *bunds*?—Have you never changed your opinion on any point in your life?

5606. I mean in this case it was avoidable?—It was avoidable, but the *bunds*, even in their first stage, were infinitely better than having no *bunds*.

5607. I accept the general conclusion, but the question was on the matter of sizes; I think the Agricultural Department was concerned and any premature conclusion could have been avoided by you. I am trying to prove that co-operation between your department and the Agricultural Department is possible on matters of research. They were trying to find out whether the minimum water required was 75 inches. Did your department co-operate with the Agricultural Department in going to Manjri before you laid it down that 75 inches was the quantity necessary and not 125 inches?—There has been no rule laid down at all.

5608. Was that a conclusion reached by definite experiment?—I am afraid I do not follow the trend of the argument.

5609. The point is that you say you are talking two different languages; I say both are talking the same language but a little co-operation is necessary?—Our department stated that these *bunds* should be constructed in order to prevent waste of water; there is no question that they did prevent waste of water. That is not in question; there is definite proof on that point. The Agricultural Department went round telling the cultivators that they should oppose these *bunds;* there is definite proof of that; they went round the irrigated tracts telling the cultivators to resist these *bunds*.

5610. *Professor Gangulee:* Did they not consult you before they went to the cultivators?—They said perfectly openly in front of us at conferences that they were opposed to these *bunds*. When they opposed these rules they opposed them generally on wrong reasoning, and since then even the cultivators have come round to admit that they have done a lot of good. One of our main reasons was that if the cultivator puts on too much water, the *bund* prevents the water running to waste on another man's field and damaging another

man's field, but damages the field of the man who has put on too much water. I say the man should not put on too much water, and if there is any damage, surely the man who does wrong should be the man to be punished and not the unfortunate man down below. There again is the same mistake of supporting the individual cultivator against the mass of cultivators.

5611. *Sir Henry Lawrence:* In what year did this discussion take place?—It has been going on since 1913.

5612. *Mr. Kamat:* You say that the bigger landholders leave it to their servants to handle the water when it comes at night?—No, I do not say merely at night time, at any time.

5613. Sometimes you do allow the water discharge to go through the fields at night, and the water has to be handled even at night time?—What do you suggest we should do? The water is there, we cannot stop it.

5614. Can any landholder handle the water without the help of the servants? I mean it is inevitable?—My personal opinion is that there should be men trained for distributing irrigation water at a common outlet; they should have a professional man to do it. One of our rules is the dividing up of the area into half-acre plots which has made the distribution of water easier, because they know now how long it will take. It is very much easier than it was; that is one of the benefits of the *bund* rules.

5615. If all you mean is that there should be trained men to handle the water, have any steps been taken in consultation with the Agricultural Department to do it?—We have been trying to get the cultivators themselves to take it up.

5616. *Dewan Bahadur Malji:* Have you a genuine desire to see this difficulty solved?—Very much so. I have refused other appointments which would have been very much in my interests.

5617. And you do not wish a deadlock to be reached?—No. We are getting round it by the special irrigation division.

5618. *Sir Ganga Ram:* Do you give all flow irrigation?—All flow.

5619. But is there no lift irrigation?—Yes, but we can utilise all the water we have got by flow; there are a few acres but it is not worth a man's while to lift water. The cultivator here does not like lift irrigation. He gets lazy when he has flow irrigation, he finds it is so easy.

5620. Our people in the Punjab like lift irrigation better. Are there falls on your canals?—Yes.

5621. What use do you make of those falls?—The trouble about using falls in the Deccan is that the supply is not continuous; it may run for 5 days and then may be closed for 5. Where the flow is continuous on a canal, there are no falls.

5622. You make no use of such falls as there are?—The crushing of the sugarcane at the effluent farm is done by water power, but it has never been taken up. We have got that in mind the whole time but the people do not want it.

5623. Why are you so much more ready to give water for sugarcane than to give water for food crops?—Because it means you can concentrate your irrigation and avoid the great loss by percolation in your channels.

Is not food of first importance in a country where you are subject to famines?

5624. *The Chairman:* If you were the dictator in this matter, how much water per acre would you give the cultivator of sugar?—My impression is that instead of 75 inches we should probably have to give them getting on for 100 inches.

5625. How much are they getting now?—140 inches.

5626 Do you suppose a reduction from 140 inches to 100 inches would reduce the acreage under sugarcane?—No, it would increase the acreage.

5627. You do not think the reduction in the water per acre would dissuade a portion of cultivators from planting sugarcane?—It will have to be brought

in very gradually. My idea would be gradually to increase the duty from year to year or every second year; but we would tell them, "That amount of water by your old methods will irrigate so much; if you can irrigate 10 or 20 per cent. more you may do so." They would do so, because it would bring in a greater profit.

5628. Even in the ideal conditions of a dictatorship, and yourself as that dictator, you do not contemplate the possibility of reducing the water from 140 inches to 100 inches in the first season?—No.

5629. It could not be done?—No.

5630. So that there is present in your mind the fact that the cultivators at any rate in the earlier stages of your experiment, if you insisted upon an immediate reduction, would turn to crops other than sugarcane?—They might give up altogether if it were brought in too quickly.

(The witnesses withdrew.)

The Commission then adjourned till 10 a.m. on Thursday, the 28th October, 1926.

सत्यमेव जयते

APPENDIX.

Note on The Sale of Water by Measurement for Irrigation by Mr. C. C. INGLIS, Executive Engineer, Special Irrigation Division, Poona.

The wide divergence of opinion which exists as to the feasibility and suitability of sale of water by measurement is due to a misconception of terms combined with confusion of thought.

2. The reasoning on which the argument for "sale of water by measurement" is based is usually somewhat as follows:—

(*i*) "It is desirable that the cultivator should get water when he requires it and in such quantity as will give him the best return."

(*ii*) "A man will take less water when he is paying for it than if his supply were not metered."

"It is obvious therefore that sale of water by measurement is eminently desirable."

3. Although the above line of argument seems at first sight to be conclusive, yet it is brimful of fallacies.

In the first place even if it were desirable that each individual cultivator should get water when he wanted it and in the quantity he desired; yet if this practice were followed the interests of the mass of the cultivators would be jeopardised; because variations from normal flow conditions would spoil the régime of the channels and so reduce the general efficiency; furthermore at periods of high demand all would want extra water, and if some men got extra water the others would suffer to a much greater extent than the pampered individuals would gain. In other words the more the interests of the individual cultivator are taken into account the more the mass of the cultivators suffer. This is the basic point of irrigation practice—namely that "the interests of the individual must give way before the interests of the mass of the cultivator."

4. Again, even if it were desirable to favour the individual against the mass, it would still be impossible to give water to individuals when they wanted it and in the quantities they desired—because an irrigation system is not like a town water-supply, with the water in pipes under pressure so that when water is wanted a tap can be turned. Under such conditions sale by measurement would undoubtedly be more economical than charging so much per house or a percentage on the rates; *but even in a town water-supply, should a water famine occur* (*i.e.*, when the "supply" is the "limiting factor" as in the case of irrigation) *further economy is obtained by cutting down the supply, allowing water to flow for only a few hours each day.* Hence, even in towns the highest economy is obtained by a system which restricts the supply far below the people desire, and distribution is then done on a system which is analogous to distribution of water by semi-modules. This is much more economical than mere metering.

5. Northing is more certain than that if a man who had hitherto been given a supply restricted by a semi-module were told he could take the quantity he desired by paying for it by measurement he would increase his supply per acre considerably. The reason for this is obvious. Take the case of sugarcane for example. By increasing the depth of water from 80″ to 120″ a cultivator could increase his crop by 2 tons per acre, which would bring in Rs. 50 additional return per acre. For this extra water he would pay Rs. 22-8, or he would increase his individual profit by Rs. 27-8. Is there any doubt he would take the extra water? Obviously there is none.

6. But what about the mass of the cultivators? Between them they would get 40 acre-inches less water than before—or sufficient to grow half an acre and produce an additional $\frac{1}{2} \times 34$ tons; or say Rs. 100 profit. There

would then be a net loss to the cultivators of Rs. 100 *minus* Rs. 27-8 or a loss of Rs. 72-8.

7. I may add that in this particular case the extra outturn of 2 tons would be purely temporary; because the extra water would damage the physical state of the soil; so that within a few years the man taking 120″ would get a smaller outturn than those getting 80″, and there would then be the double loss to the individual and to the mass of the cultivators. *Ignoring the damage due to extra water, however, we see that so long as water is the limiting factor "sale of water by measurement"* (in its generally accepted meaning, and the meaning in which I have found it is used by the cultivators and members of the Agricultural Department in the Deccan) *will lead to more water being taken per acre and consequently a reduction of area irrigated with a very big loss of potential profit to the mass of the cultivators.*

8. But there is another method of selling water which has come to be known as "sale of water at volumetric rates." Under this system water is distributed in exactly the same way as when rates are assessed on an area basis; the only difference is that *rates are assessed on water supplied* and *not on areas irrigated.*

9. The advantages claimed by the advocates of the system are that—

(*i*) The Revenue establishment who measure the areas, would be unnecessary; and so the cultivators would be relieved of interference and trouble caused by them.

(*ii*) The cultivators would be free to distribute the water as they wished.

10. Those who oppose this system point out that—

(*i*) The Revenue establishment would merely be replaced by Gauge Readers.

(*ii*) These Gauge Readers would be in a much better position to extort money; because

(*a*) they could falsify their records of discharges much more easily than areas could be falsified; and

(*b*) they could increase or decrease supplies without there being anything to show that this had been done, whereas areas irrigated can be checked at any time during the season in which the crops are irrigated.

(*iii*) There are no recording meters, except such as are prohibitive in price, which overcome the necessity for the human element, nor is there any cheap meter which cannot be tampered with.

(*iv*) Volumetric rates do not allow for differences of soil nor for losses in transit to fields; consequently the man with good land near the head of an outlet could irrigate a much larger area than the man with sandy land at the tail, yet both would have to pay the same for the water. Not merely would this be unfair to the cultivator at the tail; but it would also mean that the volumetric water rates would be kept down to the amount that the man at the tail could pay; whereas on an area basis the charges can be based on averages not on the worst case. It may also be pointed out that the main principle of irrigation assessment is that Government should take a fair share of the profits due to the water supplied. This is what occurs when charges are by areas; but would not hold if charges were based on water at outlet head.

(*v*) If there were no records of areas, information about low duties of individual fields or portions of outlets would not be known; there would therefore be no data available which would lead to remodelling, nor any effort to improve conditions. It is by going among the irrigators that we learn the clash between agricultural requirements and irrigation limitations, and without this knowledge there is not much hope of progress.

(*vi*) Water would be taken across drainage channels. This would not generally do much damage locally; but cause damage to adjoining areas, whose interests we must protect.

(*vii*) A man to save himself trouble would take water from an unsuitable part of his field instead of maintaining an additional channel. This would lead to more water being used and hence less profit. It may be argued that a man will not deliberately sacrifice profit; but we who have had to run canals know from long experience that when the choice lies between additional effort or a small, not very obvious loss, the line of least resistance will be followed.

(*viii*) Inspection of the outlet might not stop tampering; but this would be indicated by an excess area being irrigated. Hence the area irrigated would lead to the detection of tampering and false gauge readings.

(*ix*) If excess water were taken—either by tampering or by making a cut—there would then be no record of the excess water used and this could only be estimated by knowing the excess area irrigated.

(*x*) Though it would be advantageous for advanced cultivators with very large areas to be able to distribute water as they wished; this would be a double-edged tool and it is obvious that it would be exceedingly disadvantageous, not to say disastrous, for the small cultivators, who would only get what was left over by their more powerful neighbours.

11. There is no reason why—even with area assessment—distribution should not be done by the people themselves; indeed this may be said to be the present method in Sind; but experience shows that Irrigation Officers are called in from time to time by the cultivators to settle disputes and draw up revised share lists, and that if this were not so, conditions would become intolerable for the small cultivators.

The fact is that in India "public spirit" has not yet reached the stage at which the rights of the small men are respected.

12. To sum up:—We find that assessment at volumetric rates instead of by areas irrigated, though advantageous to the big cultivators, is quite unsuited to the interests of the smaller men.

We find also that there is no meter obtainable at a reasonable cost which will eliminate the human element, nor give measurements of equal accuracy to area measurements; nor is there any meter which cannot be tampered with, so that with quantity measurements the temptation to dishonesty would be enormously greater than with area measurements. In addition to this, charges would not be in proportion to the profits of the cultivators, which has hitherto been considered the fair basis for assessment. Consequently the rate would vary with the position and soil of a man's holding.

Finally, the staff would lose touch with the conditions of the cultivators, and their difficulties; and irregular practices—due to laziness or dishonesty—would arise which would reduce the general efficiency and cause damage in adjoining areas.

The arguments against sale of water at volumetric rates—except possibly where there are enlightened cultivators with very large holdings—are unanswerable, and even in these cases it should be borne in mind that if a Gauge Reader were dishonest the other cultivators and Government would suffer to a much greater extent than under the present system of assessment on areas irrigated.

We require meters, modules and semi-modules to enable us to distribute water as efficiently and as fairly as possible; but under present conditions and for many years to come assessment by area will in the majority of cases be preferable to the volumetric system of assessment.

Thursday, October 28th, 1926.

POONA.

PRESENT:

The MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.

Sir THOMAS MIDDLETON, K.B.E., C.B.

Rai Bahadur Sir GANGA RAM, KT., C.I.E., M.V.O.

Sir JAMES MACKENNA, KT., C.I.E., I.C.S.

Mr. H. CALVERT, C.I.E., I.C.S.

Raja Sri KRISHNA CHANDRA GAJAPATI NARAYANA DEO of Parlakimedi.

Professor N. GANGULEE.

Dr. L. K. HYDER.

Mr. B. S. KAMAT.

The Hon'ble Sir CHUNILAL V. MEHTA. } (*Co-opted Members.*)
Dewan Bahadur A. U. MALJI. }

Mr. J. A. MADAN, I.C.S. } (*Joint Secretaries.*)
Mr. F. W. H. SMITH. }

Dr. HAROLD H. MANN.

Further oral Evidence.

5631. *The Chairman:* In answer to a question by Sir Chunilal Mehta, you mentioned the existence of a Provincial Board of Agriculture in this Presidency, and I have asked you to be good enough to come back in the chair for a few moments to tell the Commission a little more about this Provincial Board of Agriculture, and particularly as to whether you think it is an active, useful body?—The Provincial Board of Agriculture was formed in 1919, on the suggestion of the Imperial Board of Agriculture, as a consultative body for the Government of Bombay in connection with agricultural matters. It was decided at that time that it should consist of about 40 members, comprising the heads and representatives of all the departments which were associated with agriculture, including co-operation, veterinary, irrigation, public health, and so on, together with about 25 officials of various sorts and about 15 non-official representatives of the agricultural interests in various districts. This was to be an *ad hoc* body, formed each year and was to meet once a year, generally for 3 days, to discuss an agenda framed by Government. In other words, it was a body which was asked to give advice to Government once a year on specific questions on which Government was desirous of getting advice. Since that time, it has met sometimes once a year and sometimes once in two years, the actual membership being determined anew for each Board. The last one was held in 1925.

5632. In your view, is a body of that nature, which meets only once a year, capable of bringing about co-ordination between the various departments which touch agricultural interests?—So far, as a co-ordinating body it has not been of very much value. It has been useful, however, in the sense that you have to gather on specific questions various types of opinion, and the combined opinion has been valuable to Government; but as a co-ordinating body between the different departments, I do not think it has done very much.

5633. During the course of your evidence, you adumbrated the possibility of some central advisory and consultative body for research purposes being formed?—Yes.

5634. If some such body were formed, would it not be important that a like body should exist in each Province?—I think it would be extremely valuable for such a body to exist. I have not thought really about what form such a body should take, but I think its existence would be extremely valuable.

5635. There is no other body in existence which would be capable of taking the widest possible view of agricultural progress and rural improvement generally, is there?—None. There is no other body which would do it at all, and I think a development of this Board of Agriculture might serve the purpose that you have in view. You may have a body like this meeting once a year, with a permanent committee just as in the case of the Indian Central Cotton Committee, which meets twice a year, and has a permanent sitting executive committee, which deals with matters between meetings, and has powers to deal with a very large proportion of the questions that arise.

5636. That Committee might keep in view the general interests, economic, social and hygienic, of the rural population?—I certainly think so. That would be an extremely valuable addition to our forces; and I think we might retain something in the nature of the present Provincial Board of Agriculture as a body which meets at intervals, say once a year, to which such a committee would report.

5637. Do you think such a body might even achieve a common mind between the Agricultural Department and the Irrigation Department?—Yes. I think there is no reason to suppose that it would not, provided of course the departments were ready to accept what such a body decided upon, subject of course to revision by Government.

5638. It is greatly to be hoped that they would?—Of course, in that matter there is a good deal of difficulty in bringing such a position about, because, as I said in my evidence before, one department is at the bottom a commercial department and the other is not.

5639. *Professor Gangulee:* Could you amplify this idea of a Provincial Board that you have suggested, and give us your views in writing?—I should be much pleased to do so if the Commission desired it.*

5640. *Mr. Calvert:* Is there also a committee on agriculture of the Legislative Council?—No.

5641. *Sir Thomas Middleton:* Following on the last answer which you gave to the Chairman about the difference of opinion between the Agricultural and Irrigation Departments, I listened carefully to the views put forward yesterday by Mr. Inglis, and I know your own views. I quite recognise how the difference of opinion comes in, but I heard Mr. Inglis say at the end of his evidence that he recognised that it was impossible, as a matter of practical canal management, to get such a small quantity as 75 inches of water adopted for sugarcane immediately. He indicated that the minimum he would be able to reach was something like 100 inches. Now, your own optimum is 125 inches, and you do recognise that there is something to be said for keeping the water-supply as low as possible, in the interest of the soil, apart altogether from those of neighbouring cultivators. Do you not think that, with a view to concentrating propaganda of both the Irrigation and Agricultural Departments on the work, you might both agree to recommend 100 inches of water for sugarcane?—I am absolutely ready to go this far. I am ready to recommend to the people not to water excessively, and to lay before them the facts, that by watering with 100 inches they can, with care, get the same results as they get with 125 inches. The trouble comes in, however, when the department comes and says, "You shall not have more than 100 inches." If it is a matter of propaganda, I think we can work together, but when a department says "You shall not, and the Agricultural Department supports us and says you shall not," all our propaganda in other directions becomes impossible. If it

* See Appendix B, page 271.

is a matter of propaganda by both departments, then I am entirely with the Irrigation Officer, but if behind that there is the sense that "We will compel you, and that on the advice of the Agricultural Department, to take not more than 100 inches," then you are ruining all my work.

5642. *Sir Chunilal Mehta:* The Provincial Board of Agriculture met in 1922, and we had then a good many cultivators from the irrigation tracts who came in and took part in the vernacular in the discussions of the Board. Is that not so?—That was hardly a meeting of the Board. It was a separate conference which followed it, and then we had a large number of cultivators who came in and took part in the vernacular in the discussion.

5643. There was a meeting of the Board in 1921 and also in 1922. Did you then notice that, as a result of the discussions, which were very general in character, in these Board meetings, it was thought that it was necessary, if we were to do any practical work, to have smaller bodies underneath that Board, or, let us say, that the general work of the Board should be done by these Divisional Boards of Agriculture?—That was the scheme which we worked out there, that the general detailed work which such a Board might do would better be done division by division by a special board created for each division.

5644. Yes, and which was more or less worked on the same principle, with four non-officials and two officials on the Divisional Board?—Yes.

5645. And those really have worked very satisfactorily?—On the whole, they have worked very satisfactorily. I am disappointed in some respects with them, but they have worked, I think, enthusiastically. My only criticism is that they have not taken to the detailed supervision of the propaganda work district by district and area by area in the way I hoped. Apart from that, they have done well.

5646. Can you conceive the General Board of Agriculture taking on detailed work such as the co-ordination of the Irrigation and the Agricultural Departments?—Not as a Board, no.

5647. It would be extremely difficult for them to do that as a Board?—I think so, but the idea of having a standing committee of such a Board might be useful in that direction.

5648. The point I want to be understood is that merely by the creation of a general Board we are not going to advance towards practical results?—No, I do not think so.

5649. You get advice from them which Government would be glad to have, but for getting practical value you must have these smaller boards?—We must have a smaller body.

5650. Acquainted with the local conditions?—I agree.

5651. *Sir Ganga Ram:* I was much surprised to hear the evidence of Mr. Inglis. What business have you to interfere in the work of the Irrigation Department? In the Punjab, the Agricultural Department's work is to advise the people what crops to grow and what seeds to sow. In the Punjab the Irrigation Department has nothing to do with the Agricultural Department, and *vice versâ*. I do not know why in Bombay this non-co-operation between the two departments should exist?—I do not think there is any non-co-operation and I do not think that we interfere in the least with the work of the Irrigation Department.

5652. You are responsible to the people for the production of the soil; you are not responsible to the people for getting them enough water?—I am responsible for giving them information as to the best methods of cultivating their land, the best amount of water to use and the best methods to adopt generally.

5653. And the most economical way of using the water?—Yes.

5654. Do you endorse the view of Mr. Inglis that the people have no right to water?—In the Deccan, here, nobody has any right to water.

5655. What is the water for if the people have no right to it?—Let us be quite clear. No individual has a right to water, but the people as a whole

have. There is not enough water for everybody. There is only, in fact, enough water for about a quarter of the people. That is to say I, who have a piece of land here, have no special right to water as against my neighbour, and according to the conditions at any time the Irrigation Department or the Government can give it to me or to my neighbour as they please.

5656. It is not your department's duty to determine who shall have it?—No.

5657. It is neither your duty nor that of the Irrigation Department?—It certainly is not mine.

5658. I do not understand how you come to advise them to use 140 inches of water for sugarcane, which means that they could grow, with the same water, a food crop ten times as great. On what agricultural ground do you allow them to ask for 140 inches of water?—I could grow with 140 inches of water ten times the area of wheat. I have nothing to do with determining whether it be wheat or sugarcane that is grown on the canal.

5659. You leave that to the people?—That is between Government, the Irrigation Department, and the people. What I do is to say, "If you are growing sugarcane, this is the best method to grow it, and if you are growing wheat this is the best method to grow it."

5660. Does Government dictate to the people what to grow? Who dictates to the people? In our part of the country, we are accustomed to the Irrigation Department saying "You have got so much gross area; you are entitled to so much water," and the Agricultural Department advises as to the best way of making use of that water. I do not see that there is any ground for non-co-operation between them?—I am sorry the word non-co-operation has been used, because there is no such thing.

5661. We understood distinctly from Mr. Inglis that there was?—All we do is to indicate the best methods of growing the crops, when the nature of the crop is determined. We do not say so much water should be given for wheat, and so much for sugarcane at all. That is not our business.

5662. *Dr. Hyder:* Do the irrigation people press the people to grow any particular crop?—The Irrigation Department invites, at the beginning of the year, applications for water for sugarcane, for other perennial crops, for *rabi* crops, for eight-months' crops, and for *kharif* crops, and having got the figures they determine how they shall utilise the water. We do not have anything to do with it.

5663. *Mr. Kamat:* Do you think the Provincial Board of Agriculture meets often enough to be of sufficient use?—In recent years, it has met once in two years. I should prefer it to meet once a year and have, as I said before, a standing committee.

5664. The two improvements necessary are that it should meet oftener, and should have a standing committee?—Yes.

5665. About this irrigation controversy, we were told that the motto is the greatest good of the greatest number. I want to know whether it should be for the greatest number of people or the greatest number of acres under sugarcane which the supply of water may justify?—Of course, to me the purpose should be the utilisation of that water in order to produce the largest value of material, whether it is to be produced on a limited number or a very large number of acres.

5666. As a matter of policy, from the business side to the agriculturist, is it better to allow him water for 5 acres and starve those 5 acres or to give him water only for 4 acres, but give it in sufficient quantities to ensure a good outturn?—I do not believe in restricting water so that you cannot produce a first class crop.

5667. *Mr. Calvert:* With good cultivation?—Naturally. I do not believe in restricting the water so that you cannot produce a first class crop. But naturally if you can get a first class crop with less water, I am absolutely in favour of doing so.

5668. *Mr. Kamat:* Is it possible for the Manjri farm to make experiments in co-operation with the Irrigation Department, and come to definite results? —Perfectly.

5669. About the co-operative movement, we were told by Mr. Collins that he had reached about 12 per cent. of the total number of agriculturists so far as finance was concerned. As a whole, what is your general impression? Are these societies well managed in the majority of cases, or are some of them, a large number of them, only one-man societies?—I think it is generally recognised that a very large proportion of the societies are one-man societies; that is to say, the co-operative element is comparatively small. Most of the members belong to them for the sake of getting loans. Of course, there are a few exceptional ones like Hadapsar, which we saw this week, and I could name others. But a very large proportion of them are societies run by one or two enthusiasts.

5670. So far as useful work is concerned, mere statistics that we have reached 12 per cent. of the population are not a good index?—Not a complete index.

5671. *Professor Gangulee:* I have a suspicion that this desire for excessive waterings on the part of the cultivator may be due in part to his desire to make up the deficiency caused by bad cultivation?—I think that is to a very considerable extent true. I think that water, and I may say in the Deccan, manure are both used in excess in order to make up what might be made up by good cultivation.

(The witness withdrew.)

सत्यमेव जयते

APPENDIX A.

Trees which do not seriously damage crops near which they are grown.

1. *Prosopis spicigera* (*Shami* in Marathi, *Kundi* in Sind) is well-known as injuring crops very little.

2. *Albizzia stipulata* is grown among tea and coffee regularly, with benefit to the crop.

3. *Dalbergia latifolia* is likewise grown among tea and coffee with benefit.

4. *Erythrina indica* is used all over the Deccan as the support for grape vines, with considerable benefit to the vines.

Nos. 2, 3 and 4 are usually used where there is plenty of water in the soil.

5. *Thespesia populuea* (*Bhend*, the cartpole tree or the Indian tulip tree) is grown largely near rice fields in the Konkan, without injury. It grows on well-drained soil, and in a damp atmosphere.

6. *Pongamia glabra* (*Karanj*) has the same reputation as the last, but I have myself not tested it.

7. *Polyaltha longifolia* (*Ashok*) is an erect tree with more or less short branches. It is planted near other crops in Gujarat, without very great injury.

8. *Mimusops hexandra* (*Khirni or Rayan*) is a large spreading tree, and grows well in the Konkan and Deccan. Mr. Paranjpye states:—"In Ahmednagar district, I have seen a good banana plantation, growing near a large tree."

9. *Eucalyptus* seems to allow *jowar* fodder crops to grow satisfactorily quite close to it.

APPENDIX B.

Provincial Board of Agriculture, Bombay Presidency.

The formation of the Provincial Board of Agriculture in Bombay had its origin in a suggestion from the Government of India (dated September 18, 1918) based on discussion in the meeting of the Board of Agriculture for India, that such Board should be formed in all the major Provinces. The suggestion was approved and it was decided that a Board should be constituted as follows (Government Order, Revenue Department, No. 9565 of 15th September 1919):—

1. A member of His Excellency the Governor's Executive Council (Chairman).
2. The Director of Agriculture (Secretary).
3. The Registrar of Co-operative Societies.
4. The Director of Industries.
5. The Superintendent, Civil Veterinary Department.
6. The Superintending Engineer, Deccan Irrigation Division.
7. Twelve officers of the Agriculture, Co-operative, Veterinary and Irrigation Departments selected by the officers under Nos. 2—6 above, and approved by Government.
8. Two other officers selected by Government from any department.
9. Ten non-official members from various parts of the Presidency proper, selected by the Director of Agriculture and approved by Government.

The total number of members was, hence, thirty. The members under 7, 8 and 9 were to be selected *ad hoc* for each meeting, according to the agenda proposed.

A separate Board was to be formed for Sind, but this has never come into existence.

Under this scheme meetings of the Board were held in 1920, 1921, 1923 and 1925.

The resolutions of each meeting were placed before Government, and decisions taken on the recommendations of the Board.

Now there is no doubt that these meetings of representatives of most of the departments concerned with rural development, with a number of leading non-official gentlemen interested, directly or indirectly, in rural affairs, have been of considerable value, and have, to a certain extent, guided policy in the various departments concerned. On the other hand, the co-ordination of work thus induced has not been, in my opinion, so effective as it might have been if there had been a small standing committee which, under the Presidency of the Minister for Argiculture held together the threads of the work in the interval.

Hence I would suggest to the Commission, that to enable the Provincial Board to be of the full value of which it is capable, it would be wise to provide as follows:—

1. Between the meetings of the Board of Agriculture, there should be a standing committee consisting of the Minister for Agriculture, the Director of Agriculture (Secretary), the Registrar of Co-operative Societies, the Director of Industries, the Superintendent, Civil Veterinary Department and two other officers selected by Government,—and five non-officials elected by the Board itself to act on the standing committee until the next meeting of the Board.
2. The standing committee should meet at least once every six months under the chairmanship of the Minister for Agriculture.
3. This standing committee should be the ordinary body consulted by Government on all questions of public importance concerned with rural development and especially on the co-ordination of the work of the various departments concerned in such rural development.

Such a standing committee would form a link between the different meetings of the Board itself, even if the personnel of the Board changed considerably at successive meetings, and the standing committee would report to the Board on its opinion stated and advice given on all matters referred to it and on which it was consulted between the meetings of the Board.

सत्यमेव जयते

Mr. R. T. HARRISON, Secretary and Chief Engineer for Irrigation, P. W. D., Bombay Presidency.

Oral Evidence.

5672. *The Chairman:* Mr. Harrison, you are Secretary to Government in the Public Works Department, and Chief Engineer?—Yes, for Irrigation.

5673. I understand you desire to make a statement of a general character before the Commission proceeds to question and answer?—May I be given a few minutes? I am having it typed, to be more concise. I can answer any general questions in the meantime.

5674. Do you favour the plan of a central research station for irrigation in India?—I do.

5675. Would you care to develop that idea?—I think it should be the natural outcome of the formation of this Irrigation Board.

5676. You also favour the creation of an Irrigation Board?—Yes.

5677. What will be the function of that Irrigation Board?—It will be purely a body of Engineers, a panel chosen from the Chief Engineers for Irrigation of all Provinces. The Board will never sit as a whole, but from it will be chosen a sub-committee, generally of two Chief Engineers, with the Consulting Engineer to the Government of India as chairman, and projects will be submitted to them. The Engineers will be chosen with regard to the projects which they have technically to advise on. That is to say, if we put up an irrigation problem, we would have, say, the Chief Engineers of the Punjab and United Provinces to advise on it. It would be no use bringing in the Chief Engineer of Bengal, Burma, or possibly Madras. They would only deal with the subjects which they know most about, and be chosen in relation to that fact.

5678. The prime function of this Board, I take it, will be to advise the Government of India in irrigation matters touching the interests of more than one Province?—Yes.

5679. Would it also be at the disposal of Provincial Governments for advice in the matter of schemes which were within the limit of provincial sanction?—Of course, that would depend on the Provincial Government desiring that information.

5680. If they so desire it?—Yes. That is the idea, and I hope it will fructify.

5681. Do you definitely prefer the proposal of a Board constituted in the manner you have suggested, to a single officer appointed in the capacity of Irrigation Adviser to the Government of India?—Yes. It will strengthen the Provincial Government a very great deal, politically principally. It will strengthen the Government of India in the same way, and it will finally strengthen the hands of the Secretary of State.

5682. Is it your view that, on the whole, it would be an advantage to India and the cultivator if the Government of India were in a position to take a more active part in large schemes and more active direction in cases where two or more Provinces are concerned with one particular scheme?—Answering for myself, I think it would. I do not think that this squabble (if I may so describe it) between ourselves and the Punjab could have arisen under the old régime. But I hold that it is not fair to the new régime to put all the blame on it. I think the Government of India should have adjusted themselves to the new conditions, and in this particular question between ourselves and the Punjab, I would suggest the formation of some such Board as exists on the Nile; an Indus Board. That river was not given by the Divinity to the Punjab or to ourselves. It was given to the whole country, and it is impossible to deal with it in parts. I have not worked out the scheme altogether but I have some idea as to what I would like.

5683. You do not think the Central Advisory Board could deal with cases of difference of interest or opinion as they came along?—No, not on a ques-

tion like that. It is much too big. The issues are so immense, especially to us, though not perhaps to the same extent to the Punjab.

5684. I understand that you are anxious to make a statement on this question in a moment or two, and I will return to it then. On quite a different point, have you any views which you care to put before the Commission as to the relative advantages of the system of acreage charge and charge by volumetric system?—Yes. I consider that the volumetric system is in the present conditions in this Province impossible. We have tried co-operation, that is, giving out distributaries to the zamindars or cultivators on it, and in only one case have we had anything like satisfactory co-operation. In another case we have had a sufficiently satisfactory trial to extend the conditions by three years, but in several other cases we have had to take back the distribution into our own hands as the cultivators could not arrange matters properly amongst themselves. On the general question of volumetric sale of water, we would have no hold over the area of land that would be cultivated. The present cry all round is for more water. It is most likely that if we sold our water by volume we should have a considerable decrease in the area at present cultivated.

5685. That would involve also a decrease in the total crop produced?—Yes.

5686. What are your views as to the possibility of developing minor irrigation schemes in this Presidency?—My general view on minor irrigation is that where we cannot construct major irrigation works, we should unquestionably go in for minor irrigation works. There are several parts of the Presidency, such as the district of Bijapur, where it is almost impossible, from the physical nature of the country, to consider any practical major irrigation schemes, and therefore in such cases, from the irrigation point of view, minor irrigation works such as tanks are most necessary. We can only meet the situation in that way. There is also the question of village water-supply and there they are extremely useful and indeed necessary.

5687. When you speak of minor irrigation works, would you include small schemes of improvement carried out by one or more cultivators?—Yes, within the limits laid down. One of our officers, a Superintending Engineer, has been put on special duty to investigate these minor irrigation schemes. He is not under my control now, except technically. I think the monetary limit put to his efforts is 1½ lakhs of rupees.

5688. *Sir Henry Lawrence:* That is the limit of his budget?—No, the limit of an individual work.

5689. *The Chairman:* Have you any experience of the capacity of co-operative societies to initiate, carry out and control such minor schemes of irrigation?—No. I have not.

5690. Do you think there is any prospect of their being able to do so?—I think so. Answering casually, I think it should be tried. It is a question of leadership.

5691. *Sir Chunilal Mehta:* Have you not an example in the co-operative distribution of water in Nasik?—Yes. I was thinking of the department now run by Mr. Collins and which used to be run by Mr. Rothfield. I thought the Chairman referred particularly to that. I mentioned that we have tried co-operation in the matter of handing over the distribution to the cultivators.

5692. *The Chairman:* I was not thinking of the department under Mr. Collins carrying out this work. I was thinking of the co-operative societies which it is the duty of Mr. Collins to foster and encourage carrying out this work?—Yes, but it will come within his purview.

5693. Have you had experience of the working of District Local Boards?—I have been *ex-officio* member of the Local Boards of all districts where I have worked as Executive Engineer. But that is some years ago now, and I can hardly speak with any confidence of them at the present time.

5694. Have you any views about District Boards in relation to their control of roads under their charge?—That is not my sphere. You will probably get better information from Mr. Framji, but the opinion I have formed is that we

should be chary about handing over roads in any great quantity. The demand of the Local Boards should not be granted as quickly and inasmuch quantity as they want.

5695. What about roads in canal areas?—We have made special roads called service roads. Those, of course, are always maintained and will be maintained by us, and are rather outside the question of handing over roads to Local Boards.

5696. They are but of course any extension of your responsibility in the matter of roads would touch District Boards?—We could not hand those roads over. It would not be fair to expect us to do so.

5697. One of the officers of your department has suggested that more roads should be taken over by the Irrigation Department?—In our own area?

5698. Yes. What do you think of that idea?—That is a question of opinion and expediency. We have done that in some districts. We have done it chiefly because, as I have said, it is a question of expediency, and we get our repairs done when we want them, and also it is economical as it prevents overlapping of duties.

5699. Have you commenced recruiting for the new Superior Provincial Engineering Service?—Yes, we have; it is in full blast.

5700. How about the training of officers for that service? Do you suggest any change there?—Not particularly. For the Provincial Engineering Service, I think the class of men we now get is quite good. The education that is given now is merely an improvement on that given to what we used to call Upper Subordinates. In many particulars it has been merely a change in name. These men used to be called Upper Subordinates and they are now called Assistant Engineers, but the improvement in their status and pay does react naturally on the quality of the men we get and it is improving.

5701. Has it ever occurred to you that by means of a short examination paper or by means of a short period of attachment to the Agricultural Department or by both means, young officers of your own service might be brought into much closer touch with agricultural problems?—I have not considered it, but I was listening yesterday to the examination of Mr. Inglis, and I think it would be sound. It would correspond to what was done at Cooper's Hill. I am a Cooper's Hill man. We were always given a vacation task. As one such task I visited the Shaft and Axletree Company at Wednesbury and learnt how steel was manufactured. I think it would be a very good thing if these men were called upon to give up a period of their vacation for such training, if it cannot be fitted into the term, but I think the idea is very sound and it is necessary.

5702. The Army obtain co-ordination between various arms by sending them for training to other branches. It is a close parallel, is it not?—Yes, I agree.

I think now my colleagues will ask you questions. They will ask questions confined to matters other than this difference of opinion between your Province and the Punjab, as I understand that the statement you are going to deal with covers that matter alone.

5703. *Sir Henry Lawrence:* You mentioned that in one case the sale by volumetric measure was satisfactory?—No, I did not; not by volumetric; it has never been tried anywhere. I mentioned that we tried co-operation on the acreage system; that is handing over the distributaries to the cultivators and leaving them to run them.

5704. I thought in that case the water was measured volumetrically?—No.

5705. Where was the case where the cultivators carried out the distribution satisfactorily?—I think that it was in the territory of the Raja of Malegaon.

5706. Near Baramati on the Nira Canal?—Yes.

5707. In that case it succeeded?—Yes.

5708. In others it was a failure?—One is being given another trial.

5709. How many cases have you tried?—About five altogether.

5710. And in the other cases, the cultivators quarrelled among themselves about the distribution?—Yes, it was satisfactory only in one case.

5711. I think you said that if you introduced sale by volume that would decrease the crop produced. Can you explain why it should?—In the present mentality of the people and their lack of agricultural sense which is based on their lack of education, they would not, I consider, use the water with the discretion that we do, and the tendency would be to over-water, and naturally with a fixed discharge that would mean a reduction in area.

5712. *Dr. Hyder:* What control have you got at present over the area irrigated?—We have the control over the discharge into the distributary and we see that some water goes to every man. Take Sind which I know specially well; we guarantee some water to everybody and it is our duty to see that it gets to everybody. But if it was handed over to the control of the cultivators themselves the big man would grind the face of the poorer and smaller men.

5713. *Sir Henry Lawrence :* I take it that your view is that your control of water and distribution is the best thing for the country and for the taxpayer?—I do

5714. It improves the condition of the crop and brings in more revenue incidentally, but it is actually for the benefit of the general taxpayer?—Certainly.

5715. You are quite certain about that?—That is our object.

5716. It is not merely for the sake of tyrannising?—No, I hope not.

5717. That is the suggestion?—That is what we are suspected of doing, but I repudiate and resent that strongly.

5718. You suggested that it would not be fair to hand over roads in irrigation areas to the control of District Local Boards. Was that your statement?—I should not like to see it done.

5719. To whom would it not be fair?—It would not be fair to us as a department. We built these roads, and we built them for a particular purpose. If they will keep them in the repair as we do and if they will appoint the skilled men we have to run them, all well and good; but in the present state of things, I know of very few District Local Boards where there is any man with any engineering knowledge fit to be called such.

5720. Then your point is that these roads would fall into disrepair, under district control, and that would be injurious to your irrigation?—It would be to us and to the cultivator who use these roads.

5721. It would not be fair to the cultivator, is that your point?—It would not be fair to the people in general, and ourselves.

5722. Do you draw any distinction between your departmental point of view and the point of view of the cultivator?—Not very marked, no. We want our roads primarily for our own use. We built them for the management and control of the canals, and incidentally they are useful to the people in that tract.

5723. Then if these roads fell into disrepair it would interfere with your management of irrigation canals?—It would.

5724. That would be detrimental to the interests of the taxpayer?—Yes.

5725. I want to be quite clear; it is no question of departmental prestige?—No, no question of departmental prestige.

5726. *Sir Ganga Ram:* Are you the Engineer of the Sukkur Barrage?—I am Chief Engineer for Irrigation of the whole Presidency of Bombay.

5727. Is Mr. Inglis under you?—Yes.

5728. Mr. Inglis has told us that the people have no right to water. Do you endorse that opinion?—I do not know if he said that. What he said, I think, was that no guarantee could be given. A guarantee is a different thing.

5729. I understood him to say that it was at the will of the Irrigation Department to supply water as they liked and to whomsoever they liked. Do

you endorse that view?—The conditions in Sind and the Presidency proper are very different. Down here it is a question of applying for water.

5730. Generally the civil department will settle beforehand the area to which the irrigation should be extended?—We lay down our area of command.

5731. Is the right of the people to claim water determined by the Revenue Department or your department?—It is done by us.

5732. Not by Revenue Department?—No.

5733. I do not think the question of volumetric system was rightly understood by Mr. Inglis, or, if I may say so with deference by yourself. The volumetric system is not intended to give a man as much water as he applies for, but to give what he has a right to get. Have you any basic principle on which you give the water? Supposing a man has got a gross area of 1,000 acres, how much water is he entitled to?—Take Sind in which the conditions are analogous to those in the Punjab. We endeavour to give a man water for a third of his area. Suppose a man has 900 acres, we endeavour to supply water for 300 acres, and then we fix the duty for *kharif* and *rabi*, and we supply that quantity of water.

5734. If I may explain to you the volumetric system, supposing you fix 2 cusecs, under the volumetric system they will not give more than that quantity. Many people would take more, but Government will not give more because it would affect the interests of other zamindars. In the Punjab they have got a modern machine, which cannot be tampered with, to measure the water. It works clock-like, and only gives 2 cusecs. I am willing to pay double the rates but I cannot get more water than what I am entitled to. In that area in which you said it has been a success, did you give them as much water as they wanted?- We handed over the distribution from the distributary to the cultivators; we fixed the discharge going into the distributary, we did not hand over the control of the discharge into the distributary, but after that the distribution was left to the cultivators themselves.

5735. One or two questions about the Sukkur Barrage. I am not asking you anything about the controversy between Bombay and the Punjab. I am only asking you what was the estimate of the Sukkur Barrage when it was first sanctioned?—There is no revised estimate.

5736. There have been articles in the papers about your having revised estimates?—No. The estimates for works is 17,82 lakhs and for indirect charges another 53 lakhs. That is about 18,35 lakhs.

5737. Do you find these draglines economic?—Very.

5738. May I know the cost?—I cannot tell you exactly, but I can send you that information. My brother is in charge of the works, and I have heard from him on this point.

5739. Oh, it is your brother; I thought you were in charge of it. That is why I asked you that question. There is no possibility of your sending a revised estimate?—I hope not. I should be very sorry if it came to that. I think I should probably depart with it.

5740. Your calculations were based on so much water being required for paddy. Can you tell what it was?—I cannot give you a lot of figures without notice. I had some supplementary questions and if this question had been included I should have been able to answer it. Taking rice, we want an average depth of 4·5 inches and 10 to 15 waterings. That would give a total of 4 to 5 feet.

5741. It is 4 or 5 feet?—I cannot definitely give it.

5742. *Sir Thomas Middleton :* There is one expression which you used about which I am not quite clear. You stated that the sale of water by volume would result in a decrease in the area irrigated?—The area cropped.

5743. Would you agree that that statement would only apply to conditions in which the supply of water is much less than would be required by all the cultivators in the area commanded? It is a statement which refers to your special conditions?—Yes, it is.

5744. *Dr. Hyder:* At present I am not prepared to accept the argument which you have advanced that if this volumetric system were introduced it would result in a diminution of the area cropped. I take it water is precious and you have to make it go as far as you can. I make a clear distinction between your works in the Punjab and in Sind. Take Sind where you have perennial supplies?—Unfortunately we have no perennial supply yet.

5745. For instance, where you have a system such as that at the Sukkur Barrage, which is a copy of the Punjab model; even there I am prepared to admit that no amount of water would cultivate the whole area in Sind; that is to say, the water is limited and the demands for it are excessive. But at the present time you know the extent of the irrigated area in Sind; in the Deccan you know the area that is irrigated and which you can irrigate with your limited quantity of water. On the canal you have different people with different amounts of land; add them up and you know what your present revenue is and what is the present area irrigated. You put a price on your water and say, "This is going to be our water rate; we are going to deliver on both sides of the canal to the cultivator so much water and the water rate is going to be so much." You as canal officer and as Head of the Irrigation Department would not lose the canal revenue. The cultivators then say: "Of course we can indent indefinitely upon the Irrigation Department and tell them to send us so many million cubic feet of water." But you say, "I cannot give you that amount, because, even if I were to satisfy the demands of people situated at the head of the canal what about these people lower down? I could not meet the demands of all these people." I suggest to you it need not necessarily follow that there will be a diminution in the area cropped; because you know what your area at present irrigated is, and you add up all these demands and say, "Yes, we are going to deliver so much water to the people in that locality; now you can do anything you like with it." I take it that the one disadvantage of the present system is that it is a wasteful and uneconomic system, otherwise there would be no need for the introduction of the volumetric system. We want to make the water go as far as possible, and the cultivator probably wastes a good deal of water; but what change will take place if you merely deliver a certain amount of water to the cultivator? He cannot become more wasteful?—Are you not assuming that this man is highly intelligent?

5746. No, I am assuming he is as ignorant as he is; that there has been no change either in his intelligence or his methods. The only change is that they have taken a certain quantity of water and you put the price on that quantity. I cannot see why a reduction in area need necessarily follow, because they cannot become more uneconomical after you have introduced this system?—I do not altogether follow you; the speech you have just made is a very big thing to digest. But the point is this that if we supplied that water and just got the money for it, how would we protect ourselves afterwards? If the cultivator did not cultivate the area that we expected, how are we to get him to do so?

5747. You protect yourself by selling a certain quantity to him; you sell a certain quantity of water to all the people combined in a particular tract. There is a combination in one village, and you say, "You have to pay so much; we are not so much concerned with what you do with the water." My point is that these people, though remaining as ignorant after the event as they were before, would be induced to spread out their water as much as they can in order to have a larger area irrigated. I thought that was the only merit of this volumetric system?—If I were to admit this argument of yours, the whole case against this volumetric system would go to pieces.

5748. *The Raja of Parlakimedi:* As regards the rate for crops, do you change it year by year or have you fixed it once for all?—The rates are fixed for a period of years.

5749. Does your department ever consult the Agricultural Department in fixing the rates?—I cannot say that there is any direct and ordered co-opera-

tion of that kind; I think it is left a good deal to the Irrigation and Agricultural Departments to co-operate at present.

5750. Would you welcome the idea of co-operating with the Agricultural Department?—I think it is very necessary.

5751. As regards roads, is the present system of handing them over to the District Boards working satisfactory?—I am not in charge of that sphere of work. My colleague Mr. Framji is. But I must say that it is doubtful unless you improve the professional side of those bodies that it will lead to efficiency. I fear under the present conditions it will lead to neglect and inefficiency.

5752. As to the trunk roads I want your opinion as to whether it would work well if a central fund were raised and the whole management put into the hands of a central body?—I fear that is altogether out of my province.

5753. *Professor Gangulee:* Was not the considered opinion of the Irrigation Commission in favour of the volumetric system? -Yes.

5754. What were the difficulties in adopting that system? I could not quite follow your arguments. First you say it would reduce the acreage?—Yes.

5755. What is your second point?—That is my chief and main objection. I am quite ready to think it over and let you know, but that is my chief objection at present.

5756. *Mr. Calvert:* Can you give us any figures regarding the interest position of some of your major works?—Yes. These figures I showed you yesterday are susceptible of great reduction. I got a list of your supplementary questions from Mr. Inglis; I did not get the list myself; but when I looked up these points I was struck by the extraordinary accumulation of arrears of interest. But I have discovered since working things out last night that this must be reduced by the amount of revenue that has been obtained. Therefore the proper debit is the balance, the accumulated arrears of interest.

5757. What are the accumulated arrears of interest?—These are found in the Administration Reports for the various years. Taking the Godavari Canals, the area actually irrigated is, say, 51,800 acres. The actual cost of constructing the system was 105 lakhs. That would give us 203 rupees per acre irrigated. The accumulated arrears of the interest to date would work out to 25¾ lakhs. It would bring the figure per acre irrigated up to about Rs. 247.

5758. *Sir Ganga Ram:* Interest at what rate?—That is laid down by the Accountant General. It varies.

5759. *Mr. Calvert:* It is 25 lakhs accumulated interest on a construction cost of 105 lakhs?—Yes.

5760. Is the Godavari Canal paying interest?—No. All the Deccan irrigation schemes are worked at a loss. There is only one canal, the Nira Left Bank Canal, which pays.

5761. So that your debit for accumulated interest is rising?—Yes. Now we will take the Nira Left Bank Canal. That is the only one in which the figure is decreasing, because that pays something like 7 or 8 per cent. We have got 77,000 acres irrigated; the actual cost works out at Rs. 87 per acre irrigated and allowing for the accumulation of interest charges, we get Rs. 99 or about Rs. 100 per acre. The Mutha canals give us 18,000 acres and with the accumulated arrears of interest the cost per acre irrigated works out at Rs. 583. I only bring that in to show you that it is not altogether as simple as perhaps you think, to take the actual figures. It is not all plain sailing because in the latter case we have to supply Poona with water and there is a very great demand. That curtails our expansion of irrigation. So that that figure should be considerably less, but you can take it as I have given it you. that from 99 to 250 rupees is the cost per irrigated acre including actual arrears of accumulated interest.

5762. Has the accumulated arrears of interest in any case exceeded the capital cost of the canal?—No, that is wrong. I showed you those figures, but I discovered afterwards that the Accountant General for accounts purposes had culculated the whole of the interest up to date. Why he did this I do not know but he had not made the deduction in those figures for the revenue that had been received.

5763. Under the Bombay system the accumulations of interest are being steadily debited to your department?- Yes.

5764 They are not being carried to the Famine Insurance Fund?—No.

5765. I think you prepared the answers to some of the supplementary questions?—Yes.

5766. Is there anyone of those on which you would like to help the Commission with your opinion and advice? Could you, for instance, compare the capital costs and recurring costs per acre irrigated, with other sources of irrigation of land, such as wells?—No, I could not.

5767. *Mr. Kamat:* What is your view, as to whether the Irrigation Department should be in the hands of the Minister of Agriculture?—I feel strongly about that. I do not think it can possibly be for many years a Transferred subject. I hold that it is most necessary to have continuity and the control must be, I think, out of the hands of the Ministers.

5768. What particular difficulty do you apprehend, that your projects would not be properly understood from the technical point of view?—No, not at all.

5769. That is not the difficulty?—No.

5770. Then what precisely is the difficulty?—All our money would be subject to a vote. That has a particular bearing upon major irrigation works. In the past we used to provide for these major irrigation works and Government used to provide for them out of revenue. I remember the first year I came to occupy my present position I was given 45 or 50 lakhs of rupees for these Deccan works. The rains held off very late and I was asked to give up, I think, 28 lakhs. So that you never knew what amount you would get. The result was that our works cost an immense amount of extra money in overhead charges. Sir George Lloyd instituted the present system of borrowing the money, which is very right, so that posterity will pay for the benefits they will receive. If this money is subject to vote there would be a very grave liability of its being subject to the chance of political favour.

5771. In other words, you fear that the legislative bodies would turn down your proposals although the Minister may advocate them?—Undoubtedly. I do not care under whom I serve. I am at present under Mr. Cowasji Jehangir.

5772. In answer to Sir Henry Lawrence you stated that the present system is based on the good of the public and is not intended to tyrannise over them. Do the people ever suggest for a moment that it is a tyranny? Is not the clamour merely for improvements in the present system?—Speaking quite candidly, I think, they regard the rules we institute as oppressive and they think we institute the *band* rules and other rules purely for our own pleasure and profit as a department. I think the feeling is that we do harass them, and I would do anything in my power to remove that impression.

5773. Whenever you issue any new rule, do you publish the proposed rule for criticism or suggestions in the same way that motor vehicle rules, for instance, are notified by the Government?—No. We are, after all, only a department of Government. The matter is first of all threshed out between ourselves and the local Revenue Officers who are very closely in contact with the people. After the matter is decided, the rules come up to Government for sanction. Thereafter they are published.

5774. But so far as the public are concerned you take them unawares?—The Reforms have only been in operation for five years. Before that we did not consult cultivators to the same extent as we do now.

5775. Is this one of the causes of the dissatisfaction we find generally amongst the public and could it be avbided?—Yes, I suppose that is one of the reasons; but I suppose we all dislike taxes and various necessary restrictions.

5776. Do you concentrate your attention on the major irrigation works? Do you also pay attention to the development of tanks and minor irrigation works in different districts?—Yes, our ideal now is major irrigation; but of course until Mr. Lowsley was appointed the Ordinary Divisional Irrigation Officer did it.

5777. You give all possible facilities to the minor irrigation works?—Yes. We would not omit constructing necessary tanks if we could get the money to do so.

5778. You are perfectly equitable towards all districts?—As far as possible. They do not think so however.

5779. *Dewan Bahadur Malji:* When determining the quantity of water to be supplied to cultivators, have you ever consulted the Agricultural Department as to the quantity?—I do not think so. The Agricultural Department is a fairly modern growth.

5780. Do you think it should be done?—We must do it. There must be much more co-ordination between the two.

5781. Mr. Inglis told us that one department talks in one language and another department in another language. I think you can speak in English and finish the matter?—Yes. Co-operation will break down many barriers.

5782. *Sir Ganga Ram:* Are you in favour of lift-irrigation?—No.

5783. Would you encourage lift-irrigation because if a man has to lift water he will not waste it, as he has to spend some effort to lift it?—From the technical point of view we endeavour to get all flow for the facilities for the distribution of the water. Also, lift is objectionable because it requires so much labour.

5784. Do not people like lift-irrigation?—Not if they can get flow.

5785. Do you make any use of the falls in the canals?—No, we have no demand.

5786. Have you considered that by the force of the fall you can raise the water automatically?—We take our hats off to the Punjab in many respects and we hope they will give us a chance of emulating what they have done.

5787. Suppose there is good land one foot high close by and there is a fall, cannot you make use of it to lift the water by the force of the fall?—Yes, we might easily, but we would have to charge more. In the Punjab they do not mind what they pay, but there is very great difficulty in getting even the small rates we charge now.

5788. We were told by Mr. Inglis that lined canals have been successful here?—Yes, but it is a very expensive method.

5789. Can you give me an idea of the cost per mile?—No, not at present, but may I send you that?

5790. Will you do so?—I will with pleasure.

5791. What value do you get for one cusec of water? We get about Rs. 1,200 per cusec in the Punjab?—Much less than half that on inundation canals in Sind.

5792. *The Chairman:* Do you want to read your statement?—May I?

5793. Before you do that I should like you to state in a few words a general indication as to what this statement is?—The statement I wish to place before you is to explain the attitude of the Bombay Government towards the Punjab Government. I should not have asked to do so if Mr. Sangster had not brought this question up.

5794. I do not propose to stop any statement of that kind, but I think you ought to know that, speaking for myself at any rate, I cannot envisage the Commission expressing any views on a dispute which after all is founded on purely technical questions. I think the limit of our responsibility is to

come to some conclusion as to whether the existence of this dispute and the fact that it has not already been settled is not a strong indication that some *ad hoc* body advising the Government of India in these matters ought not to be created?—I quite understand the position. All I wish to do is just to state briefly what are the points of difference between us; I do not mean in a technical way, but to explain our attitude which is dubbed by the Punjab Government as captious. May I read this statement?

The Chairman: Please.

The witness read the following statement:—

Mr. Sangster, Chief Engineer for Irrigation to the Punjab Government, is reported by the papers to have given evidence that future irrigational expansion in the Punjab is obstructed by the Bombay Government. The impression created is that our attitude is unnecessarily captious and I am here to endeavour to remove this impression. They clamour for the immediate construction of what is known as the "Lesser Thal Canal Project" requiring a *kharif* supply of 6,355 cusecs and a *rabi* supply of 3,085 cusecs. It is necessary to envisage the position. To the Punjab situated as they are at the head of the Indus it is a question of extracting more water from the Indus or its tributaries and of adding one more great scheme to their already fine record of irrigational achievement. To us however situated as we are on the lower portion of the Indus and dependent wholly on the supplies of water in that river the question is of vital importance. It is to us, if the supplies are not available, a failure of the Sukkur Barrage Scheme and in general a matter of life and death. Nor does this note of alarm originate from this Government. In the despatch from the Government of India to the Secretary of State (dated 16th December 1920) at the time of submitting the Sukkur Barrage Scheme to him for sanction frequent references are made to the supplies of water available in the Indus. They admit that there is likely to be a shortage to the Sukkur Barrage Canals in the *rabi* period which is our critical one in the months of February and March, though on the admittedly small data available they consider that the supplies available were generally sufficient for the simultaneous construction of both the Sukkur Barrage and Sutlej Valley Schemes then before them. They lay emphatic stress however on the point that there is no sufficient data before them and that before embarking upon any further schemes in either Province these data must be collected.

In their own words: "We propose to regulate the construction of new canals in the Punjab according to a programme which will ensure that undue demands are not made on the Indus without due consideration of the observations of discharges that gradually become available."

In January 1921 a note compiled by the Inspector General of Irrigation, Sir Thomas Ward, dated the 10th December 1920, was sent to us by the Government of India. This note called on both Governments for the immediate appointment of a special staff for systematically and scientifically collecting all data on the question of the supplies available.

I would quote the following from Sir Thomas Ward's note to put the position clearly as it appeared to him:—

"Such records of discharges as exist have however been carefully examined and analysed and on the information before them the Government of India are satisfied that the Sutlej Valley Project can be put in hand without prejudicing the supplies necessary to secure the area of irrigation contemplated on the Sukkur Canals.

"More than this it is impossible to assert and the question of collection of reliable data for the disposal of the problem has become one of the first urgency. It will obviously be necessary once construction commences on the Sukkur Scheme, for any future projects put forward by the Punjab to be very carefully examined in relation to the possible effects of further withdrawals from the tributaries of the Indus upon the rights to irrigation from the Sukkur Canals upon which the Government of Bombay are now enter-

ing. I have no hesitation in saying that the data for such an examination do not at present exist.

"Again there are two points to which I would specially invite attention. The first is the extreme importance of the work to all the parties concerned; to the Government of Punjab because all future schemes in that Province will have to be examined with an eye to the rights of Sind to irrigation, to the Government of Bombay because projects for extension in Sind will similarly have to be analysed with reference to the prescriptive rights which would thereby be acquired by them as against the Punjab, to the possible prejudice of extensions in that Province and to the Government of India as arbitrator in inter-provincial differences."

Both Governments duly appointed a special staff and they have been working on the collection of the data for the last four years. Actually however due to the differences in the methods of observations of discharges it is only in the last two years that it has been at all possible to co-ordinate results. They were using surface floats, and we were using current meters. Now we are both using current meters for the last two years. Recently a joint report has been received from the two Executive Engineers in charge of the work stating in effect that the results so far obtained are inconclusive. Latterly we have received from the Government of India two letters, one suggesting the formation of an Irrigation Board and the other suggesting that until this Board is formed an *ad hoc* committee might be instituted to investigate and if possible to dispose of this vexed question between ourselves and the Punjab. In reply to the latter proposal we have pointed out that the data collected are, we regard, insufficient.

We have said:—"Sufficient data are not as yet available to determine whether there is actually a regeneration of supply in the Punjab rivers due to the return of water used for irrigation. Further any quantitative determination of the effect of the Sutlej Valley withdrawals on the supply at Sukkur is at present impossible and accurate data as to the discharges of the various rivers concerned are not to hand.

"In the circumstances this Government fear that if the proposed Committee proceed to investigate the insufficient data which have already been collected there is great danger that that Committee may form incorrect theories and inferences from these data and thus much time and labour may have to be utilised later on to correct those inferences.

"The Governor in Council would therefore much prefer that a definite decision be given by the Government of India to the effect that the Thal Canal Lesser Project 1925 shall not be further considered until accurate data as to the discharges and regeneration of water in the various rivers concerned have been collected for a sufficient number of years to enable reasonable deductions and inferences to be drawn from them.

"At the same time the Government of Bombay do not desire to be unreasonable or to take up any *non-possumus* attitude, but trust that the Government of India will give every consideration to the arguments against any premature reconsideration of the Thal Canal Project in view of the facts stated above."

That is how the position stands and all we ask for is a policy of caution and justice.

5795. *The Chairman:* How soon do you anticipate this matter will be settled by the Government of India?—I fear they will never settle it under present conditions.

5796. You think they will never settle it?—No. The two Provinces are in this state. What we feel intensely is, that they say: "What are the rights of Sind?" In their last letter they have suggested that if it comes to the point, the area under the Sukkur Barrage should be reduced.

5797. I am not quite certain about your last answer. Do you suggest this controversy will never be settled?—Not unless some form of control is

devised and exercised. We have been given the assurance by the Government of India that no schemes will be permitted, no large irrigation schemes will be permitted in the Punjab, until we have been consulted, and accept the position.

5798. *Sir Henry Lawrence:* What was the date of that despatch from the Government of India which you quoted in your note?—16th of December 1920.

5799. With that there was a note by the Inspector General for Irrigation?—No, not attached to this. The date of the Inspector General's note was some days earlier and was sent to us in January 1921.

5800. You told us it was December 1920?—It was written in December 1920 but sent to us in January 1921.

5801. Can you put in copies of that note and the despatch for the information of the Commission?—Yes, with pleasure.

5802. We would like to have them for reference, as you have quoted from them?—Yes.

5803. The complaint from the Chief Engineer of the Punjab was the Government of Bombay not stating their case, and giving no indication of what their objection was to the Punjab scheme?—Yes.

5804. Is that view, in your opinion, not correct?—It is not correct. We have kept them fully informed, right up to date, of all our objections. We have not corresponded direct with them. We have corresponded with the Government of India, but the Government of India presumably sent our replies to the Punjab Government, as the Government of India have sent on to us the replies from the Punjab Government.

5805. When did you last address the Government of India?—About a week or 10 days ago.

5806. But before that, was the Government of India not in possession of the reasons for which you objected to the proposal of the Government of the Punjab?—The Government of India have been in possession of all our reasons. I have made a précis of the whole of our correspondence up to date. Shall I hand it over to you now?

5807. The only point is this; we were told that the Government of Bombay had not replied to the Government of the Punjab or to the Government of India regarding the proposal of the Government of the Punjab. What is your answer to that point?—That is quite incorrect.

5808. Have you only replied since the complaint was made by the Chief Engineer of the Punjab Government? Is that correct?—I presume he refers not to one letter, but to several. The date of our actual reply is 25th October.

5809. Two days ago?—Yes.

5810. You do not get my point. The Chief Engineer of the Punjab says that for a long time the Government of the Punjab have been pressing for this scheme, and that the Government of Bombay have not given their reasons in opposition to it. Do I understand that last year, or the year before that, the Government of Bombay have been withholding any reply to the Government of India?—No. It is only this last letter that they can complain of.

5811. What previous letters have you addressed to the Government of India?—Here is a list of them. May I run through it?

5812. You told us that you have addressed certain letters to the Government of India on the subject. What are the dates of those letters? That is all we want to know?—We addressed the Government of India on the 15th of May 1923.

5813. Could you send in a statement of the correspondence that has gone on?—Yes, I will; there has been a great mass of it. All I can tell you is that every letter we have received either from the Government of India or from the Punjab Government we have replied to.

5814. The matter has been under discussion for some years?—All the time from 1920 up to the present day.

5815. *Dr. Hyder:* I know nothing about the official correspondence, but I suppose in this particular matter of Sind and the Punjab, you are in the same position as the Sudan and Egypt?—Yes.

5816. The Punjab is the Sudan and you are Egypt in this matter?—Yes.

5817. That is to say, Sind could not exist without there being adequate irrigation?—It could not exist.

5818. You would not object to the Punjab Government constructing some canals in the Sind Sagar Doab, provided those schemes did not interfere with your schemes lower down in Sind?—Yes.

5819. Is there any third party to the dispute, that is, the North-West Frontier Government?—They are not interested as far as I know.

5820. They have not been mentioned at all in this correspondence?—Not to my recollection.

5821. *Sir Chunilal Mehta:* I will try and refresh your memory, Mr. Harrison, about the dates. The Government of India forwarded a copy of the Punjab Government's letter on the 28th of November 1924. To that the Bombay Government replied on the 3rd of February 1925. You will find it on page 3 of your précis. In that letter of the 3rd of February, the Bombay Government stated their reasons for objection to a small section of the Thal Canal?—Yes.

5822. The Government of India again replied on the 13th of April 1925, forwarding a note of the Officiating Consulting Engineer, Mr. Harris. To that letter the Government of Bombay replied on the 12th of June 1925, furnishing the requisite figures in a statement contained in two parts?—Yes.

5823. And so on. This matter has been under discussion with the Government of India and the Punjab Government ever since then, and the replies have been promptly given?—Yes, as promptly as we possibly could.

5824. *Mr. Calvert:* Is the present point that you do not agree about the discharges from the rivers?—No. The Punjab Government claim that their *kharif* withdrawals are returned to a large extent in the *rabi* months, which are our critical months, in the form of seepage. We say that it may be, the conditions are totally different in the Punjab. Their rivers flow in a valley, whereas the Indus flows on a ridge. Seepage may occur in the case of their own rivers, but the formation of Sind is such that we do not get any at all. We have two gauging stations, one at Mithankote and the other at Sukkur. The Mithankote *rabi* discharge may be more than that at Sukkur; but all the extra water is lost in transit. We estimate that whatever extra water comes down from Mithankote is lost in transit on the way to Sukkur. We get nothing extra at all. They say that we shall get a great deal of seepage water back, but we say we shall get none.

5825. If the Punjab went in for a project like the damming of the Jhelum so as to utilise the monsoon water for irrigation, would you object?—No. It will not affect us. We should not object to that.

5826. When was the Sukkur Barrage project first considered?—It has been under discussion for 50 to 60 years. It has been actively under discussion, before it was sanctioned, for 3 or 4 years.

5827. You are a new-comer on the scene so far as the Sukkur Barrage is concerned?—Yes, that is what they say, that we are new-comers and have no rights. We have a similar position constantly before us in the case of our water-courses. The zamindars at the head consider that the zamindars at the tail have no right to any water. They say they never got the water before, and they have no right to more than they had in the past. This contention is obviously untenable.

5828. The Punjab Government is not objecting to anything Bombay is doing?—They are not objecting. They have got nothing to object to. They are at the top of the river.

5829. But Bombay objects to the Punjab Government's schemes?—Yes.

(The witness withdrew).

Mr. H. F. KNIGHT, I.C.S., Collector of West Khandesh, Bombay.

Replies to the Questionnaire.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) Undoubtedly propaganda by the Revenue Department and by the Agricultural Department, backed up by field demonstrations, have been to some extent successful. But the ryot is intensely conservative, and unless he can be shown that an improvement proves both successful and profitable he will not take it up. Probably financial success is the greatest lever. The adoption of cotton growing in Khandesh is due to the profitable nature of the crop and recently the profit from ground-nuts has caused in this district an increase in the ground-nut area from 9024 acres in 1921-22 to 46,816 acres in 1925-26. At present Taluka Development Associations are doing very good work here, the Dhulia and Sindkheda Associations run field demonstrations and the former Association's "dry farming" plot of cotton at Morana was a most valuable object lesson last year when late rains were short. But on the other hand the shortage of rain prevented a Sindkheda plot to demonstrate artificial manures, giving any results.

I would emphasise the necessity of the Revenue, the Co-operative and the Agricultural Departments combining in the work, *e.g.*, at "Jamabandi" when all the village officers of a taluka are assembled, I have held agricultural demonstrations of, *e.g.*, iron ploughs, use of copper sulphate, etc., and Agricultural Department Officers have lectured. Many of the *patils*, I admit, view the affair with something akin to good-natured contempt or pity for a misguided official who thinks a Government Officer can teach them their business, but general discussion with them does help to indicate the main difficulties of the agriculturist and to induce him to consider improved methods. As far as possible I consider Government must work through and with Taluka Development Associations—Associations of which the Committee purports to be local agriculturists, though often it is found that an energetic local official is the motive force. No Government demonstration will have the influence of a demonstration by a local committee of *patils*, actual agriculturists, but again I would emphasise that in backward districts such as West Khandesh, official help and official patronage must be ungrudgingly given.

(*b*) In my opinion the effectiveness of field demonstration can be improved—

(*a*) by grant of more funds to Taluka Development Associations, to enable them to do more propaganda work,

(*b*) by making a fuss of such field demonstration holding parties to see them, etc.

(*d*) I know of no striking instances of success or failure of demonstration work but in this district,

(1) I have been told by many cultivators that the reason they do not sow Akola *bajri* which gives a heavier grain yield and resists drought, is that the straw (*Kadbi*) is so thick and hard that their bullocks cannot eat it. The remedy appears to be the pushing of chaff cutters.

(2) The number of packets of copper sulphate as a preventive of smut in *juar* sold in this district in—

1923-24	3,257
1924-25	4,426
1925-26	8,160

This increase is largely due to "pushing" by the Revenue authorities. It is not as good as it should be because the Bhils in the west consider grain so treated unhealthy, also I under-

stand that at least one zealous but misguided Revenue subordinate instructed the cultivators to *boil* the *juari* seed in copper sulphate mixture. This indicates the difficulty of convincing an ill-educated community and the need of supervision of the propagandist.

QUESTION 4.—ADMINISTRATION.—(*c*) (*iii*). There is room for a very large expansion of made roads in this Presidency. In parts of this district, the black soil area, "Kaccha" roads are impassable for weeks together in the rains and when the dry weather comes they are almost impassable as an iron-hard mass of poached cattle prints. Their impassibility in the rains reacts on the cultivator who is practically out of touch with everything for that period, and their badness during the dry weather is a great hindrance to getting his crops to market. As far as my experience goes it is usually villages on made roads that are most "go ahead" in every way and I am an advocate of every possible extension of made roads.

I might perhaps call attention to the Akrani Mahal of this district, to which no wheeled vehicle can go, and where all export or import has to be carried by men or minute donkeys. The result of course is that the country is a secluded backwater, where the inhabitants have absolutely no inducement to improve their methods of agriculture.

QUESTION 5.—FINANCE.—(*a*) I would emphasise the fact that conditions even in this one district vary so greatly that methods of finance desirable in one part, may be entirely impracticable 50 miles away.

Along the Tapti Valley in this district we have an industrious, capable, and prosperous population of Gujar agriculturists whose richer members do much to finance the tract. Also in the Tapti Valley and in the east of the district the co-operative movement has made progress and there are 157 societies which, in the villages where they exist, finance largely the more respectable village cultivators. These societies are financed by the Dhulia Co-operative Bank. The less prosperous or less respectable cultivators in this area are financed by the traditional village *sowcar* on traditional lines. In the west and north of the district we find the Bhil, Mauchi, Pavra, etc.,—*nil* tribes extremely backward and entirely illiterate, and quite incapable of financing themselves, often living from hand to mouth on jungle produce. In the Nawapur taluka a population of 62,310 is financed almost entirely by immigrant moneylenders settled in the headquarter town of Nawapur. the *sowcar* advances the Mauchi or Bhil money against his crop before it is even sown, and provides seed; when the crop is ripe the *sowcar* takes the whole of it and credits the cultivator with what may, or may not, be the value less advances, the Mauchi then draws on account from the *sowcar* what money he wants or what he can get, and the account is kept running indefinitely. The *sowcar* cannot sell up the Mauchi's land as it is on inalienable tenure, the Mauchi will not go to the courts to dispute the *sowcar's* accounts, and the *sowcar* makes an easy and profitable living, and the Mauchi may perhaps be said to be saved from the temptations of having more money than is good for him. Personally at present I see no alternative to the system. The inhabitants are far too backward to run co-operative societies successfully, finance by Government *taccavi* would be an enormous task, and in my opinion we can only wait till education has filtered into Nawapur taluka and meanwhile by the inalienable tenure ensure that, when the Bhil and Mauchi does by education realize that he can do better, he still has his land and that it is not acquired by his *sowcars* in the meantime.

In the same way I see no alternative to the village *sowcar* for many of the cultivators. Their holdings are uneconomic, their reputations in the village bad, and beyond the *sowcar* who will often, though at usurious rates of interest, advance money on very frail security, they have no hope of getting credit anywhere else. Personally I am not against the *sowcar*, he performs a most useful part of rural economy (a note by Mr. Simcox, late I.C.S., is probably still in the Bombay Secretariat elaborating this view)

and with his local knowledge and inherited customs he undertakes business that no bank or properly run co-operative society would look at. (The outcry against him is really the result of our police and judicial system—formerly (and in parts not so very long ago) the overgrasping *sowcar* ran a real risk of having his nose cut off and his account books burnt by a mob of infuriated debtors, and this exercised a moderating effect on his exactions. Now his features and his accounts are safe and the Civil Courts will give him legal aid to the letter of his bond. We can only hope that growth of public opinion and the competition of co-operative credit societies may eventually take the place of the older and more direct check.)

For the cultivator with a decent holding, I see no better help in finance than co-operative credit societies and backed by the spread of co-operative banks, I consider these should provide both short and long-term credit. I admit, however, I have not studied the question in detail, as in this matter I am rather a believer in non-official agency.

(*b*) I do not wish to make suggestions as to cultivators making fuller use of Government *taccavi*. On the contrary I would discourage it. I admit of course there are exceptions, *e.g.*,—

(1) Where the tenure is inalienable and ordinary credit is therefore restricted. Here in the interest of keeping decent cultivators going, *taccavi* is imperative.

(2) Among backward tribes, who can only raise loans at usurious rates, if at all, and who must receive somewhat paternal help from Government if they are to survive. In Taloda taluka this year I had to distribute *taccavi* liberally to Bhils to keep their cattle alive as the rains were late in breaking. They could not get money elsewhere, as they had exhausted their small credit with the *sowcars* last year when crops were poor.

(3) At present *taccavi* is I consider justifiable for permanent improvements such as digging wells, making embankments, etc., as the cultivator often cannot raise the money otherwise on reasonable terms. But co-operative credit societies and banks ought to undertake this eventually.

(4) Where a cultivator is taking up new land for cultivation and has yet no security for the credit he needs.

(5) In famine times when ordinary channels of credit are closed.

But for the ordinary financing of agricultural operations I do not think Government should allow *taccavi;* my objections are—

(1) that to make any progress, the cultivator must be taught not to rely on official help or on the *sowcar*, but on mutual self-help in the form of co-operative credit.

(2) The *taccavi* system is inelastic, and difficult to supervise, *i.e.*, to ensure that all the money reaches the cultivator.

Question 6.—Agricultural Indebtedness.—(*a*) This is no new problem. I quote from Captain Elphinstone's Settlement Report of 1862 dealing with part of Dhulia taluka of this district,

"In conversing with the people I gathered that they are very happy and contented under our rule, but that they still look back with fondness to olden times, when they say the *sowcar* was only a moneylender, but that he has now become so powerful and so grasping that he has literally become their master. These moneylenders appear to be the cause of more misery than heavy taxes or even famines could possibly bring about, and the people earnestly entreat that the power of these men may be curtailed. All over the country you hear the cry of 'the Courts are ruining us'! 'They reduce us to penury'! 'We shall never be independent or feel secure in our homes until the *sowcars*' hands are tied'! 'The feeling of being in the power of the native merchant has a very depressing effect upon the minds of the people, and it makes them sullen, discontented, and

indifferent to their own interests as well as to those of Government. In former times, when the fulfilment of contracts between creditor and debtor was not enforced, and the former could not always obtain redress, if the latter refused to pay, the moneylender was very circumspect in his dealings, and would not lend more to an individual than he knew or imagined could be repaid by the borrower; and contrary to our accepted rules of political economy, which would indicate the very opposite result under such circumstances, the interest demanded by the creditor seems to have been most moderate—in fact commensurate with the debtor's means. At the present day, however, when the Civil Courts are so easy of access to the wealthier classes, the *sowcar* has it in his power, owing to so few of the cultivators being able to read or write, to falsify his debtor's accounts to any extent, and to sue him for any amount he pleases. Could not some means be devised to restrict within more limited bounds the almost absolute power of the *sowcar*? All our endeavours to benefit the cultivators and render them a prosperous and contented people will, I fear, prove fruitless until this is done. I must here apologize for having apparently digressed so far from my subject, but the financial prosperity and individual happiness of the agricultural population appears to me so important a subject, and so closely connected with the future prospects of the Government revenue, that I could not well pass over this subject in silence."

Again I quote from the Revision Settlement Report of Dhulia Taluka, 1896:

"The signs of well-being are too evident to be mistaken. That the majority of the people is in debt there can be unfortunately no doubt; but except perhaps in one or two of the poorer north-western villages the burden is lightly borne. The fact that the agricultural classes in this country almost universally live up to the extent, not of their income but of their credit, is too often overlooked. A big debt is as often a sign of prosperity as the reverse, and so long as the Kunbis are well nourished, well clothed and well housed, have as many cattle and servants as they want, and enough ready money for the celebration of marriages and feasts on a scale the reverse of economical, indebtedness is no evidence of poverty."

That the agriculturist is indebted there is no doubt but I do not consider any one cause can be given the chief credit or discredit for this. The causes may perhaps lie among the following:—

(1) The habits and customs of the people which involve considerable expenditure on unremunerative and social objects.

(2) The climate or rather the uncertainty of the season, a run of bad years must put the ordinary agriculturist into debt and the worse the year the higher the interest he will have to pay. At Hatnur village Sindkheda taluka last year I gathered from the cultivators that taken as a whole the village is indebted to about 20 times the land revenue, partly to *sowcars*, and partly to the local co-operative credit society. If the year is bad, the cultivator must live and must borrow money.

(3) The judicial system. I do not entirely agree with the extract given above, but certainly the procedure of the Civil Courts does put the ignorant and illiterate agriculturist at a disadvantage. *Per contra* the extremely lengthy proceedings in execution of a decree against an agriculturist, make it necessary for the *sowcar* to keep his rates of interest high, and many agriculturists are not above trying to do the *sowcar* down by any means.

(4) The uneconomic holding. If a cultivator cannot live on his land, he must either work elsewhere as a labourer or borrow money to keep alive. But the best times for earning money as a labourer are when he must be looking after his own crop. Hence he usually must borrow almost every year in order to keep going, and can never get out of debt. He would economic-

ally be better off as a landless labourer, but for various reasons he hangs on to the patch of land that cannot support him.

I had got from some local agriculturists estimates of the cost to a cultivator of starting fresh on an economic holding, which may illustrate the point. According to these, if a cultivator with an economic holding but without capital has a good year and grows cotton, it will cost him Rs. 750 to get a return of Rs. 1,000, if he grows *juari*, Rs. 625 to get a return of Rs. 660, if he grows *bajri*, Rs. 600 to get a return of Rs. 600. This means that in the first case he has Rs. 250 to use

(*a*) for paying off the borrowed capital, and

(*b*) for working expenses until the next crop is ready.

I do not entirely agree with these figures but they do indicate that, even more with an uneconomic holding, a cultivator once he has had to borrow for working capital must have very great difficulty in getting ever out of debt unless he can supplement his agricultural income by, *e.g.*, labour, carting, or other means.

In my opinion this fact of so many holdings being uneconomic, *i.e.*, not big enough to employ a cultivator, his family, and bullocks whole time, and the damaging effect of a run of bad years on the more substantial agriculturist—what one might call the monsoon factor—are responsible for most of the indebtedness.

The latter factor—the monsoon factor—can in my opinion only be combated by extension of improved methods of cultivation, in particular "dry farming."

(*b*) I am very doubtful what measures can be taken to lighten the agriculturists' burden of debt beyond the encouragement of co-operative credit societies. The agriculturist must be financed, the *sowcar* must adjust his rates to his returns, and without a considerable change in the system of judicial administration I see no easy method. But I confess I have not considered the matter in detail.

As far as the other causes of debt are concerned, education against wasteful expenditure may do something, but it is idle to expect the Indian cultivator to emulate the penurious saving habits of the French peasant, and personally I have considerable sympathy with his desire to have a certain amount of fun out of life.

(*c*) With regard to restricting the cultivators' right of mortgaging or selling his land, no one answer is possible. In this district a large proportion of the land is held on inalienable tenure by backward tribes such as Bhils. Were they to be given the right to sell or mortgage their land, they would, from their improvident habits and lack of education, be ousted at once and their place taken by more acute agriculturists, or they would be reduced to the status of rack rented tenants of *sowcars*. This process is complete in all parts of the district where such backward tribes have held land on alienable tenure, and unless this tenure is continued until such tribes are sufficiently educated to look after themselves they must go to the wall without prospect of recovery. In this district this problem is important as the landless Bhil is frequently a dacoit, and therefore, though by his idle methods of cultivation his land does not yield an outturn such as it would under, *e.g.*, a Gujar cultivator, it is imperative for the peace and the future progress of the district to keep the Bhil on the land. Though to-day he is a backward tribesman and poor cultivator, yet by preventing him alienating his land, we ensure that in the future if and when he is educated, he will have land to live on. In this case the present agricultural productivity of the district has to be sacrificed to future considerations. I would earnestly suggest that any proposal to make land alienable which is now inalienable, needs very careful scrutiny. In the Nawapur taluka of this district practically the whole area is held by backward tribes on inalienable tenure, this prevents the community of *sowcars*, who live in the headquarter town and fatten on the Bhil, from getting the land for themselves, and therefore I

get petitions pointing out the hardship to the Bhil involved in restricting his credit, and urging, of course, in the Bhils' own interest, that the land be made alienable. This would benefit the *sowcar* alone, and it is he who organises such petitions, and compliance with them would ruin a taluka which one day may support an educated community of *ex*-backward tribes.

For cultivators other than backward tribes, I am not entirely convinced of the desirability of restricting the agriculturist right of transfer. The bigger agriculturist can undoubtedly look after himself and he needs the credit which he gets from being able to mortgage his land. The small cultivator with an uneconomic holding needs credit to keep going at all and to keep on getting deeper and deeper into debt. But in my opinion the quicker the uneconomic holder is squeezed out the better and if only we could ensure that his holding would be added to another to make an economic holding, agriculture would benefit by his disappearance. But as regards the holding that will employ an agricultural family—what I would term an economic holding—I am in favour of inalienability—not on the ground that such holding will be better cultivated, nor on the ground that the cultivator will not desire credit he cannot get with an inalienable tenure, but because it is vital in a ryotwari Province to have on the land as many owner cultivators as possible. If the land gets entirely into the hands of non-cultivating moneylenders and the cultivator is reduced to a mere tenant the character of the Province must change for the worse. Further the restriction of credit to some extent prevents the cultivator wasting money on unnecessary social ceremonies, and eventually must have an educative effect on social ideas. I would, however, note two conditions which I consider desirable:—

(1) Government must be prepared to make special arrangements by *taccavi* or co-operative societies to finance such tenure holders.

(2) Such inalienable economic holdings should be impartible.

(I would venture to call attention to my letter No. L. N. D. 778 of 9th July 1925 to the Commissioner, Central Division, printed in the preamble of G. R., R. D., No. 4702-24 of 26th February 1926, paragraphs 9, 15, 17 and 20. Copy of G. R.* attached.)

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(*a*) A Bill to prevent fragmentation and another to encourage consolidation are at present under consideration by the Government of Bombay, and Government have sanctioned the grant of part of the waste area of this district now under distribution, on impartible tenure, and I am at present awaiting Government orders on the form of lease to be adopted in these cases. Both the legislation and the proposed leases should prevent further fragmentation if they can efficiently be watched. But experience with inalienable tenure lands in this district, which among Bhils are often alienated without attracting the notice of any Government authority, makes me doubtful whether it will be possible to avoid further fragmentation for some time. Legislation and leases however afford the possibility of enforcement in future as cases of evasion may come to notice, and only perseverance can educate the ryot. The main obstacle of course is the Hindu law of inheritance and the ryot's sense of "fairness" to his family which prevents him leaving the property to one individual. Personally I consider the effects of fragmentation so disastrous, that I would like to try the experiment of removing land in some areas from the operation of Hindu law, making fragmentary cultivation a criminal offence involving forfeiture of the land. This sounds excessively Draconian, but obviously cultivable land cannot increase *pari passu* with the population and unless fragmentation or the increase of population is stopped, we must everywhere reach eventually the condition of parts of the Konkan where the bulk of the population cannot support themselves on their land, and the possession of this land prevents them ever becoming a permanent and efficient industrial labour force elsewhere. Unless the land can support the agricultural population, the population must be reduced by pestilence or

* Not printed.

famine or birth control; in the present state of Indian opinion the last named remedy seems unlikely (though Mr. Devadhar of the Servants of India Society tells me that the matter is beginning to excite interest). Practically it is famine and pestilence we have to attempt to guard against. Personally I doubt whether there would be much difficulty in the working of a law making fragmentation a criminal offence, so far as the cultivator is concerned. Thinking *patils* in this district with whom I have discussed agricultural conditions agree that something must be done to work the land more economically. The opposition is more likely to come from the Legislative Councils, where it sometimes seems penalties of any kind for any purpose are considered *per se* undesirable, and I frankly confess I doubt whether under present conditions effective legislative action to prevent fragmentation is possible But as far as I can see the result—pestilence or famine—is inevitable. The influenza epidemic with its great destruction of human life has only postponed the day of reckoning.

The problem is of course of varying urgency in various districts. This district (West Khandesh) is infinitely better off than many others but the following figures show that the evil is increasing. The cultivated area of the district (excluding plural holdings, *i.e.*, holdings of persons who hold land elsewhere as well) was—

	Acres.
1917	1,370,322
1922	1,397,977

an increase of 27,655 acres.

The holdings in these two years were as follows for agriculturists:—

	1917.	1922.	
Up to 5 acres . .	6,272	6,446	+174
„ „ 15 „ . .	17,909	19,130	+1,221
„ „ 25 „ . .	11,908	12,018	+110
„ „ 100 „ . .	15,532	15,020	—512
„ „ 500 „ . .	1,234	1,117	—117
Over 500 „ . .	20	19	— 1

For Non-agriculturists.

	1917.	1922.	
Up to 5 acres . .	1,415	626	—789
„ „ 15 „ .	1,159	1,067	— 92
„ „ 25 „ . .	850	615	—235
„ „ 100 „ . .	882	819	— 63
„ „ 500 „ . .	351	302	— 49
Over 500 „ . .	59	59	

These figures referring only to a period of 5 years appear to me to show a very marked increase in the number of agriculturists cultivating holdings up to 15 acres, which, except in a very few soils, is not an area which can economically employ a pair of bullocks, and which therefore means that the holder is wasting part of his time. There is also a big drop in the holdings of 25—100 acres, which means a decrease in the comparatively substantial agriculturist class who can with luck lay by a little capital. The evil even here is sufficient to need attention.

(*b*) In my opinion the main obstacle in the way of consolidation of holdings is the cultivators' great attachment to the soil. The ownership of even an acre or two gives a man the status of a cultivator as opposed to that if a mere tenant or a landless labourer. The social prestige attaching

to land is a great factor in the desire to possess it, and a further factor is the absence of any other remunerative outlet for the cultivators' savings. Added to the above is of course the system of Hindu law which insists on each member of a family obtaining his share.

It is difficult to suggest any remedy for the social importance of land holding, beyond the possible restriction on the size of a parcel of land that may be transferred, which would prevent new owners acquiring petty "job lots" of land. This might also help the cultivator to put his savings into postal cash certificates, etc., if he found he could not raise enough to buy land.

For Hindu law, I know no remedy except education and the growth of the leaving of land *by will*. This will take a very long time, and probably be opposed by public opinion. (Dr. Munsiff, Assistant Director of Public Health, recently quoted a case of a rich cultivator at Nasik who disinherited some worthless sons and left his land to a nephew. A prevalent relapsing fever shortly took off both uncle and nephew, but the villagers were convinced that this was a direct judgment on both for the impious *will* disturbing the "natural" disposition of the property.)

For consolidation of present holdings, the main difficulty lies in the disposition of the cultivator. Often in the partition of an estate between say 4 brothers, each will insist on a ¼ share of each individual field—lest he feels that the others get an advantage over him, if he takes one particular field. This feeling is equally strong in the village, and consolidation of present holdings by consent would be—as far as my experience goes—practically impossible at the moment.

The only remedy I can suggest is compulsory consolidation in a few sample villages where a majority or even a fair minority of the cultivators can by propaganda be persuaded of its advantages.

(*c*) Certainly; legislation to deal with dissentients and minors, etc., would be imperative. I once relaid out into decent house plots a large village that had been destroyed by fire. This, though all the house sites were mere blackened ash heaps, took much persuasion and argument for weeks, and to attempt the agricultural relay out of a village, unless some natural calamity had reduced all fields to a like value, would be an appalling task without power to compel dissentients to come in.

QUESTION 14.—IMPLEMENTS.—(*a*) The iron plough is certainly making headway even in this backward district, but of course is handicapped by needing more or much better bullocks to work it. In my opinion therefore the introduction of this plough depends largely on animal husbandry, and in particular on inducing the cultivator to keep better cattle, and feed them better, and especially in abandonment of the traditional village grazing system. (See my remarks on Question 15.)

The cultivator is interested in improved machinery but he is hard to convince of its advantages. I was watching a modern implement for weeding between rows the other day and discussing it with the local *patils*, but they would not admit it was as good as the indigenous small double hoe for the purpose, and probably in their hands it would not be so satisfactory. But this was on the farm of an agricultural bias school, and the real test will be when the boys who are now using the modern implement come to apply it in their own fields later.

I am anxious to see further experiments with power tractors in this district. The District Local Board had applied for a grant for tractor experiments to be run in conjunction with the Dhulia Technical School as a repair shop and training place for tractor drivers. But unfortunately funds were not available.

I am of course not convinced that tractor ploughing would pay in a country of small holdings and poverty-stricken agriculturists, but I think every experiment ought to be made, not only in the hope of better tillage by deeper ploughing, but because the introduction of tractors would reduce

the number of bullocks that have to be kept and the pressure on the local grazing, and the improvement of cattle or their replacement by mechanical means is I consider an essential to any improvement to agriculture generally. I should like to see also tractors used for moving crops to market, *e.g.*, the bringing in of the cotton crop to Dhulia cotton market by cart, usually grossly overloaded, is extremely hard on the bullocks and if tractors could do this work it would be much to the good.

Tractors appear to be successful in Gujarat and in view of the improvement in tillage and in cattle that I would anticipate, I think there is justification for further experiment in the Deccan. But I suggest that such experiment must be made in conjunction with a repair depôt and training class for drivers, if possible run by some permanent local institution such as a District Local Board.

QUESTION 16.—ANIMAL HUSBANDRY.—(*a*) In this district there is the usual problem, the shortage of fodder, the keeping of superfluous cattle, and the consequent deterioration of the general level of cattle, and yet there is sufficient grass grown in the district to allow a large surplus for export. The forests in the west and north of the district could provide for the cattle of the district many times over if the grass could be distributed, and in practice in a normal year fodder shortage is confined to the talukas of Dhulia and Sindkheda, the agriculturists of other areas carting grass long distances for their own needs from forest.

(*c*) In the two talukas mentioned fodder shortage is most acute from about April till the rains have broken for a month—normally say till the middle of July. If the rains are late or there are no early heavy falls, shortage continues. This year grass has been short well into August.

(*d*) and (*e*) Personally I consider that the traditional method of keeping cattle in this country is responsible for much of the bad agriculture. The ordinary small cultivator feeds his bullocks decently during the actual cultivating season but thereafter unless he is doing carting work, he turns them out every morning with the mob of village cattle to pick up what they can off the alleged village grazing grounds where they compete for almost non-existent grass with aged and barren cows and useless bullocks. The young stock never have a chance, and the older ones never can recuperate. Government have endorsed this plan by the provision where possible of free grazing grounds in villages and by a fee for forest grazing which is infinitely below the economic value of the grass consumed. Until the cultivator can be taught—as he has learnt in parts—that he must "stall-feed" his bullocks all the year round, I do not see how we can get any great improvement in tillage. For this reason—though in view of the opinion of the Legislative Council I do not hope for my view to be accepted—I consider Government ought to drastically reduce the grazing facilities in Government lands, and, except in areas such as the Satpuras in the north-east of this district which are a valuable grazing reserve for cattle-breeders, endeavour to insist that grass should be cut and taken to the cattle instead of the cattle going to the grass. This in my opinion would tend to reduce the number of useless cattle that now eat the grass the better cattle need, and would encourage the cultivator to keep decent plough cattle—or what is in many cases the most economical method—to sell his bullocks at the end of one cultivating season and buy new ones just before the next.

I know that in view of public opinion and Hindu sentiment, this proposal is not likely to be accepted, but I think it should be recognised that Government is conniving at a ruinous feature of agriculture by continuing the present policy.

Cultivators will never attempt to improve their cattle unless it is made financially unprofitable to continue the present system.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*b*) Beyond a certain amount of carting, in this district the ordinary cultivator has no secondary occupation to keep him employed when there is no agricultural work to be performed, unless the attendance at marriages and other festivities can be so termed,

The Bhil of course turns to wood cutting, collection of jungle produce and illicit distillation of liquor, but that is merely because he does not get enough out of the land to live on. Did he get enough, he certainly would not work otherwise.

I cannot suggest a secondary occupation for the cultivator which seems likely to succeed. Such should of course not be merely mechanical, such as spinning, but should exercise his brain; it must fit in with his inherited conservative ideas of what a cultivator can and cannot do—here I believe is where chicken farming breaks down—it should be economically profitable. Personally I think the only way of giving the cultivator more to do is the extension of irrigation, especially well irrigation, where raising crops is a whole year job. But that obviously cannot be done for every agriculturist.

QUESTION 19.—FORESTS.—(*a*) It is rather difficult to say what is the fullest use of forests for agricultural purposes. I have no doubt all villagers would ask for unrestricted grazing and unrestricted permission to cut wood. This, though doubtless of immediate use for agriculture, would obviously not be of permanent advantage to any village. As stated above in answer to Question 16, I am not a believer in free or unrestricted cattle grazing nor in allowing villagers to cut wood without control. I may quote the example of a village I inspected last May, Ghodade in the Sakri taluka. Some years ago the forest area of the village—really pasture forest with a sparse growth of inferior trees—was handed over to a village committee's management. The result has been disastrous to the tree growth, which now is largely pollarded and cannot last much longer, owing to the wasteful method of cutting employed. This forest adjoins other similar forest under departmental control and the difference is striking. In my opinion therefore the control of forests cannot be relaxed, in the interests of posterity.

(*b*) and (*c*) The supply of fodder in rural areas can be increased in forest by closure to grazing for a period. The supply of firewood by the closing of forests also. But both these postulate the existence of convenient forests at hand. Something can be done by propaganda, for instance the lopping of trees for Tahal (*i.e.*, to make the ash rice seed beds in the Konkan) when I was in Thana district 10 years ago, was largely being carried on on lines laid down by Mr. J. P. Orr that did not seriously damage the trees. But this needed constant supervision and urging of the cultivator. I doubt whether in the dry tracts of the Deccan anything can make trees grow in village grazing grounds—the casualness of the villager for communal purposes and the ubiquitous goat would not give a chance. Private enterprise too is handicapped. Young trees in most areas would need laborious watering, fields are not fenced, and grown trees hinder the growth of crops. An exception that may be said to prove the rule, is the Bhils' habit of planting mango trees when possible, but the Bhil has little else to do, he prefers a casual job of watering young mango trees to steady work, and later on the tree will yield him a crop without the necessity of any further work.

(*d*) The question of afforestation or disforestation affecting the supply of moisture in the soil is to my mind a problem which needs more research than it has received. At present a forest belt about 14 miles long and 2 miles wide at the foot of the Satpuras is being gradually disforested and given for cultivation. Personally I am rather nervous as to the effect this may have on the rainfall, on the water supply in the lower cultivated lands, and on the subsoil water level in the villages. But I could find no reliable data to guide me to any conclusion as to how much land it would be safe to disforest. In discussion with various cultivators as to the alleged decreasing fertility of the district (of course largely attributable to the fact that some 50 years ago only the better lands were cultivated) various aged cultivators have given the destruction of forests as one reason why the rainfall is less and less constant now than it used to be. (Others attribute the falling off to the wrath of God over some sin committed by the population but could not give me a clue to what the sin was.)

(*f*) Undoubtedly many forests suffer from excessive grazing—an interesting example is on the Bombay Agra Road 10 miles from Dhulia. Here on the west is a fenced Kuran which has been sold for grass cutting or late grazing for many years. On the east is forest normally open to grazing. On the west after the first really heavy rain grass springs up everywhere, on the east grass is scarce and sparse. Obviously the continual grazing has rooted up much of the grass, and eaten down the rest before it had time to seed and establish itself. The only remedy I can see is a long period of closure in the hope that grass will again spread, and I assume that this applies to many areas where grazing is excessive in this district, especially the pasture forest which is never closed, and a walk over any of the hills will show how erosion is thereby facilitated.

QUESTION 25.—WELFARE OF RURAL POPULATION.—Beyond the subjects referred to in the Questionnaire, I would suggest two matters which vitally affect the welfare of the agriculturist:

(*a*) an adequate drinking water-supply in the village and

(*b*) malaria.

But these are sanitary rather than agricultural problems.

QUESTION 26.—STATISTICS.—(*a*) (*i*) In this Presidency I believe the statistics of areas under crops are comparatively fairly accurate. The area of each survey number is known and the village *patil* and the cultivator can give a very fair approximation to the respective areas under various crops in any survey number. I admit most of the work is probably done in the village "chavdi," and not in the field, but I think the areas are as accurate—or more accurate—than could be expected of the agency which prepares them, *i.e.*, the village headman and accountant.

(*ii*) I am afraid I view with distrust all estimates of yield that are not based on accurately ascertainable figures, *e.g.*, if so many bales of cotton are known to have been exported from a district, it is easy, saving perhaps an allowance for bales exported from railway stations just outside the district, to calculate the average outturn over a period of years and in the same way if one knows the quantity of cotton ginned in a year one can get that year's outturn. But my experience of estimating outturn before the crop is harvested is discouraging. I with a number of Revenue and Agricultural officers made some experiments last year in estimating the quantity of various *bajri* and cotton fields ready for harvest, and checked our estimates by actual harvesting. The results not only differed to an extraordinary degree but we could not find any constant personal error factor attaching to any individual. The cultivator from experience of his own individual field can often (if he will) give a very close estimate of the probable yield, but I am very doubtful of the estimate of future yield given by either the Agricultural or Revenue Departments. However it is possible that continued training and practice would make an improvement, but I should never, I am afraid, put full reliance on such statistics.

(*iii*) In this Presidency, statistics of livestock and implements are, I consider, accurate for all practical purposes.

(*iv*) The Settlement Reports in this Presidency give practically all available information.

Oral Evidence.

5830. *The Chairman:* Mr. Knight, you are Collector of West Khandesh?—Yes.

5831. You have put in a very interesting answer to our Questionnaire, and we are greatly obliged to you for the trouble which you have taken. Would you like to make any statement of a general character at this stage, or shall we proceed at once to question and answer?—I should like to say that my knowledge of agriculture is merely such as I have acquired incidentally through my work as District Officer. I do not profess in any way to be able to deal with the matter scientifically, or to be able to support any suggestions I have given by detailed statistics.

5832. On page 286 of your written evidence, you talk of the difficulties of inducing cultivators to take up improved methods. Have you had any experience of demonstrations on cultivators' own fields?—I have not made any personal demonstrations, but there has been a fair number of them in the West Khandesh district by Taluka Development Associations.

5833. Carried out on the cultivators' own fields?—Yes.

5834. What do you think of the value of that type of propaganda?—My own opinion is that it is the only one which can possibly be successful. I should like, however, to give an example which came to my notice last week. I was inspecting certain villages for their crops, and there accompanied me a very substantial *patil*, a cultivator who always grows Akola *bajri* himself, and has been doing it for the last 10 years. I, he, and other cultivators from the next village were tramping round the fields, and all the time he was getting at them to explain why they did not use this Akola *bajri*. They still insisted that although they had seen it grown successfully in his own fields, and although they knew he fed his own bullocks with it, yet other cultivators' bullocks would not eat it. That was as far as we could get. They had the example in the next village of a cultivator of their own Mahratta caste growing it successfully for the last 7 or 8 years and feeding his bullocks with it, yet they would not take it up.

5835. On page 287, you say: "I am an advocate of every possible extension of made roads." You are strongly of opinion that better communications would be greatly to the advantage of the cultivators?—Judging from my experience of districts, it must be so. The *kutcha* roads are so bad in many parts of the districts that the bullocks cannot take a full load, so when the cultivator takes his cotton to market he has to make more trips, or take more carts. Besides, to take a cart over a bad road has a very wearing effect on the bullocks.

5836. Is any attempt made by the villagers to improve these by-roads?—I should not like to say no, but the signs are very small.

5837. No doubt, it would be difficult for them to make them passable during the rains, but if they were attended to at the end of the rains, before they became hardened, could they not be greatly improved?—I doubt whether it could be done by village agency. The black cotton soil at the end of the rains is a mass of cattle footprints, nearly a foot deep, and in a very few weeks it gets as hard as iron, and you can do nothing with it.

5838. These roads are under the District Boards, are they?—In theory, yes. The ordinary by-roads are under nobody.

5839. Do the District Boards take no active steps to improve them?—No. The Taluka Boards supply a little money for smoothing away the worst places if they are pressed to do it by some influential local personage, but that is as far as they can get.

5840. Have these roads grown worse in your experience?—I do not think so.

5841. They are as bad now as they always have been?—They are certainly no better.

5842. What steps do you suggest might be taken for their improvement?—Practically speaking, I imagine, it is entirely a question of finance with the Local Boards. Personally, I would put the money into made roads instead of by-roads.

5843. Do you advocate a subsidy from the Provincial Government?—If the Provincial Government can afford it, certainly.

5844. Would you suggest that in the event of a District Board not carrying out the work, the matter should be taken out of its hands and undertaken for a period at any rate by the Provincial Government?—I think if the subsidy was given, the District Local Boards would carry out the work.

5845. If they did not?—I do not think I should. The cultivator has to learn that the District Local Board exists for his own interests. After a time he will realise that if the District Local Board does not spend the money on the roads, he had better turn them out and put somebody else in instead.

5846. Do you see any signs of villagers taking more active interest in their own local government?—I hope so. But I have talked to a great many villagers about their Taluka Local Board, and my impression is not altogether encouraging that they are learning rapidly. I am afraid many of them do not know who their Local Board member is. The matter continually crops up before the District Officer, because every village wants its roads mended, or a new road or a school. Backward districts are still under the impression that the Collector has all the funds at his disposal. I have tried often to impress on people in West Khandesh that if they want communications or schools they should bother their local member of the Taluka Board, but the majority of the villagers do not know for whom they voted or who is their sitting member. But I admit that West Khandesh is a backward district.

5847. You do not think that the plan of giving a subsidy in part payment, with the proviso that if the work is not carried out the District Local Board should be dissolved or certain work should be taken from it, is feasible?—I should prefer to do it the other way, and try to awaken the people who elect these Boards to the fact that they must see they do their work.

5848. We hoped to get the idea they were awakening to that, but you have not encouraged us?—I think they are better than they used to be, but you must remember this is a fairly new system.

5849. On page 290, you give some very important figures which you say you have got from local agriculturists, being estimates of the cost to a cultivator of starting fresh on an economic holding. Do you accept them as accurate?—No, I think they are on the high side. I can give you details if you want them.

5850. On the same page you say, "The monsoon factor can, in my opinion, only be combated by extension of improved methods of cultivation, in particular dry farming." Do you suggest the ideal method of dry farming is capable of discounting to any important extent a failure of the monsoon?—I can only judge by an example we had in West Khandesh last year, where the Dhulia Taluka Development Association ran experimental cotton plot and kept the soil worked round the crop the whole time. The later rains failed, but that crop was roughly twice as good as the other cotton crops in the same village.

5851. On page 291, you talk about the possibility of making inalienable economic holdings impartible. Would you suggest compulsion there?—Personally, in a district like West Khandesh, I would; I do not think it would excite so much opposition as is anticipated.

5852. On the same page, you deal with fragmentation of holdings, and in answer to Question 7 (*a*) you say: "I would like to try the experiment of removing land in some areas from the operation of Hindu law, making fragmentary cultivation a criminal offence involving forfeiture of the land. This sounds excessively Draconian, but obviously cultivable land cannot increase *pari passu* with the population." Have you any indication as to how action of that kind will be received by the population?—I think it rather depends on the population itself. In West Khandesh we have a fair area of new land

which is now being given out for cultivation. There is very great land hunger there, and if that land were given out on such terms I do not think anybody would object at all. They will be only too pleased to get the land. In backward areas like West Khandesh, I do not think that even if we apply it to land already given out, people will mind it.

5853. The Commission has had before it some figures tending to show, apparently, that progressive fragmentation reaches a point when it no longer increases and when the tendencies making for consolidation balance the tendencies making for further fragmentation. Your figures on page 292 do not appear to support that theory?—No, I do not think they do. We are still in the decreasing stage in West Khandesh, but the district has been opened up almost entirely in the last hundred years, and the period has not yet been long enough for it to have its worst effects.

5854. Do you agree from your experience that there is a point when stability is reached?—I have never looked into it carefully, but I have never found a case where to me it appeared to be reached. I admit I have not gone into it statistically in any district.

5855. What is the area which you know best where a large and more or less stable population has been cultivating the land for many centuries?—Parts of the Thana district.

5856. There the Hindu law of inheritance applies?—Yes.

5857. If the tendency towards further fragmentation carried with it no natural check surely in a district of that kind, you would have infinitely more aggravated conditions of fragmentation than you actually have?—Yes. In the Thana district I have known fields which, I think I should be right in saying are only as big as this table; certainly no bigger.

5858. From your experience of that district, do you think that fragmentation is going from bad to worse there, or that stability has been reached?—Certainly my impfession, when I was there about ten years ago, was that fragmentation was still increasing.

5859. On page 293, you say, "The only remedy I can suggest is compulsory consolidation in a few sample villages where a majority or even a fair minority of the cultivators can by propaganda be persuaded of its advantages." I suppose you know that successful voluntary endeavours have been made in the Punjab?—No, I am afraid I know nothing about that.

5860. I was a little surprised to see that on page 294 you say it is an economical method for a cultivator to sell his bullocks at the end of one cultivating season and buy new ones just before the next. Have you worked out the finance of that?—I have not worked it out in detail, but various cultivators and others have told me of it. It is mainly due to the cost of keeping the bullocks alive before the rains when the price of fodder is so high.

5861. I can conceive that so long as only a very small portion of the population follows that method it might be economical, but if large numbers of people did it, it could hardly remain so?—I do not quite agree, because they sell them to professional graziers who take them off to suitable grazing grounds (and there always are suitable places somewhere) and bring them back later. There is ample grazing if you can get the animals to the grass.

5862. It is only a question of selling to professional graziers who will sell them back to some cultivator?—Yes.

5863. You do not think the method might lead to a reduction in the total number of draught bullocks?—I do not think so.

5864. On page 295, talking about the possibility of a decline in the fertility of the land, you say, "In discussion with various cultivators as to the alleged decreasing fertility of the district (of course largely attributable to the fact that some 50 years ago only the better lands were cultivated), etc." Is that in your experience an explanation of the alleged reduction in fertility?—I would not say that, but I would say that it is partly the reason why the cultivator thinks that there has been such a large reduction.

5865. Do you think that the fact that 50 years ago, as you say, only the better lands were cultivated, whereas now both the better and the indifferent lands are cultivated, explains in many cases the idea that the land as a whole has declined in fertility?—I think it does.

5866. *The Raja of Parlakimedi :* Have you got these demonstration farms spread over your district?- We have a Government farm in Dhulia where they run an agricultural school and experimental cotton breeding station. Beyond that the Taluka Development Associations arrange, as far as their funds admit, every year two or three demonstration plots for demonstrating improved methods of cultivation, or manuring or improved seed in their own talukas. But it is worked by the Taluka Development Associations and not by Government.

5867. Would you not like to have one or two demonstration farms on a large scale in some important centres?—Personally I do not believe that you will ever reach the bulk of the cultivators unless you show them improved methods on their own actual holdings. To me it is doubtful whether an ordinary Government farm, however useful for experimental purposes, will produce much impression on the ordinary cultivator. He thinks that Government's resources are so infinitely superior to his own that it is no use his trying to follow them. That is how he views it. Remember I am only speaking of a backward district and not of an advanced district such as Poona.

5868. As regards these country roads, in other parts of India in backward tracts, for instance the Agency tracts, their management is taken over by the Revenue Department. Do you think the same thing can be followed in Khandesh?—In the more backward parts of Khandesh I would be quite willing to undertake it. The Forest Department have a good deal of that sort of work to do in the Satpura areas, but they have never yet been provided with sufficient money actually to make the roads. All it has been possible for them to do is to make the roads passable for timber traffic.

5869. Government cannot be approached for funds?—Government have been approached and we have managed to get for our District Board, only the other day, Rs. 30,000, for a particular road, on condition that the District Local Board would spend all the money this year. But the Provincial Government are not, I understand, particularly over-burdened with money to spend in grants at present. It takes a great deal of worrying to get any grants at all.

5870. *Sir James MacKenna :* I infer from your memorandum that you take a keen interest in agricultural and economic questions in your district? —I am afraid I cannot claim that. I cannot claim to know more than what actually touches my own work.

5871. Have you had any agricultural training at any stage of your career? —I had the ordinary Assistant Collector's agricultural course in Poona some years ago. I think it was for a month.

5872. Does that course still continue?— I cannot say.

5873. Have you a Deputy Director of Agriculture in your district?—We have one for West Khandesh and the adjoining districts of East Khandesh and Nasik.

5874. Where is he stationed?—At Nasik.

5875. That is not in your district, is it?—No.

5876. Have you any other agricultural staff in your district?- There are the officials of the Government cotton farm and agricultural school, and men working under the Taluka Development Associations, called Agricultural Overseers.

5877. Do the Deputy Director's diaries go through you to the Director?— No.

5878. Do you think it would be a good thing if they did?—I doubt whether one could do much practical good by looking at them.

5879. I would like to know a little more about these Taluka Development Associations. Are they voluntary associations or statutory?—They are entirely voluntary, but they receive a grant from Government.

5880. And what do they expend it on?—They usually employ a fieldman and pay him, and as I was trying to explain, they have demonstration plots in their talukas on the cultivators' lands.

5881. Do you think that this voluntary system is the best? Do you prefer it to a statutory committee appointed and financed by Government?—I certainly do prefer the voluntary bodies myself. Of course, to begin with the Taluka Development Associations need a certain amount of pushing from official sources to get them going.

5882. There are no Government officials on these associations?—Yes, the local *mamlatdar* is usually a member, and there is the Agricultural Overseer.

5883. *Professor Gangulee:* It is very gratifying to see a Collector of a district taking so much interest in rural problems. Do you find it possible to pay attention to rural questions in addition to your own executive and judicial duties?—A Revenue Officer is very closely concerned with rural problems. After all his main duty is land revenue and that entirely depends upon agriculture.

5884. I follow that, but your function is to collect revenue. The interest you have taken in the Taluka Associations and the social, moral and educational welfare of the rural population is not really your duty?—I am afraid it is generally considered that the Collector's duties extend to everything in the district.

5885. Do you think that the agricultural outlook in a District Magistrate is helpful to him in discharging his duties?—It certainly is.

5886. Would you recommend some sort of agricultural training for these District Officers before they take up their duties?—Frankly, I have forgotten everything I learnt at the agricultural course at Poona some years ago!

5887. Are you in touch with the Director of Agriculture here?—I write to him if I want to know anything. If he happens to come to my district he discusses things with me if I happen to be at headquarters, or perhaps puts up with me.

5888. Do ryots come to you for any help with regard to better seed, or with difficulties regarding irrigation or in the event of an outbreak of cattle disease?—It all depends upon where I happen to be at the moment. If I am in a village where there is any difficulty with regard to irrigation or cattle disease they will come to me and I will direct them where to go.

5889. They do not seek your assistance in any way, but they complain of their difficulties when you visit their village?—West Khandesh is a backward district. They seek the assistance of the Collector in every possible matter and especially for restoring erring wives to their husbands. In my area these backward Bhils will bring everything to the Collector, and usually these are matters in which he can take absolutely no action.

5890. You state here that the ryot is intensely conservative. Is that your opinion?—Yes, most certainly.

5891. Yet you say later that they have taken to the use of copper sulphate extensively and that they took 3,000 packets in 1923 and recently they have taken 8,000, so they take to these improvements after they are convinced that these improvements are economic and will benefit them?—Certainly; if the cultivator is really convinced he will obviously take improvements. But it is very difficult to convince him.

5892. Even if these improvements are demonstrated on his own land?—I am afraid so. I have given the instance that occurred to me last week, where one man has been cultivating Akola *bajri* for years but his neighbours will not take it up.

5893. You say Taluka Development Associations require for their motive force some energetic local official. Do you suggest that these Development Associations have not yet found their feet and cannot be guided by non-

officials as yet?—In West Khandesh they have not, but they are going that way. In the oldest of these associations the *mamlatdar* is on the committee but much of the spade work is now done by non-officials. The other Taluka Associations are working towards that ideal. The most recently formed one was got up by the *mamlatdar* and I hope it will continue.

5894. Have you personally visited any meetings of the Taluka Associations?—I have attended their annual meetings, which are merely formal occasions for making speeches by the Deputy Director of Agriculture and officers of the Co-operative Department.

5895. The members invited you to attend these meetings?—Yes.

5896. Is there in your district any adult education propaganda?—They have an agricultural boarding school in Dhulia; they have got one or two agricultural bias schools in the district.

5897. Do Taluka Development Associations take up adult education work?—No.

5898. With regard to the attitude of village *patels* you say that they view the affair with something akin to good-natured contempt or pity for a misguided official who thinks a Government officer can teach them their business. What do you mean by the *patel's* good-natured contempt?—His contempt is with the idea that myself or an official who spends his time sitting in an office and coming from another country can teach him anything about agriculture, which his ancestors have been doing for centuries. I consider it natural, and it is probably justified.

5899. But, villages have taken certain improvements from your hands, for instance the use of sera against contagious diseases of cattle?—I was merely referring to my small demonstrations.

5900. Do you consider this attitude is a serious obstacle to agricultural propaganda work?—But there is a great deal to be said for the *patel*. He and his ancestors have farmed certain land for thousands of years and it would be very unwise to change his methods, without ample proof that the change is for the better.

5901. That is so in every country. European farmers had to go through that stage, and they will stick to their empirical knowledge and not take to new methods unless they are convinced?—I suppose so; I have never farmed anywhere.

5902. With regard to demonstration, you suggest that more funds should be granted to the Taluka Development Associations. They do get a grant of Rs. 1,000?—Yes.

5903. You consider that amount not sufficient?—I think one will do more good with more money.

5904. They must draw up a programme before they get money from Government. Have they developed any system of propaganda or educational work, or anything of that kind?—Every Taluka Development Association, as far as I know, makes out a programme for its next year's working. For instance, there are to be so many plots and such and such things to be done on them.

5905. You know that Government will not give further grants for any slip-shod methods of work?—This is a case where I think it would be worth while gambling on Taluka Development Associations working properly.

5906. With reference to demonstration you say "by making a fuss of such field demonstrations". What do you mean?—When the demonstration cotton crop is ready for harvesting, issuing invitations to all the local people.

5907. On page 286 you say the increase in the use of copper sulphate is largely due to 'pushing' by the Revenue authorities. What part did the non-official agencies, local bodies or Taluka Development Associations take in this particular matter?—In this particular matter they took practically none.

5908. The Revenue authorities introduced this improvement?—I think I am right in saying the Agricultural Department introduced it and Govern-

ment said we should afford them all possible assistance from the Revenue Department. I therefore saw that the subordinates made the people acquainted with the existence of copper sulphate and supplied the taluka towns and various village officers. Whether they were all used I cannot say, but so many were paid for and I hope they were used.

5909. These Revenue authorities are officials. The cultivators have been benefited by the officials directly at least in this case?—I hope so.

5910. With regard to roads, am I right in thinking that the local bodies have not paid adequate attention to this question from apathy, or is it due to lack of funds or anything of that sort?—I am afraid I cannot give an opinion as to the validity of the various claims on local bodies; whether roads should take precedence over education or health is a matter for the local bodies to decide. I should not attempt to dictate to them except in an emergency.

5911. Do you come into contact with the members of local bodies?—I see a good many of them.

5912. Do you speak to them about better communications?—To give an instance, often when I go to a village the villagers complain to me about the roads and want them mended. I always say to them, " Government, in order to teach you, have given all the money to the Taluka Local Board, and you should go to the local member about it. Who is your local member? " In many cases they do not know who the local member is. In most cases they do not remember whether they voted or not. In this particular case the local member happened to be with me. I explained to them that to get their village road mended they must sit at the *patel's* door and make things unpleasant for him till he gets up in the Taluka Board and manages to get a grant for their village. That is not the traditional method of getting money in this country. The traditional method was to approach Government. It will be a long time before they learn the new way of doing it.

5913. With regard to *taccavi* loan, I think it is distributed by the Revenue Department at present. Do you regard that arrangement as satisfactory?—I think that in most of this Presidency it is to be distributed or is distributed for minor matters through the co-operative credit societies.

5914. Do you approve of that method?—Yes, in the most advanced places; but in places like West Khandesh it is impossible, and Government had to exempt the district.

5915. West Khandesh, I think, is comparatively prosperous compared to the Deccan?—Yes, comparatively speaking.

5916. Do you find that on account of cotton their economic condition is much better than in other parts?—Do you find any change for the better there?—It is very difficult for me to make comparisons, because since 1916 I have been either in the Secretariat or in Nasik or in the Khandesh district, so I cannot really compare it with Thana or Satara or Ahmednagar.

5917. What is your general impression of the rural population?—I cannot give you statistics, but my own impression is that it is better than it was.

5918. The economic condition is decidedly better than it was before?—I should not go so far as to say decidedly. My own impression is that the economic position has improved.

5919. What about the primary education movement in your district?—The District Local Board want to introduce compulsory primary education when they have the necessary buildings, masters and funds. They cannot introduce compulsory primary education for some years for lack of masters, lack of buildings and lack of funds.

5920. The demand for education is there, but because they cannot get teachers and adequate funds they have not introduced it?—Yes.

5921. You find there is a demand for primary education?—I would say from my experience that the demand for primary education is a good deal more than it was 10 years ago.

5922. Do you find any dynamic changes coming into the villages?—No.

5923. With regard to their social life or outlook there is no visible change?—I cannot think of any at the moment.

5924. What about litigation? Is it dying out or increasing?—It is very difficult to say. It is not very bad in West Khandesh, partly owing to the ignorance of the people. I cannot say what it is in comparison with what it was years ago.

5925. How many voluntary social service associations are there in your district? Do you come in touch with them?—There is one Health Association in Dhulia city.

5926. Purely non-official?—There are official members, but it is essentially non-official.

5927. Are they working among the villagers?—No; it is in Dhulia city. I cannot, off-hand, think of any other.

5928. Do you know of any particular non-official agencies working in the village areas in your district?—Yes, I think at the moment the local India National Congress Committee have appointed a paid propagandist to tour the district and to conduct an economic enquiry into the conditions of the villages and do political propaganda.

5929. Do you know whether the motive is purely political or whether he is trying to uplift the people of the country?—I would rather not give an opinion.

5930. *Mr. Calvert:* On the question of roads, have you ever thought that it might pay you to take a loan to cover all the non-recurring cost such as roadway embankments, bridges and so on, leaving the local body to finance wearing cost, maintenance and repairs out of revenue?—I did suggest that to the West Khandesh Local Board. We have three taluka towns north of the Tapti which are totally unconnected by main roads and in the rains it is impassable, but at the moment the District Local Board is busy with the expansion of its educational programme, and some local notabilities had a scheme for a light railway to be built by a private company, so it was not worth while pressing them any further.

5931. The fact that you have often to meet the whole cost from revenue is a difficulty?—A very great difficulty.

5932. Have you worked out roughly how far the maintenance charge of a metalled road is covered by the difference between transport charges on metalled and unmetalled roads?—No. I can only say that in one taluka the market rate for cartage is 4 annas a mile on a metalled road and 5 annas a mile off it during the dry season.

5933. It would be a simple calculation to find out how many carts pass per day and see whether it would be economic to have a metalled road?—In the wet season they cannot go off the metalled road.

5934. The charge is 25 per cent. more on a *kutcha* road?—Yes.

5935. With regard to the dependence of your people on the village *sowcar*, is the Usurious Loans Act made use of in your district?—I am afraid I do not know.

5936. Is it your experience that debt follows credit, *i.e.*, your big owner is more in debt than the small one, the small owner more than the tenant and the tenant more than the labourer?—My impression is that that is so, but not in any definite proportion.

5937. Not in any exact proportion, no; but debt does tend to follow credit?—That is my impression, but I admit I have no statistics to back it up.

5938. *Dr. Hyder:* Is it your experience that the large landowner may be up to the neck in debt, but that if that happens to the small man he is submerged?—Yes.

5939. *Mr. Calvert:* On page 289 the reasons you have given for indebtedness all indicate decreased credit, uneconomic holdings, bad years and so on. Those things tend to reduce a man's credit and therefore his borrowing power

becomes less?—Certainly, but he has probably started with a fair debt to begin with.

Sir Chunilal Mehta : The price of land goes up and increases his borrowing power.

5940. *Mr. Calvert :* Is it not your experience that in a more prosperous district the debt is higher than in a poor district?—I cannot say; I have never gone into it.

5941. I gather that some sections of your people can mortgage their land, while some cannot?—Yes.

5942. Have you any idea of the proportion between secured and unsecured debt?—No. We have 2 lakhs of Bhils, whose credit is very small. The rest of the population are fairly good agriculturists and hold land of their own on alienable tenure.

5943. The Bhils cannot mortgage?—No.

5944. They have no mortgage debts?—No.

5945. Are they less in debt than those people who can mortgage?—As far as the amount of money is concerned they are much less in debt, but for practical purposes they are often more. The rate of interest they have to pay is much higher, and very often they have to pay back their debt by acting as farm labourers for the people who lent them the money, and continue like that from year to year.

5946. You know that in Jhelum Colony there is primogeniture and impartibility, but relations get a grip on the owner and there is a sort of indefinable tenure of partnership and the benefit of the impartibility is apt to disappear? -Yes.

5947. Do you not think that might occur here too?—Certainly it might, but I think the experiment is worth trying in Khandesh, where we have this land to give out. I admit I know nothing about similar experiments elsewhere.

5948. They also work on the land free, they help to provide bullocks, and so on, and have a sort of indefinable claim on the land which a civil court might admit?—I quite realise that must be the case, at any rate to begin with.

5949. It is a little difficult?—I do not suppose it would be plain sailing by any means.

5950. *Dr. Hyder:* If that were so, the main advantage of impartible holdings would remain, that no fragmentation and sub-division would occur? —The main advantage in my opinion is impartibility of cultivation.

5951. *Mr. Calvert :* Would you favour me with your opinion as to whether the teachings of the Agricultural Department have really got down to the small man?—Except in a very few cases I do not think so myself.

5952. On page 292 you give us some figures as to classification of holdings. Those figures refer, I presume, to owners?—Yes.

5953. If you had similar figures for cultivating units, cultivators' holdings, would you expect to have a lower scale than this? I mean are there more cultivators than owners in your district, or *vice versâ*?—I should say there were more cultivators than owners but not so very many. I have no figures to show what the proportion is.

5954. Actually from an economic point of view the owners' holdings are immaterial: it is the cultivators' holdings we want to know?—I do not think so. The tenant does not get the same benefit from cultivating the landlord's land as he would from cultivating his own land.

5955. By cultivator I mean a man who cultivates in any capacity, as owner or tenant. Your cultivators would be somewhere below the 15 acres group, would they not? You have no people cultivating 500 acres?—No.

5956. And probably no people cultivating 100 acres?—Yes, we have.

5957. Single people?—The joint family.

5958. I mean individual cultivators?—It is hard to say what an individual cultivator is; most cultivators have a wife and children. A substantial number cultivate 100 acres or more.

5959. You have no 1,500 acres holdings?—No.

5960. So that really all that land in the two top groups goes down to the lower groups?—As regards units of cultivation, yes.

5961. So that your units of cultivation are probably bunched round the lower groups?—Yes.

5962. If you got an educated cultivator, an educated man of the cultivating class who was trusted by the people and put to propaganda work, steady persistent propaganda, year in and year out, do you not think he could wear down the opposition to consolidate, and produce results?—Yes, I think he certainly could.

5963. Practically the whole secret of the Punjab system is persistent propaganda, year in and year out, gradually overcoming the opposition?—Personally I think in many parts, for instance, in the Tapti Valley where the soil is largely uniform, it could be effected without any great difficulty now. It is in the villages where you get a small area of good soil and a large area of bad soil that it would require a great deal of propaganda before you could get anyone to come in.

5964. Assuming for the moment you had compulsion, and by compulsion you had brought about consolidation, that you had pleased 99 people and displeased the 100th, which do you think would shout the most: the 99 in your favour, or the one against you?—The one against us, certainly.

5965. Even among his neighbours the disgruntled man might do much more active propaganda than the 99 men who are contented?—Yes.

5966. *Mr. Kamat:* Have you got village panchayets in your district working well?—I cannot say they are working well.

5967. How many have you?—I forget.

5968. Can you tell me roughly?—Roughly I should say there were about 20. I really forget how many.

5969. They are not working well; is that because of apathy on the part of the people and lack of interest on the part of the Collectors?—Could not I take those two questions separately?

5970. Yes, if you like. Is it partly due to apathy on the part of the people?—Not so much apathy as dislike for direct taxation.

5971. And lack of interest on the part of the district officers?—I should deny that personally.

5972. Do you think these village panchayets might be stimulated by greater interest being taken in them by the Collectors?—Of course I do not admit your first point.

5973. Do you not think they could be very valuable agencies for village reconstruction?—I cannot give an opinion without more details, I am afraid.

5974. If, for instance, you called together your *mamlatdars* and asked them each to take a village to be made into a model village, with the help of the people, of course, could you not introduce amenities such as a village library, a good drinking water-supply, cleanliness, good surroundings and that sort of thing, so as to make an Indian village something like an English village?—If you had the funds you certainly could; the main difficulty is where you are to get the funds from.

5975. If you make a demonstration in the first place in one village could you not get the funds, people having seen what you want to do?—I have argued with the villagers of a good many village panchayets and tried to point out to them the things that are needed in their villages, and I am always met with the answer, "But we have no money to pay for it; we do not want the village panchayet, and we should be glad if it were abolished." I agree there are a few enlightened villages where the village panchayets are working, but even there their funds are very restricted.

5976. Have you not made any definite demonstration in a particular instance; for instance, if public welfare work were shown to be good, would it not catch on?—Without funds and without some agency for doing the work I am very doubtful. As Assistant Collector I have often had to lay out new parts of village sites in decent streets, allowing space for trees to be planted and things like that, but I have never yet seen any attempt made to keep up those amenities.

5977. So that you think the difficulties are not due to lack of interest either on the part of the people or of district officers?—The difficulty I think is disinclination of the villager to tax himself for communal purposes.

5978. Would not the village panchayets, if improved, be better instruments for rural reconstruction than the Taluka Development Associations?—I cannot give you an answer. I have seen Taluka Development Associations doing good work, and I am not in a position to say what improvement village panchayets might or might not do. The more people you can get to conduct prepaganda for you, the better, obviously.

5979. Mr. Calvert asked you whether the Usurious Loans Act was in operation in this Presidency. Do you know that in addition to that we have got the Deccan Relief Act?—I know we have got the Deccan Relief Act.

5980. And that by that Act the Court may decree a reasonable rate of interest notwithstanding an agreement for a higher rate of interest between the moneylender and the cultivator?—Yes.

5981. They can also decree, in favour of the cultivator, that the repayment of the loan shall be by very convenient instalments spread over a number of years?—Yes.

5982. *Mr. Calvert:* Under that Act can the Courts make the moneylender give back to the borrower any excessive sum he has paid in interests?—I am afraid I do not know at all; I have never had to work that Act.

5983. *Dewan Bahadur Malji:* In your note you mention the lengthy execution proceedings and point out that execution proceedings have to be transferred to Collectors?—Yes.

5984. And those proceedings drag on for a number of years?—In some cases they certainly do.

5985. During the course of such proceedings do you ever farm out the attached lands and liquidate the debts?—I cannot say whether it is ever done; I have considered doing it.

5986. Doing farming business?—Yes, renting out the land. I think I have a case at the moment under enquiry, but I have not done it in any other cases so far.

5987. So that these provisions in the Civil Procedure Code are practically a dead letter; I mean farming; those provisions are generally not made use of?—As far as my experience goes, generally they are not.

5988. Another matter in which the agriculturist is at a great disadvantage is that, as you know, when the sale is conducted by the Collectors, the agriculturist is compelled to pay the sale fees according to the land revenue rules?—Yes.

5989. In addition to that, the High Court has provided for poundage at 5 per cent.?—Yes.

5990. Those fees are paid by agriculturists or non-agriculturists, but the agriculturist is at the greater disadvantage of having to pay poundage, so that he pays double fees?—I have just been looking into the matter and I find I have not been collecting poundage.

5991. *Sir Ganga Ram:* In your memorandum you often refer to economical and uneconomical holdings. What is the size you regard as being economical or uneconomical?—I am afraid that is a term I have used rather loosely; I refer to it as the area which can employ a cultivator who has one pair of bullocks.

5992. But what is its acreage?—In the light lands in the south of the district I take it as 20 to 22 acres.

5993. Is your district canal-irrigated at all?—It is only irrigated by *bunds* which take off from streams and give a certain amount of irrigated land. There is no regular canal irrigation. There are a few second class irrigation works and that is all.

5994. Is there any well-irrigation?—Yes, there is well-irrigation.

5995. When you say 20 to 22 acres, are you speaking of canal-irrigated land or well-irrigated land, or what?—No, that is the light soil in the south of the district, depending on rainfall only.

5996. Why is it that the number of people holding 100 acres is very much decreasing?—I imagine it is largely due to the natural increase of the population.

5997. That should have increased the cultivation?—I am afraid I have not followed the question.

5998. Do the people who own 100 acres employ tenants to do their tillage?—A good many do; others are undivided families and they work the land through their brothers and sons and hired labour.

5999. Do those who employ tenants receive payment in cash or do they participate in kind?—It varies; both systems are employed.

6000. In your note you suggest that uneconomic landholders had better be squeezed out as soon as possible. What do you mean by the word "squeezed"?—Be eliminated. Our experience is that the man with the small holding, if, as is often the case, he cannot get more land to cultivate as a tenant, cultivates his small holding very badly. It does not produce enough for him to live on, it hinders his getting employment as a labourer, and his condition goes from bad to worse.

6001. You say that unless the father by his will disinherits his children, the law prevails. Can he disinherit if the land is ancestral?—I do not know; I believe so, but I admit I do not know the Hindu law on the subject at all.

6002. In your district do these Loni school boys go back to their land or do they seek employment elsewhere?—I have not got any figures, but as far as I remember about half go back to their land and half try to get jobs elsewhere. I am not sure of that.

6003. You say in your note that tractor experiments should be made. I have just enquired from Dr. Mann the cost of one ploughing by tractor already established, and I am told it is Rs. 8 on heavy land and Rs. 4 to Rs. 5 on light land. Do you think the cultivators could stand that expense?—I am not prepared to give any opinion until we have had a tractor working.

6004. There is no question of experiment because the experiment has already been made?—They are, I understand, successful in Gujarat; tractors have been used there successfully.

6005. But can the people in your district afford it?—That is what I want to find out by experiment.

6006. In your note you speak of "made roads"; what do you mean by that?—Metalled roads.

6007. In your district does not the Forest Department allow free grazing in some places and at a small charge in other places?—Certain villages have the privilege of free grazing; that is, if there is forest available; but there is very often no forest available.

6008. If compulsory primary education is introduced, do you think they will forget all they have learned in two years? That has been the experience in other places?—I am afraid I am not an educationalist; I could not say.

6009. Are there any irrigation schemes on the *tapis* in your district?—There are none at present that are likely to be carried out. There are several which might be carried out.

6010. There are some which can be carried out?—I do not say they can be carried out profitably.

6011. No, but as a projected measure they can be carried out?—They have been projected in the past, but I do not know that Government will ever find us the money.

6012. But there are schemes possible?—Yes.

6013. Have you any idea what interest they would bring in?—I am afraid I have forgotten.

6014. *Sir Thomas Middleton:* You have already told us that you had a month's agricultural education at Poona and that you have forgotten all you learned. Reading your memorandum on animal husbandry I come to the conclusion that you have made very good use of that amount of education. I think you must have spent a great deal more time than a month in studying the difficulties which arise in a grazing area?—I did not study that at Poona.

6015. Perhaps you began to think about it after being at Poona?—Yes, I had to think about it.

6016. I read these remarks as referring to Western Khandesh chiefly?—Yes.

6017. You told Sir Ganga Ram that you expect a pair of bullocks in West Khandesh to cultivate 20 to 22 acres of light soil?—Yes.

6018. What do you take for the heavier soil?—I should say in the Tapti Valley roughly 15 to 16 acres.

6019. You put these figures in both cases rather higher than I should have expected?—I have not done it more than by a casual enquiry among villagers as to what bullocks would cultivate.

6020. It may be the approximate average in that area, but it is very much above the average for India. It has a bearing on the number of superfluous cattle that you have got in your district?—Yes.

6021. Your remedy is the drastic one of increasing the grazing rates and starving out the worthless animal from the overstocked grazings?—It is the remedy I should like to employ, but I do not think there is any chance of its being employed.

6022. You recognise that it is impracticable?—It is impracticable under present conditions.

6023. A little later you refer to the great increase in grazing which has been produced by the enclosure of forest on the Dhulia Road?—Yes.

6024. Short of the drastic remedy of starving, by putting up the prices to such an extent that worthless cattle would be kept off the grazing, would it not be possible to solve the difficulty in some such way as the following:—there are in each of the villages in your area a certain number of cultivators who have plough bullocks; there are probably a number of Bhils and others who may have next to no plough bullocks but who keep a few animals and overgraze the village wastes to such an extent that the cultivators' cattle have no chance whatever of picking up anything in the dry season. If some arrangement were made by which the cultivators could have reserved for themselves a certain area in proportion to their numbers, and a certain area were left to tribes like the Bhils whom you cannot expect to adopt a settled husbandry, do you think it would be possible to induce the better cultivators, by showing them what has happened in enclosed forests, to go in for a system of rotational grazing on their own land? The result would be that if the aggregate amount of grazing on the enclosed area were doubled or trebled, as it easily might be with proper grazing, the benefits would be limited to semi-cultivators and not spread over the Bhils and other hill races whose cattle at present come into competition with those of the better cultivators. Do you think there is any possibility of some such arrangement?—I rather doubt it. What grazing there is in a village is looked upon as the common property of all the village cattle and, in any case, I should be very loth to adopt any arrangement which would put any stigma on the Bhils and other backward tribes whom we hope eventually to turn into settled cultivators.

6025. At present is it not their cattle that constitute the difficulty?—No, I do not think it is. The poor Bhil keeps goats and chickens. If he has any cattle it is usually one plough bullock, which he shares with another Bhil who has got another.

6026. Have you got many *kolis* in your district?—Very few *kolis*.

6027. Do most of your cultivators belong to the *patel* or *patidar* class?—The majority of the cultivators are of the more advanced Marathi, Gujar and Kunbi castes; but then there is rather more than one-third of the area where the cultivators are almost entirely Bhils, Mauchis and Pavras.

6028. The difficulty at present is that the Kunbis see no chance of making any improvement in their grazing area because of the encroachments of cattle belonging to others and I was wondering whether there was any possibility of reserving for more advanced cultivators, of whatever caste, a certain area of grazing land and persuading them to graze the land in rotation as is done in the enclosed forests?—We have to a certain extent made a move in that direction by trying to sell wire fenced *kurans* to villagers on an average of the last 3 years' prices. We managed to get rid of two out of four to the villagers. We had a big *kuran* but the villagers would not offer any reasonable price for it. They offered to pay for it by instalments, but the prospects of getting the money out of them eventually were rather doubtful. But there is that possibility that if you take the trouble to fence *kurans* you might then sell them to the better class villagers for their own cattle; but without that I doubt whether any villagers would be ready to come forward to buy an unenclosed area of forest, because they would find it so very difficult to keep other cattle out.

6029. On page 292 you say the social prestige attaheing to land is a great factor in the desire to possess it. Is that a great factor?—I think it is, so far as my experience goes.

6030. It is not due to the fact that a man who has worked and cultivated land does not want to leave it?—No, the man who has land in the village is in every way more respected than a mere tenant. If a man gets into trouble and he wants to prove he is respectable, the first thing he tells you is that he has land of his own in his village.

6031. *Dr. Hyder:* You give certain figures on page 290. Do you say it will cost Rs. 750 to get a return of Rs. 1,000 if he grows cotton? Will you look at items (*a*) and (*b*)?—Does your item (*b*) "Working expenses until the next crop is ready," include the maintenance of the cultivator and his family?—Yes. I would explain that these are not my figures; they are given to me by cultivators. I disagree with them rather; to my mind they are placed too high. For instance, they allow for keeping a watchman. The ordinary cultivator starting in a small way would not keep a watchman; he would turn one of his family on to keeping a watch on the crop. My own enquiries in giving out land for Bhils were that roughly a Bhil starting afresh required a capital of from Rs. 300 to 400, which he had to get from Government by borrowing, saving, illicit distilling, theft or somehow.

6032. That does not include the price of the land?—No.

6033. That is free?—The Government was willing to give the land to backward classes free of occupancy price.

6034. So that if a Bhil in your tract accumulated Rs. 900, that would keep him going for 3 years?—I think it certainly should. I only took it until the got the crop in.

6035. If a Bhil had savings in the co-operative society amounting to Rs. 900, that would tide him over a period of scarcity or of famine for 3 years?—I think it certainly should.

6036. I suppose your district is not opened up by village roads on either Yes.

6037. I suppose your district is not opened up by village roads on either side of that road?—There are village roads to most parts of the district except one part which is only accessible by foot or small pack animals.

6038. I only use this as an illustration. Money cannot be raised to supply the people with wells and roads; the people look to the Government to supply them with money, do they not?—They certainly look to Government to give them money, yes.

6039. The Government cannot give them money?—I understand not.

6040. And they have not got any money?—That I do not admit; I think we could easily raise a loan of 10 lakhs if necessary in Khandesh for a North Tapti Road.

6041. I admit that they do not wish to part with their money?—They certainly do not wish to part with their money.

6042. As they do not wish to part with their money and the Government cannot give them money, I want to know from you as Head of the district what you think of this suggestion: that you conscript your people, that you say to them: If you want these things, pay a labour tax, repair the wells or tanks which have got silted up, and make up the roads by putting in so much labour per family; the Government do not want any money from you?—Yes, that plan has often been tried in digging village wells and so on. The usual rule in a village is for the Government to contribute one-third, the Local Board one-third and the village one-third. The villagers always say they are willing to give labour worth one-third the cost; but when you come to work out what they have done you find something has gone wrong, they have been busy with marriages or harvesting and they have not provided what they promised.

6043. That is on a voluntary basis?—Yes.

6044. But supposing they were conscripted for about 10 days when they had no agricultural operations to perform and were made to work, so many members of each family between the ages of 16 and 45?—I cannot say I like the idea.

6045. Do you think it would be undesirable from a political point of view?—I think it would be undesirable from every point of view, except that you might get better roads in the end.

6046. Owing to the fact that the people do not make the best use of their chief industry, agriculture, there are no funds available and they do not evince a liking for direct taxation?—No, but if you arouse sufficient enthusiasm I think the money could be raised. There are two lakhs of Bhils in the district, and I have often had proposals from Bhils that I should collect an extra anna on each rupee of Government land revenue for the creation of a fund for Bhil education. The Government did not approve of such a voluntary-compulsory levy and so I cannot do it.

6047. They want to be educated but the Government are afraid?—You may put it like that; doubtless some Bhils would kick, but the great mass of them would not.

6048. *Sir Chunilal Mehta:* When was this proposal of an extra cess on the land revenue for the Bhils put up to Government?—I do not know that it has ever been put up to Government, but the offer was made some time ago by the Bhils themselves. It has been turned down I think by Government or the Commissioner on the analogy of the proposed cess for Mohammedan education in Sind. I have not put it up to Government myself, because I thought there was no prospect of getting it through.

6049. Was that in recent years?—Yes, quite recently. It originated before I became Collector, but the Bhils have often talked to me about it since.

6050. So that you have not really had a definite decision from Government; you have not put it up to them?—No, I have not put it up to Government at all.

6051. You cannot tell what view the Minister would take with regard to it?—I can only judge from the Government's orders on the subject or the collection of subscriptions by officials.

6052. Have you any idea when those short courses for Assistant Collectors in the Agricultural College were abandoned?—I do not know at all.

6053. It was some years ago?—I do not know.

6054. Are you aware that about two years ago the question was again raised, and some arrangements have now been made by which some kind of training will be given to Assistant Collectors?—Yes, but I do not know what the details are.

6055. It is coming into force this cold weather. In answer to Sir James MacKenna you said that the diaries of the Deputy Directors were not submitted to you as Collector?—No.

6056. Are there any recent orders of Government by which the Deputy Directors are to prepare programmes, to inform the Collector of their tours in the districts and to get the Collector's assistance in calling meetings of all the Revenue officers and the leading people in the district in order to carry out those programmes?—Yes, there are recent orders for co-operation between the two departments, though I am not prepared to say what the exact details of it are.

6057. Have the Deputy Directors approached you?—Continually, yes.

6058. In fact, Khandesh is one of the districts where the co-operation between the Agricultural and Revenue Departments is excellent?—That I could not say; I do not know what it is in other districts.

6059. But in your district it is very good?—I think it is all right at present; I have certainly got on very well with the agricultural people.

6060. Have you any experience as to whether roads under the District Local Boards have deteriorated or not?—There are very few of them in Khandesh and those I know are full of large holes; but whether they have deteriorated recently or not I cannot say.

6061. The District Local Boards have certain money at their disposal; do you think they are giving a fair share of that money to the roads?—It is very difficult to answer; it involves evaluating the claims of health and education as against those of communication. I imagine any District Local Board would be perfectly justified in setting its own value on the three factors and allotting its money accordingly.

6062. That is really what I should like to know: whether the District Local Boards, judged by your standard, give a fair proportion of their resources to education, village health, sanitation, roads, and so on?—On the whole I should say yes; but I personally would spend more money on roads at present under the circumstances of the district. In other districts probably it is not needed.

6063. Would you place roads in front of education in your district?—That is a poiltical question I would rather not answer.

6064. Do the Local Boards receive substantial financial assistance from Government?—Yes.

6065. Have you had occasion to compare the assistance given by this Government with that given by other Governments?—No

6066. You have never examined that question?—No.

6067. On page 289 you say the best times for the labourer to earn money as a hired worker are when he must be looking after his own crop. What are you referring to there?—I mean that if a man has a field of cotton of his own ready for picking, he must pick his own cotton first, though in the same village there is probably a rush to get labour for a larger cultivator's crop and he would get more money if he could neglect his own field and pick somebody else's cotton. He misses his opportunity of getting the best rate of wages for picking cotton.

6068. That would make it all the more desirable, would it not, that in his spare time he should have some other occupation besides agriculture?—Yes.

6069. You have referred on page 294 to spare-time subsidiary occupations?—Yes.

6070. It is your opinion that the extension of well-irrigation would afford the best kind of occupation for cultivators; it would occupy his time during the whole of the year?—Yes.

6071. But there are physical limits, apart from financial, to such extension?—Yes.

6072. What kind of occupation would you suggest, therefore, for those places where well-irrigation was not possible?—The main subsidiary occupation in Khandesh at the present time is illicit distillation, but I cannot suggest that! Frankly, I have been unable to think of a suitable occupation. To my mind, you must have an occupation which is fairly interesting, or it does not do a man any good, and you must have an occupation which is profitable. As far as my experience goes, it is difficult to think of an occupation which will be profitable unless you have a demand for the product; and with the present marketing facilities in the districts it will be extraordinarily difficult to find a product which will pay the cultivator. I had an experience the other day which bears on the point. The local Mahars weave cloth, and they came to me with a petition to the effect that their traditional occupation of weaving this cloth was now going, and no one would buy it. Some *patels* were there with me and I asked them why this was, and they said the cloth was more expensive and did not wear so well. I had no answer to give; if the local consumer will not take the product, a man is wasting his time making it.

6073. Are the cultivators weaving *khaddar* (coarse cloth) at all?—I do not know of any. It is a traditional occupation of the Mahars in the villages.

6074. The Mahars have some land to cultivate as well, have they not?—Some have and some have not.

6075. So part of the hand-weaving would be done by cultivators?—Yes, but it seems to me no use their going on weaving if they do not get some profit on it. They could not get a profit, because the local people said the cloth did not wear and was too expensive.

6076. You recently had a Government weaving school going round your district?—Yes.

6077. Did they tackle these Mahars?—I could not say.

6078. I do not think they did. If weaving amongst people of that class was improved and they were shown better methods of doing their work, that might afford some relief to this languishing industry?—It might, but is not a thing I should be willing to be definite about.

6079. Have you examined this question?—Not beyond the mere statement of the Mahars, confirmed by the villagers, to which I have already referred.

6080. None of your Taluka Development Associations take an interest in a matter like that?—I do not know that any Taluka Development Association takes an interest in Mahars' weaving. The District Local Board tried to introduce weaving in primary schools and held a school for primary school teachers last hot weather, but I do not know whether it will be a success. I merely mentioned this to show that I had been unable to think of a subsidiary occupation which appeared likely to be successful. Although to all appearances weaving should be successful, the actual weavers complained it did not pay them and I cannot think of any other subsidiary occupation for which sufficient demand and marketing facilities exist to make it pay.

6081. How long has this weaving been going on?—It is a traditional occupation.

6082. There is no reason why it should suddenly collapse now?—I suppose it depends on the demand and the price of cloth elsewhere.

6083. There are always ups and downs in a trade. Do you think this question has been sufficiently examined?—No. I merely want to point out that I have not got a remedy; I cannot suggest any subsidiary occupation. personally, I find it very hard to think of one.

6084. Would you consider hand-weaving as an auxiliary occupation is a matter for investigation?—It is certainly a matter for examination.

6085. You have the cotton on the spot; there are mills from which the yarn would be available; and weaving has been a traditional occupation for centuries. Is there any reason for a sudden falling off?—I do not know. I merely have the statement of the weavers to go on. That was very likely coloured by the fact they wanted land and it was a good excuse; but the local villagers confirmed the fact they did not buy the cloth they used to.

6086. There are a good many weavers in your district?—In Dhulia itself, yes.

6087. Weaving all kinds of cloth, both fine and coarse?—No. They are nearly all concentrated in Dhulia, and they weave the ordinary stuff, nothing particularly fine.

6088. Have you at any time examined the business working of this hand-weaving business?—No, I have never gone into that in any detail.

6089. I mean, such questions as where they buy the yarn, how they sell the cloth and their credit arrangements?—No I have not gone into that at all.

6090. *Sir Henry Lawrence:* From the point of view of the interests of the ryots in your district, which do you consider most necessary, better roads or schools?—The primary need is better roads, because unless the ryot has an opportunity of going about I do not think he will make any use of what he learns at school. You have to educate the people not only by books but also by environment.

6091. Can you get about your district in a motor-car?—No. I can get about parts of it in a Ford.

6092. The village roads are good enough for that?—Not all of them, by any means.

6093. What proportion of your district can you move about in in a motor-car, or rather a Ford?—It is difficult to say. The trouble is one can get along all right for 5 or 6 miles, and then you come to a place you cannot possibly get over without having the car carried.

6094. *Mr. Kamat:* Do you mean the roads are not good enough for British cars?—They are not good enough for any cars at all, but they do all right for Fords.

6095. *Sir Henry Lawrence:* You have a provincial road running from north to south?—Yes.

6096. Have you a provincial road running from east to west?—Yes, there is one to Nandurbar which joins the Agra road.

6097. *The Chairman:* I have just two questions to ask. Did you say in answer to Mr. Calvert that cultivators in debt who were unable to pay occasionally worked as labourers for the lender of the money?—The backward tribes usually do; it is their sole method of obtaining credit, to agree to work off the debt by labour.

6098. So many days' labour, is that the term of repayment?—Usually a Bhil gets into debt because he wants to get married. He borrows Rs. 80 from a *patel* and agrees to serve him for a year for that sum. He gets the cash in advance, and he is supposed to work for a year.

6099. If he does that he liquidates his debt altogether?—Yes, but usually he wants some clothes or something and goes on borrowing from the *patel*, so that eventually he stays for years working for him or is a *badmash* and bolts.

6100. *Dr. Hyder:* Does he get food from his employer?—The Bhil usually does. The higher castes usually get higher cash wages and no food.

6101. *The Chairman:* Do you think it would encourage interest and activity in agricultural matters if cultivators whose methods are outstandingly good or who take an active interest in propaganda in the district were to receive some small tangible reward in the shape, perhaps, of a medal or something of that sort?—It would certainly be appreciated.

6102. Is it done at all in your district?—I do not know of it in agriculture. I have had to distribute for the Veterinary Department one or two medals to people who particularly helped them.

6103. Were they appreciated?—Yes. In fact, one gentleman wanted a much larger medal than we could afford to buy, so he said he would pay the balance himself.

(The witness withdrew.)

Mr. F. B. P. LORY, I.E.S., Director of Public Instruction, Bombay Presidency.

Replies to the Questionnaire.

QUESTION 2.—AGRICULTURAL EDUCATION.—As the outcome of the enquiries instituted by the Government of India in the year 1917 with a view to adapting the teaching in Primary schools more closely to the needs of children of the agricultural classes, Government determined that provision should be made for an alternative curriculum, of a semi-agricultural nature, for Primary standards V—VII.

2. It must here be stated that the classification of Primary education followed in this Presidency differs from that in other Provinces. In this Presidency all purely vernacular education is classed as Primary. Our Primary course consists of an Infant class and seven standards. The three upper standards of the course would in all other Provinces be classed as Vernacular Middle, which they really are. The qualification for admission to a Secondary (Anglo-vernacular) school is having passed the IVth vernacular standard.

3. In issuing orders for an alternative course for Primary standards V—VII Government declared that they had definitely resolved not to introduce a vocational bias into the Primary course until standard IV had been completed, it being recognised that, though all education should aim at fitting the child for the part he has to play in life, the object in view in the first five years should be to make a child literate, and that the schools should concentrate on this purpose.

4. I attach a copy* of the alternative agricultural curriculum sanctioned by Government in 1923 for standards V—VII. For want of a better name the curriculum is generally known as "Agricultural bias." Government definitely decided not to experiment with a purely agricultural course such as that which had been adopted in the Punjab, but that the object should be solely to add an agricultural bias to the ordinary Primary standards. I attach a copy* of the letter also (for Marathi schools).

5. Work according to the new experimental course was started in 1923 in a few selected village schools in different parts of the Presidency. For the agricultural work teachers have had to be specially trained. The method adopted was to select teachers belonging to the agricultural classes and to send them for nine months' special training to one of the agricultural schools maintained by the Agricultural Department in three different Divisions. From Sind selected teachers were sent for special training to the Agricultural College at Lyallpur. There were forty-three of these schools in existence on 31st March, 1926, attended by 1,451 boys (this being the number of those in the agricultural bias classes proper, and excluding those in the lower classes). Twenty additional classes are being opened this year.

6. Each class is supplied with one agricultural teacher who replaces one member of the ordinary staff. The practice followed has been to select as a rule a man with a second year training certificate (pay Rs. 35 to Rs. 50) and to give him the pay of a third year trained man (Rs. 40 to Rs. 60). The training of each teacher covers a period of nine months and involves an expenditure of Rs. 350 (for substitute's pay, etc., and stipend to the deputed teacher).

---

* Not printed.

The average extra cost of an agricultural bias class over that of an ordinary Upper Primary class is represented by—

	Rs.
(1) The difference between the pay of a 2nd year and a 3rd year trained teacher per annum . . .	72
(2) Contingencies (hire of bullocks, purchase of seed and manure, etc.)	240
(3) Wood for carpentry work, iron and fuel for smithing	50
(4) Rent for class accommodation and field . . .	84
	446

say Rs. 450.

The figure for Sind is Rs. 772, owing to higher expenditure on the hire of cattle, cost of water, manure, etc.

In addition to this there is an initial expenditure of Rs. 200 for agricultural implements and Rs. 225 for carpentry and smithing tools.

Taking 45 as the average number of boys in an agricultural bias class (standards V—VII), the average recurring cost per pupil is Rs. 10 per annum (in the Presidency proper). To this must be added Rs. 17, the average cost of educating a boy in a District Local Board primary school. Thus the total annual expenditure per pupil in an agricultural bias class is Rs. 27.

In most of the places the villagers have given a plot of land free of rent or at a very cheap rental. The size of the plots varies from half an acre to one acre. The practical work is done by the boys under the guidance of the agricultural teacher, and no servants are ordinarily employed for the work. So far as I am aware, each boy is allowed to take the produce of the plot allotted to him.

The teacher of agriculture is so far in every case an assistant, owing to the fact that the men specially selected for the purpose were comparatively junior.

7. As explained in my reply to question 23, the curriculum of these classes leads up to the Vernacular Final examination, a special alternative syllabus for that examination having been sanctioned for boys who have been trained in these classes. The examination according to this alternative syllabus was held this year for the first time, and I have not yet received complete information as to the result. It is clearly too early to attempt to discover what the after-career of the boys who have been through the course is going to be.

Adult education.

8. Attempts have repeatedly been made to educate the adult population in the villages by means of night schools. In the past these attempts have generally been met by failure. A special attempt in this direction was made by the Co-operative Department a few years ago with the assistance of funds specially provided by a well-known philanthropist. These schools had to be closed in 1924, after an existence of two or three years, owing to the provision for their maintenance ceasing. They had not, it would appear, been very successful in securing the purpose in view, and that in spite of the fact that special Inspectors were appointed for their supervision.

It would appear that the teacher is the principal factor in the question. The work is uncongenial, but, if the teacher is the right sort of man, and if it is made worth his while to make a night school a success, there is every prospect of night schools being conducted with success.

9. Special attempts have been made in this Presidency to assist the spread and progress of education by means of Visual Instruction. The Educational Department maintains nearly a hundred magic lanterns, under the supervision of a special officer, the Deputy Inspector of Visual Instruction. The inspecting staff in each district is supplied with one, two, or three lanterns

and during the course of their tours they give lectures at which not only the school children but the villagers attend. It is reported that these lectures as a rule arouse considerable interest. In this branch of its activities the Education Department works in close co-operation with the Agricultural Department, as well as such other departments as the Department of Public Health, the Co-operative Department, etc.

I hold the view that a most useful purpose would be served if the magic lantern and the cinematograph were more extensively employed in educating the village classes. The first need is to encourage a desire for improvement in agriculture, and this can best be done by bringing home to the people how unsuccessful generally are the results of their own agriculture and by showing them how better results have been attained in other countries by care and thought, and chiefly by the adoption of scientific method. I advocate an intensive campaign on these lines, with lecturers specially trained for the purpose.

QUESTION 23.—GENERAL EDUCATION.—1. In my reply to question 2 I have given an account of the agricultural bias classes started with a view to adapting the work in the primary schools more closely to the needs of the agricultural community. The main points in respect of which the ordinary primary curriculum is unsuitable for the children of this community concern either the curriculum or the teachers. In considering the curriculum, it is necessary to deal separately with the true primary standards (I—IV) and those which would elsewhere be classed as middle (vernacular). In the former, as already stated, the main object both in village and town schools is to make the children literate, and the schools therefore concentrate on the three R's with the addition of Hand-work, Drawing, and Nature Study (where there is a trained teacher). The curriculum in itself therefore cannot in these early standards be regarded as unsuitable for children of the agricultural classes. It cannot, however, be doubted that the curriculum of the higher vernacular standards (V—VII) is not well suited to the needs of the children of agriculturists, and it was in recognition of this fact that Government decided on opening the agricultural bias classes of which I have already given an account.

2. One particular in respect of which the education given in the village schools is unsuitable both in the lower and the higher standards is the Readers, which are, it must be admitted, not altogether suited to village children. The chief defect lies in the language used, the books being largely written in language too advanced for village children. The question of getting fresh Readers prepared is, I may state, under the consideration of Government.

3. But far more important than the curriculum is the agency by which the teaching is conducted—the teachers. The old complaint that the teaching is literary rather than practical is chiefly due to the methods of instruction followed by the average teacher, partly because his own attitude towards life and nature is based on convention and tradition, and partly because he teaches in the way in which he himself was taught. The solution lies in the training of our teachers. The teachers must be men who go to nature and to life for their facts and will teach their pupils to do the same. It is probably essential that those who are to teach the children of agriculturists should be men who belong to the rural classes; it is certainly essential that they should have been educated and trained in a rural atmosphere. Our present Training Colleges are all held in urban surroundings. The need for a Training College in rural surroundings for training teachers for village schools is fully recognised by Government, but at present they are unable to provide the means for establishing such an institution.

4. But, just as the chief problem for the educationist is first to make the village masses literate and then to keep them literate, so the chief problem of the statesmen is, or should be, to keep the best agriculturists on the land. The common attitude towards education is not as a thing that everyone should have for its own sake but as something which should be acquired as a means to a further end, that of bettering oneself. And here, as in England, the

agrioulturist's usual idea of the best way to better himself is to cease to be an agriculturist at all. The number of boys who after passing the IVth vernacular standard either continue to study in vernacular standards V—VII and then appear for the Vernacular Final examination (the qualification for a primary school teacher and for the lower grades of the Public Service) or else take to the study of English (even a smattering of which commands a value in industrial centres) is continually increasing. Few boys who have studied up to the VIIth vernacular standard or have gone far in an Anglo-Vernacular school are content to go back and work in the fields. The best pass the Matriculation examination and become clerks, or go on to the University. Thus the country is drained of its most intelligent young men, and it is those with less intelligence that get left on the land.

5. How far the agricultural bias classes which we have commenced to open will help to counteract the tendency to which I refer, it is difficult at present to predict. It is generally agreed that the classes have so far been successful, and they are undoubtedly popular. It is, however, a question whether many of the boys who have completed the course in one of these classes will be content to remain on the land. It was found necessary (in order to induce boys to join the classes, it must be admitted) to give them an opportunity of appearing for the Vernacular Final examination, a specially modified alternative syllabus being allowed in their case. It is likely that most of those who pass this examination will become teachers, or village accountants. But at least we may hope that those who complete the course are not thereby unfitted for agriculture and that most of those who fail to pass the Vernacular Final examination will take up agriculture as their occupation, and we may further hope that the course they have been through will have made them better agriculturists.

APPEN

Statement showing the expenditure on various kinds of

	TOTAL EXPENDITURE FROM				
	Government funds.	District Local Board.	Municipal funds.	Fees.	Other sources.
1	2	3	4	5	6
	Rs.	Rs.	Rs.	Rs.	Rs.
University	11,78,228	5,300	1,05,330	17,05,959	4,40,002
Per cent. of expenditure	33·4	·1	3·0	51·0	12·5
Secondary schools	22,12,234	20,122	1,92,746	32,44,725	13,76,763
Per cent. of expenditure	31·4	·3	2·7	46·0	19·6
Primary schools	1,14,84,237	7,60,153	39,03,056	5,97,913	13,56,797
Per cent. of expenditure	63·5	4·2	21·6	3·3	7·4
Special schools	12,67,059	44,713	1,02,399	2,71,693	3,99,142
Per cent. of expenditure	61·1	2·0	4·9	13·0	19·0
Total (Direct)	1,61,41,758	8,30,288	43,03,531	59,10,290	35,72,704
Per cent. of expenditure	52·5	2·7	14·0	19·2	11·6
Direction	1,49,851	..	..	..	69
Per cent. of expenditure	100	..	..	..	0·0
Inspection	11,79,756	..	..	..	224
Per cent. of expenditure	100	..	..	..	0·0
Other indirect expenditure	17,66,878	4,53,877	22,52,254	3,13,806	7,69,726
Per cent. of expenditure	31·8	8·2	40·5	5·6	13·9
Total (Indirect)	30,96,485	4,53,877	22,52,254	3,13,806	7,70,019
Per cent. of expenditure	44·9	6·6	32·7	4·6	11·2
GRAND TOTAL	1,92,38,243	12,84,165	65,55,785	62,24,096	43,42,723
PER CENT. OF EXPENDITURE	51·2	3·3	17·3	16·4	11·8

DIX A.

institutions in the Bombay Presidency in 1925-26.

Total.	No. of pupils on 31st March, 1926.	Cost per scholar from					
		Government funds.	District Local Board funds.	Municipal funds.	Fees.	Other sources.	Total.
7	8	9	10	11	12	13	14
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
35,24,819	9,863	119	1	11	181	45	357
100							
70,46,590	93,569	23	..	2	35	15	75
100							
1,81,02,156	9,13,168	13	..	4	..	2	19
100							
20,85,006	20,461	62	2	5	13	19	101
100							
3,07,58,571	10,37,061	16	1	4	6	3	30
100							
1,49,920	..	..	..	..	..	..	..
100							
11,79,980	..	..	..	..	..	..	..
100							
55,56,541	..	..	..	..	..	..	..
100							
68,86,441	..	..	..	..	..	..	..
100							
3,76,45,012	10,37,061	19	1	6	6	4	36
100							

APPENDIX B.

Statement showing the number of pupils in the various kinds of recognised institutions in the Bombay Presidency on 31st March, 1926, and their classification by communities.

	Hindus.				Mahommedans.	Others.	Total.
	Advanced.	Intermediate.	Backward.	Total.			
University	6,887	766	100	7,753	467	1,643	9,863
Secondary Schools	45,735	15,323	1,449	62,507	7,544	23,518	93,569
Primary Schools—							
Upper Primary	25,242	33,135	6,306	64,683	10,653	1,597	76,933
Lower Primary	198,410	358,578	161,651	658,639	149,402	28,194	836,235
Total Primary	223,652	391,713	107,957	723,322	160,055	29,791	913,168
Special Schools	6,458	3,583	2,644	12,685	5,477	2,299	20,461
GRAND TOTAL	282,732	411,385	112,150	806,267	173,543	57,251	1,037,061
Total population	1,917,055	9,156,979	4,075,849	15,149,883	3,775,098	366,738	19,291,719
Percentage of pupils to population	15·1	4·6	2·8	5·4	5·1	15·6	5·6

APPENDIX C.

Table showing the total number of District Local Board Primary Schools and the number of one man schools in 1925-26.

	Number of Primary Schools.			Number of one man Schools.		
	Boys.	Girls.	Total.	Boys.	Girls.	Total.
District Local Board . .	8,711	653	9,364	4,779	244	5,023

APPENDIX D.

Note regarding pay of primary school teachers in force in the Bombay Presidency in 1926-27.

	Presidency Proper.	Sind.
	Rs.	Rs.
(1) Unqualified teachers . . .	20	25
(2) Qualified teachers (passed Vernacular Final Examination).	25—1/5—30	30—1/5—35
(3) First year trained teachers . .	30—½—35—½—40	35—½—40—½—45
(4) Second year trained teachers . .	35—½—45—1—50	40—½—50—1—55
(5) Third year trained teachers . .	40—½—50—1—60	45—½—55—1—65

2. In addition, Head teachers get an allowance which is based on the average attendance of the school during the preceding two years, and which varies from Rs. 5 to Rs. 25 per mensem according as the average attendance varies from 0 to 300 and more, the rate of allowance being Rs. 5 per mensem for every 75 pupils or fraction of it.

APPENDIX E.

Statement showing the number of trained and untrained teachers in Government, District Local Board and Municipal Primary Schools in the Bombay Presidency on 31st March 1926.

Division.	Trained.	Untrained.		Total.
		Qualified.*	Unqualified.	
Bombay Division . . .	2,955	2,021	691	5,667
Central Division . . .	4,420	3,844	394	8,658
Northern Division . .	3,940	1,782	156	5,878
Southern Division . .	3,535	1,067	187	4,789
Sind	2,051	774	90	2,915
Total No. of teachers .	16,901	9,488	1,518	27,907
Percentage to total .	60·6	34	5·4	100

* *Viz.*, passed Vernacular Final Examination.

सत्यमेव जयते

APPENDIX F.

Table showing the Expenditure, etc. of the several Provinces in India in 1923-24.

Name of Province.	Number of pupils.		Population.	Percentage of Primary pupils to population.	Percentage of total pupils to population.	Expenditure on Primary Schools.					
	In Primary Schools.	In all Institutions.				Government funds.		All other sources.		Total.	
1	2	3	4	5	6	7		8		9	
						Rs.	Per cent.	Rs.	Per cent.	Rs.	Per cent.
1923-24.											
Bombay Presidency	835,921	947,061	19,291,717	4·3	4·9	1,10,42,991	66	56,43,729	34	1,66,86,720	100
1925-26.											
Bombay Presidency	913,168	10,37,061	19,291,717	4·7	5·4	1,14,84,237	63	66,17,919	37	1,81,02,156	100
1923-24.											
Madras	1,771,692	1,980,605	42,318,985	4·2	4·7	65,78,409	52	61,61,392	48	1,27,39,861	100
Bengal	1,555,341	2,009,827	46,695,536	3·3	4·3	20,04,895	34	38,29,310	66	58,34,205	100
United Provinces	999,287	1,082,012	45,375,787	2·2	2·4	57,25,292	65	31,00,746	35	88,26,138	100
Punjab	561,186	752,806	20,685,024	2·7	3·6	22,99,736	38	36,73,129	62	59,72,865	100
Burma	276,485	238,569	13,212,192	2·1	2·6	61,472	2	25,36,343	98	25,97,815	100
Bihar and Orissa	776,745	866,191	34,004,546	2·3	2·5	1,76,847	4	41,95,539	96	43,72,386	100
Central Provinces	319,224	345,447	13,912,760	2·3	2·5	21,57,989	57	16,11,980	43	37,69,969	100
Assam	208,446	237,353	7,606,230	2·7	3·1	7,66,070	62	4,60,650	38	12,26,720	100
North-West Frontier Province . .	37,542	49,190	2,251,342	1·7	2·2	4,10,141	76	1,27,966	24	5,38,107	100

APPENDIX F—*contd.*

Table showing the Expenditure, etc. of the several Provinces in India in 1923-24—contd.

Name of Province.	Total (Direct and Indirect) expenditure.						Percentage of columns 7 to 10 (i.e., Government expenditure on Primary Education to total Government expenditure on education.)	Percentage of columns 9 to 12 (i.e., total expenditure on Primary Education to total expenditure on education.)
	Government funds.		All other sources.		Total.			
1	10		11		12		13	14
	Rs.	Per cent.	Rs.	Per cent.	Rs.	Per cent.		
1923-24.								
Bombay Presidency	1,89,55,834	58	1,38,47,452	42	3,28,03,286	100	58	51
1925-26.								
Bombay Presidency	1,92,38,243	51	1,84,06,769	49	3,76,45,012	100	60	48
1923-24.								
Madras	1,67,13,404	45	2,02,87,097	55	3,70,00,501	100	39	34
Bengal	1,30,09,486	38	2,14,38,821	62	3,44,48,307	100	15	17
United Provinces	1,62,57,109	54	1,38,93,848	46	3,01,50,257	100	5	30
Punjab	1,13,15,754	52	1,02,38,121	48	2,15,53,875	100	20	25
Burma	61,24,418	46	70,88,932	54	1,32,13,350	100	1	20
Bihar and Orissa	43,05,947	36	77,67,182	64	1,20,73,129	100	4	36
Central Provinces	53,02,455	60	35,33,318	40	88,35,773	100	41	43
Assam	22,36,226	60	14,86,821	40	37,23,147	100	35	33
North-West Frontier Province . .	10,46,717	63	6,13,442	37	16,60,159	100	41	32

Oral Evidence.

6104. *The Chairman:* Mr. Lory, you are Director of Public Instruction in this Presidency?—Yes.

6105. You have put in a very interesting note, for which the Commission is greatly obliged, and which we have had an opportunity of reading. We have also received a correction to certain figures on the first two pages, and this has been incorporated. I do not know whether you would care to make a general statement at the outset, or shall we proceed at once to question and answer?—I have nothing to add to what I have already written.

6106. How many agricultural bias schools have you?—Sixty-three. There were 43 until quite recently, when we opened 20 more.

6107. How long has the oldest agricultural bias school been in existence?—8 years. We started with 20 in 1923.

6108. Have you yourself come to any view at all as to whether the prime purpose of these schools (namely, to educate these boys without unsettling them for the land) has been achieved or is likely to be?—No. It is early yet to come to any conclusion, but everyone with whom I have discussed that point agrees that this course will at any rate unfit them less than the ordinary vernacular middle course (what we call upper primary) for agricultural pursuits.

6109. The tendency of education to unsettle a rural population and cause migration towards rural centres is not merely an Indian problem?—No; I have said that in my note.

6110. It is a world problem for which, apparently, no one has yet discovered the complete solution?—It is true we have had the same problem in England, but, after all, in the last hundred years England, from being an agricultural, has become an industrial country, whereas India will, I imagine, remain for very many years to come predominantly an agricultural country.

6111. Do you think there is any danger at all that the agricultural bias schools may teach a boy nature study at the expense of the three R's, that is of literacy?—A boy has already attained literacy before he enters an agricultural bias school; he has already been at school 5 years.

6112. So you do not think there is any danger that on the purely educational side the agricultural bias schools may fall short of the schools which have not the same curriculum?—No. There is no danger in the case of those particular schools.

6113. At what age do your boys here go to school?—They start at the age of 6.

6114. In the elementary schools?—Yes. That is the school-going age.

6115. How about nature study in those schools?—Nature study is in the curriculum. In practice it is generally taught in those schools in which there is a trained teacher, and in those only—a man who has been through a course of training in what we call here a 'Training College,' but which in other parts of India is generally known as a 'Normal School.'

6116. So far as elementary education is concerned, is there any danger that this attempt to create an interest in agriculture and nature generally may prejudice literacy?—I would differentiate between the two. It is possible that if boys were taken away to work on a field, that might interfere with their ordinary work; but I do not think there is anything to fear, if they attend regularly and if the teaching is efficient. If a boy attends school pretty regularly and works for 4 hours a day we can make him literate. What happens, however, is that he does not attain anything like that standard of attendance, and he does not get proper teaching. A school taught by an untrained teacher is probably a one-man school, and in those schools there is a danger that if field work or agriculture were taught in addition to the ordinary subjects the latter might be interfered with. As I said, in the case

of such schools nature study is not taught as a rule. Now, with the exception of one or two schools (one of which the Commission saw the other day, and which is not typical), agricultural is not taught at all in the first 4 or 5 years.

6117. You will probably agree with me that the possibility of a conflict between literacy and agriculture or nature study (call it what you will) is a thing which should be carefully guarded against, and if there is such a conflict literacy should be the prime objective?—I agree with you entirely. I have said in my note that literacy is and must be the first consideration in the elementary standards; we should concentrate on the attainment of literacy.

6118. I suppose one of your chief difficulties lies in training your teachers? How are the teachers who undertake the training in agricultural bias schools themselves trained?—A teacher in an agricultural bias school is a man who has first passed the Vernacular Final examination and then done 2 years in one of our ordinary training colleges for primary teachers. He then goes for 9 months for special training at one of the agricultural schools under the Agricultural Department, such as Loni.

6119. I thought, from an answer Dr. Mann gave the Commission, some change in the method of training these teachers was contemplated?—It is true that if we accelerate the rate of opening these agricultural bias schools Dr. Mann will not be able to train all the men we shall require. At the present time he trains about 20 every year. I fancy what Dr. Mann was referring to was the fact that we are trying to start a rural training college; *i.e.*, a normal school in rural surroundings.

6120. How far has that project gone?—I had a small project which I put up to Government and asked them for sanction to move a one-year training school from an urban centre to a rural district 5 or 6 miles away. It was not possible to carry it out; but I hope to be able to carry out the idea in the case of one of these particular schools. It is not a full training college, but only a one-year normal school. In the case of our main training colleges the difficulty is to get buildings. We should have to put up large new buildings in some rural spot, and I cannot get the money for that.

6121. You mentioned the Loni school just now. I understand that is under the Agricultural Department?—Yes.

6122. Are you familiar with its working?—I have been there two or three times.

6123. Are you an advocate of the principle it represents?—I think the idea is excellent.

6124. Do you know whether it has made any impression on the cultivators in the immediate neighbourhood of the school?—I know this, and it must be common knowledge to them, that since the farm took over that particular site the land has been very greatly improved. How far the teaching the school gives to its pupils is improving the agriculture of the neighbourhood, however, I cannot say.

6125. In this matter of attempting to spread literacy among the rural population, do you think the fact so many of these boys leave school early and return to entirely illiterate homes, where there is neither the example which would come from literate parents nor any reading matter on which to practise, makes it likely that adult education, if it could be achieved, would make an important contribution towards the general spread of literacy?—Various experiments have been made to try to teach the adult population of the villages to read and write, but they have not been successful. I would not give up trying, however. The experiment was tried some years ago by the Co-operative Department, but that had to be given up because the funds which had been supplied for the purpose became exhausted. I think the Co-operative Department would be a very suitable agency to undertake the work.

6126. I am very anxious to get from you whether you think the fact that so many homes are illiterate is an important reason for the relapsing into

illiteracy of boys who leave school literate, but at an early age?—Undoubtedly it is one important reason.

6127. So that the advancement of adult education, if it is possible, would be most important?—Yes.

6128. It would be a most valuable contribution?—Certainly.

6129. Having regard to that, do you feel a sufficiently determined effort over a sufficiently long time has been made in order to ascertain whether adult education can be pressed forward?—No. I think that though attempts and experiments have been made they have not been as sustained as they might have been. I certainly think more might be done.

6130. Are there any schemes on foot at present?—Yes. We have a good many night schools in the Surat district, which I am told are prospering. They are partly for children and partly for adults, and the scheme is assisted by funds given by a philanthropic gentleman in Bombay. The trouble in all this business is the personnel. Not only the local but the intermediate directing personnel is always changing. An officer starts something of this sort and then he is transferred.

6131. Is not there a hope that if you could achieve adult education and so increase literacy in any one village up to, say, 50 per cent. of the population, future generations would be able to maintain their literacy, and the same measure of expenditure on adult education would become unnecessary?—Quite.

6132. So there again there seems to be a good reason for making a determined assault on the present position of illiteracy by means of adult education?—Especially if this is done in villages where the standard of living of the people and their material condition are fairly advanced.

6133. Do you feel hopeful that if some such scheme were attempted success could be achieved?—Not generally. I think it could be done in certain places, where, if it was watched, it could be made successful. But, taking the whole countryside, I do not think you could carry this through, though of course you could carry it through if you concentrated on it and had the requisite amount of money.

6134. You mean to say that any means you can see in prospect would be insufficient to deal with the matter?—Yes.

6135. What about the education of females? Is the attendance of girls at schools increasing at all?—It depends very largely on the community. It is in some communities but not in others. Gujarat was very much advanced in this respect 50 or 60 years ago compared with the rest of India, but it does not seem to have made since then the progress one might have thought. I am speaking, of course, of rural areas in particular.

6136. The movement has not assumed important proportions?—No.

6137. Is there any sign of women taking an interest in night schools or adult education generally?—No, not that I know of, except where you have a movement such as the *Seva Sadan*, which is confined chiefly to urban or semi-urban areas. I suppose they get women in from the districts to a certain extent.

6138. *Sir Ganga Ram:* In several places in your memorandum you refer to the Punjab system?—Yes.

6139. Have you derived that information first-hand by visiting the Punjab?—No.

6140. In regard to female education, have you a sufficient number of women teachers?—No, we cannot get sufficient.

6141. Is that the impediment to the expansion of women's education?—Partly. Even if we had more I do not see we could do very much more than we do, but it is an impediment.

6142. *Sir Thomas Middleton:* In reply to the Chairman you referred to the education of women in Gujarat?—Yes. I said that, considering the state of

women's education in Gujarat 50 years ago, the rate of progress had been disappointing.

6143. Were you thinking of the north or the south of Gujarat?—I am thinking of the whole, but chiefly of Ahmedabad and Kaira. I am talking of the rural areas.

6144. Is it not the case that the education of some of the cultivating classes in Gujarat has advanced rather rapidly in the last 20 or 30 years?—There are many parts of this Presidency where the rate of advance has been much more rapid in the last 20 or 30 years. No doubt there has been an advance in the area to which you refer, but 40 years ago the position there was already very advanced.

6145. When you say other areas have shown greater advance, how do you measure that advance? In numbers attending or literacy?—I have not the facts and figures before me; I am giving my general impression.

6146. *Dr. Hyder:* Your system of secondary and higher education has been entirely unaffected by the recommendations of the Calcutta University Commission; you have not taken up any of their recommendations?—No. We have a separate School Leaving Board, of course.

6147. You have not any intermediate colleges in this Presidency?—No.

6148. *Sir Chunilal Mehta:* Did I understand you to say in reply to the Chairman that the agricultural bias schools will not interfere with literacy because the boys come there after they have obtained their primary literary education?—Yes.

6149. Is not there a very great wastage after boys have received their instruction in the three R's because so many of them do not continue their studies? As a result of not carrying their studies further, do not many of them forget later what they have learned?—Yes.

6150. Can you give us any idea of the extent of such wastage?—No, I am afraid not, because the only way to do so is to compare the number who have passed the 4th standard (the Punjab 5th) with the figures for literacy, and I cannot understand how the latter are arrived at. The figures are roughly these. Of the boys who enter primary schools, only some 10 per cent. become literate. We have no figures to show how many of those who become literate remain so. I asked someone for his opinion on that and he said 10 per cent., but I think that was rather pessimistic. Still, there can be little doubt that half the people in the villages who once knew how to read and write have since lost that faculty. Undoubtedly a very large number relapse into illiteracy.

6151. *The Chairman:* Is it really the case that there is no relapse into illiteracy after a boy leaves an agricultural bias school?—It is very unlikely that there will be any.

6152. Suppose a boy goes to an agricultural bias school, and remains there 2 years. Is there any danger of a relapse on his part?—After all, he will have been in a school for 7 or 8 years at least. It must be remembered that in an agricultural bias school he is going on with his other subjects (reading, writing, etc.) all the time. There are 3 or 4 hours daily given to ordinary subjects, and it is not likely that a boy who does two years, or even one year, in an agricultural bias school will ever become illiterate.

6153. By that time how old would he be?—It is difficult to say. Theoretically he should enter an agricultural bias school at the age of 11 or 12. I said 6 was the school entering age, and that is so for the advanced communities; but the backward communities generally come in later, and a certain number of years are lost, so that, while I have not the exact figures, the age may be 15, 16, or even 17 in some cases.

6154. You think that provided a boy has worked steadily up to the age of 14 he is unlikely to relapse into illiteracy?—Yes.

6155. *Sir Chunilal Mehta:* Your idea would be to keep the boy at school until at least 14 years of age, in order that he may receive the full benefit

of literacy?—If he attends regularly and is taught properly, it is quite possible to make him literate before that. You cannot keep all the children of agriculturists until 14; 11 is the compulsory age.

6156. I am only talking of the average, not of particularly bright boys. Do you consider the agricultural bias school offers the best chance of keeping a boy at school until that age?—The alternative would be the ordinary upper primary school.

6157. Yes, we have that alternative, but we find that the boys do not go on. You said yourself just now that only 10 per cent. retain literacy?—10 per cent. of those who, having passed the vernacular 4th standard, go back to the fields and do not go on.

6158. Let us say 100 boys pass the 4th vernacular. If none of them went on with their studies, 10 of them would retain their literacy; is that what you mean?—I did not say that; I said someone had quoted that figure, but I thought probably about half retained their literacy.

6159. How many of those 100 continue their studies?—I am afraid I cannot give you that figure. I can only give you the numbers in the first five years and the last three; 836,000 in the first five years and 76,000 in the last three.

6160. What I want is your opinion as to whether the agricultural bias school is the school most likely to attract a boy after he has passed his 4th vernacular, or whether the present alternative course we have now is likely to do so?—You have to consider what attracts in each case. In the case of the ordinary upper primary, the attraction is the Vernacular Final examination. We have managed to attract the boys to the agricultural bias classes by having a modified form of the Vernacular Final adapted to the curriculum of the agricultural bias classes.

6161. Which has the greater attraction of the two?—I cannot say. I should think they were both equally attractive, but the object of the agricultural bias course is to provide something more adapted to their needs.

6162. And which, being popular, is more likely to attract the boys?—Yes.

6163. *The Raja of Parlakimedi:* Is the introduction of agricultural bias training in the 5th and 6th forms popular now?—All reports go to show that it is popular. I have had considerable evidence to that effect.

6164. Do the students who are particularly interested in this training go on to other agricultural institutions?—We only started 3 years ago, and then with only 20 schools, so that there are only 20 which have just completed the course for the first time. So far, I have not got any evidence of what is happening, but I shall watch the after-career of the boys who go through these classes. I have, however, already heard of cases of boys who have completed their 3 years' course and who want to go on to a special agricultural school like Loni.

6165. On page 317, you say plots of land are acquired from villagers at a nominal rent or free of rent for school gardens. In those gardens do the students concentrate on the main crops grown in that area?—Certainly. They are not taught anything beyond what is being done all round in their fathers' fields.

6166. If any improvement is effected in the growth or production of a crop, would you demonstrate it to the villagers?—It should be and I hope it is, but I am afraid I cannot say exactly whether it is done or not.

6167. At present have you got books on agriculture translated into the vernacular?—Yes, but not a book specially adapted for the use of schools. Some agricultural readers were brought out, but (I forget exactly why) they were finally condemned as not being suitable. We have a nature study book which has just been brought out and which is an adaptation of an English book on nature study written up by Dr. Burns of the Agricultural College.

6168. *The Raja of Parlakimedi:* Was it entirely done through the department?—We had a very great deal of trouble in getting it translated into suitable language in the vernaculars. We tried to get it done through some of the teachers at one of the vernacular training colleges; I think it was entirely done departmentally but we certainly had difficulty in getting it put into suitable language.

6169. *Sir James MacKenna:* Is it not a fact that the best literature of western countries is written in the common speech of the people, while the literary and spoken languages in India are so diverse that when a boy leaves school the literature in his own language is more or less a closed book unless he has carried his studies to a great length?—It depends on what you mean by literature; if you put an English agricultural child to read high-flown literature, no doubt he cannot do it, or at any rate, he will find difficulty. What you have to do is to provide him with something which he can read. After all, in England we had " Tit Bits," which I think was the first thing of its kind when the lower classes first became educated.

6170. *Professor Gangulee:* Are you in touch with the various educational experiments now being conducted throughout the country? You have just said that you have not paid a visit to the Punjab schools. There are other experiments going on in the country; are you not in touch with them?—As to the Punjab, we sent a man from our department up there specially to report and give us his views; and, after all, one has read McGee and other books on the various experiments that have been made. We have experiments which are being carried on in this Presidency too.

6171. Do you feel the need for co-operation in this matter of education with other Provinces just to see what system they are trying to work out?—Certainly, that is most useful.

6172. Do you seek advice or suggestions from Mr. Richey, the Educational Commissioner with the Government of India?—No, I do not seek it.

6173. Do you have correspondence with him with regard to your schemes?—No.

6174. You do not seek his advice?—No.

6175. Supposing you had developed a scheme, you would not send that scheme to Mr. Richey for his suggestions?—No, it has not been the practice.

6176. You have been working under the Ministry of Education since the Reforms, have you not?—Yes.

6177. Has this popular control of education in any way accelerated the progress of primary education in this Presidency?—Since the Reforms the most momentous event has been the passing of the Primary Education Act; that was consequent upon the Reforms; it was the work of the then Minister.

6178. We may take it that a definite departure from the policy of education hitherto pursued by the Government was marked by the passing of that Act?—You ask, 'Have the Reforms brought about an acceleration of primary education?' As I say, the main achievement has been the passing of that Act. The fundamental principle of that Act was the transfer of control from the Education Department to the Local Boards and Municipalities. We are now absorbed in the actual work of transferring control.

6179. Do you consider that such transfer will be successful? Already a number of the schools have been transferred?—They have only recently been transferred.

6180. What is your view of the working of those schools that have been transferred to the local bodies; do you find any definite change?—There is not sufficient time to pronounce on the actual results. It is true, of course, that the Act provides for the transfer of control in District Local Board areas and in Municipalities; but it is also true that before the Act these Municipalities did control and manage their schools to a far greater extent than in the District Local Board areas, where the Department actually managed the schools formerly.

6181. Municipalities are mostly concerned with the urban areas, are they not?—Entirely.

6182. Agricultural education is under the control of the Department of Agriculture?—You do not include agricultural bias schools in that?

6183. I have that also in mind; the whole scheme of agricultural education?—Agricultural bias schools are not agricultural; they are not technical schools, nor even vocational schools; they give ordinary education with an agricultural bias. They are under the Education Department, who work with the assistance and co-operation and advice of the Agricultural Department.

6184. You have told us your difficulties with regard to adult education; I understand previous efforts in this direction have proved to be futile. Have you studied the root causes of this failure?—I have never been down and studied it *in situ*, but I have read about it, considered it, and talked to people about it a great deal. The general feeling is this; the people say they will not come out at night; they say it is dark and they are afraid to come out. All sorts of reasons are given. There is a general disinclination on the part of the people in the villages to come out in the dark.

6185. Did you have lantern slides or cinemas or anything like that to attract them?—In this Presidency we have a very complete system of visual instruction, with magic lanterns. We have no cinema. I cannot say we have concentrated in one village with a magic lantern. We have lanterns which are used in the High Schools, and our Inspecting staff also take them round with them when they tour, so that these lanterns have never remained in one place.

6186. These efforts towards adult education were confined to the urban areas?—I have been thinking this afternoon entirely of rural areas.

6187. You rightly point out that you cannot get efficient teachers for all classes of schools?—I cannot say we do not get efficient teachers. I do not put it quite like that. We get as good teachers as we can get. Our teachers have what we consider a fairly high qualification, and we have a very large percentage of trained teachers.

6188. From the table you have put in, I see you have about 11,000 untrained teachers?—Yes; but, our percentage of trained teachers is over 60. But you must remember that even the untrained teacher has passed the Vernacular Final examination; that means he has gone through an eight years' course. He will probably be teaching in a village school which goes up to the fourth standard. Compared with other Provinces in India, I believe that is a far higher qualification than the ordinary untrained teachers have.

6189. Do you not think an untrained teacher is likely to give a distaste for education rather than create a taste for it?—I do not see why he should give a distaste. It is quite possible that he may be an efficient teacher. A man who has passed the Vernacular Final examination should be perfectly competent to give distinctly efficient education up to the fourth standard.

6190. Your second difficulty is to arrive at a suitable curriculum for your schools?—No; on the contrary, when you are dealing with the first four years there is not much room for divergence of curriculum, and I said it depends chiefly on the teacher. What I meant was that it depends very largely on the personality of the teacher. If you get the right man he will teach the curriculum, but if you get the wrong man he will not. The teacher is really the most important factor.

6191. In your lower primary grade do you have a satisfactory curriculum from the infant stage to the fourth standard?—It is fairly suitable, I think.

6192. You are aware of the projected method put forward by the Rev. McGee in his schools. Are you doing anything of that kind?—No, not in our ordinary village schools. In certain selected schools here and there, there are people who are trying experiments, but that is one out of ten thousand.

6193. *Mr. Calvert:* Is there now any steady persistent propaganda being carried on in favour of adult education?—Just at the moment in rural areas I think not. I am not quite sure what the Co-operative Department is doing. There have been two or three starts with adult education, but they all seem to have petered out. There was a society started in Bombay about 3 years ago; I was asking about it the other day, but I could not find that anything much had been done. I do not know whether its activities were to be extended to rural areas.

6194. *Mr. Kamat:* With regard to the training of teachers for agricultural schools, you said your principal difficulty was as to buildings in rural surroundings?—Yes.

6195. If the Loni type of school were devoted solely to the training of teachers, would that settle your problem of agricultural education?—Are you suggesting that Loni would be suitable for training our teachers for ordinary rural schools and that instead of training them in Poona we should train them in Loni?

6196. No, my question is this. The Loni type of school is rather expensive; each boy there costs Rs. 275 to Rs. 300 for the educational training he gets. If that school is not indispensable, should not the Loni type of school be converted into a training school for turning out agricultural teachers? Would such an arrangement upset your system of agricultural education?—I cannot understand the question.

6197. I say the present type of school boy you turn out at the Loni school is expensive. In the first place, is it indispensable that you should have a Loni type of school?—The Loni type of school is not indispensable.

6198. If it is not indispensable, cannot you convert the Loni school into a training college for agricultural teachers?—Your suggestion is that Loni should be used for training teachers for agricultural bias schools. But a teacher for an agricultural bias school has two trainings at present; he is first trained in an ordinary normal school and then he gets a special training in agriculture.

6199. What would you do; first of all give him rural and agricultural training throughout?—Yes, certainly.

6200. *Dewan Bahadur Malji:* On page 318, of your note you have given the alternative curriculum?—Yes.

6201. That is not yet entirely put into operation?—In what respect do you mean?

6202. There are certain books which are only in Modi and are not translated into other vernaculars?—I do not know what they are doing in Gujarat but they must be doing something. And, after all, we have got the Vernacular Final examination, so that they must be preparing something special for it.

6203. You have no definite idea?—No, I cannot tell you straight away.

6204. I understand you are now contemplating incorporating in your vernacular series for ordinary schools, lessons in agriculture?—Certainly; we are considering the question of revising our Readers altogether.

6205. I hope you will at least allow the lessons when prepared to be criticised through the Bombay Central Co-operative Institute?—Most certainly; or perhaps written by them.

6206. *The Chairman:* You have given the Commission a statement showing the expenditure on education in Bombay?—Yes.

6207. Have you that before you?—Yes.

6208. Would you tell me whether the Government funds under the first heading "University" are really recurring funds, that is to say, are they truly annual expenditure?—Yes, that is the annual expenditure. That sum is the sum that is every year voted in the budget for "University and higher education." I have put it here as "University," but it represents also the

maintenance of Government Arts and Professional Colleges and grants to Non-Government Arts and Professional Colleges. I should really have said higher education.

6209. How much in fact are the annual grants by Government to Universities?—It comes under different heads, but I think we only actually give a grant of half a lakh in this Province. I can get you the figures. We give far less to the University, practically nothing compared with other Provinces in India.

6210. The Bombay University is entirely independent?—Yes, and, compared with the Universities in other Provinces, it is almost self-supporting.

6211. On page 316 of your memorandum you are talking about the agricultural bias classes, and in paragraph 6 you say, "Each class has one agricultural teacher over and above the staff that would normally be employed." Does that mean that each class has an additional teacher?—That is the paragraph for which I have substituted my amendment.

6212. Then I have got the wrong paper?—I am afraid I made that mistake myself; that is the reason why I submit this revised figure. He is not over and above; he replaces an ordinary teacher in the school. Therefore the only expenditure which you can legitimately debit to the agricultural bias class as such is the difference between his pay as an agricultural bias teacher and what it would be in an ordinary school.

6218. I do not know whether you would wish to say anything about your views as to the desirability of introducing compulsory education?—I look upon compulsion as being one of the most hopeful means of securing literacy during the first 5 years.

(The witness withdrew.)

The Commission then adjourned till 10 a.m. on Friday, the 29th October, 1926.

सत्यमेव जयते

Friday, October 29th, 1926.

POONA.

PRESENT:

The MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.
Sir THOMAS MIDDLETON, K.B.E., C.B.
Rai Bahadur Sir GANGA RAM, Kt., C.I.E., M.V.O.
Sir JAMES MACKENNA, Kt., C.I.E., I.C.S.

Mr. H. CALVERT, C.I.E., I.C.S.
Raja Sri KRISHNA CHANDRA GAJAPATI NARAYANA DEO of Parlakimedi.
Professor N. GANGULEE.
Dr. L. K. HYDER.
Mr. B. S. KAMAT.

The Hon'ble Sir CHUNILAL V. MEHTA. } (*Co-opted Members.*)
Dewan Bahadur A. U. MALJI. }

Mr. J. A. MADAN, I.C.S. } (*Joint Secretaries.*)
Mr. F. W. H. SMITH. }

Mr. R. M. MAXWELL, M.A., C.I.E., I.C.S., Collector of Kaira, Bombay Presidency.

Replies to the Questionnaire.

QUESTION 2.—AGRICULTURAL EDUCATION.—(*i*) The supply of teachers and institutions for agricultural education is so small that it can not really be said that such education is within the reach of all cultivators. Whatever scope there may be for remodelling primary education (which is now the concern of Local Boards and Municipalities), it is certainly surprising that secondary education is to this day so largely devoted to general subjects which may be held to qualify the students mainly for clerical work in Government services, and in my opinion it would be useful to set up an entirely separate branch of secondary education wholly devoted to the needs of agricultural communities.

(*v*) and (*ix*) At present I fear that agriculture is studied mainly as a means of getting a comparatively easy degree in order to qualify for better paid posts in Government service. What becomes of the majority of the students I am unable to say; but a good many of them are certainly employed in Government service to do duties which have no connection with agriculture; and certainly a very few of them are actually occupied in cultivating their own lands or those of others.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—I think that demonstration farms and plots have done a certain amount of good but the objection is that they are not carried on on commercial lines. They cannot, therefore, be expected to exercise much influence among people who have to make their livelihood out of agriculture. The object of demonstration should be to convince the cultivators that better crops than their own can be grown under identical conditions and yield a higher rate of profit after the deduction of all expenses. I cannot say that I have ever seen an agricultural farm which was calculated to carry conviction in this manner. I think that instead of having big farms or permanent demonstration plots, it would be better to lease one Survey No. from time to time in a much greater number of different villages, where a profit and loss account should be kept under the supervision of the villagers themselves so that they could see exactly how the expenses and their results compared with their own.

Generally, without claiming much detailed acquaintance with the work of agricultural demonstrators, I should say that agricultural propaganda were rather conspicuous by their absence, although undoubtedly more effective than formerly. My impression is that the ordinary agriculturist can hardly ever meet an agricultural officer. This is not entirely the fault of the Agricultural Department, who are thinly staffed for the area they have to cover; but I think that there is perhaps over-much tendency to expect all direct propaganda work to be carried out by the *mamlatdars*. Anything in the nature of sustained propaganda there certainly is not, if one discounts the distribution of more or less indigestible Agricultural leaflets which probably few cultivators can read. Lantern lectures, constantly followed up by more such lectures, would be sure of getting an audience if delivered in the villages themselves: but it is useless to call the cultivators miles away from their own village for such purposes. To be effective, agricultural propaganda must be carried to their doors, and I think this is where we fail at present.

QUESTION 5.—FINANCE.—(*a*) Apart from what has been said in dealing with other questions, I would suggest that instead of leaving everything to the initiative and resources of the individual cultivator, Government, as the ultimate owner of the soil, should be prepared to carry out work necessary for the reclamation, protection or improvement of its lands, recovering interest on the capital expended in the form of enhanced assessment. At present except in the field of irrigation where this principle is already recognised there is no expenditure on development of a remunerative kind. I have known many cases where cultivators unable to give security for loans or to combine for the purpose of joint schemes would gladly have accepted such an alternative, with permanent benefit to themselves and the land.

(*b*) There is no need to "induce" the cultivators to make fuller use of *taccavi*. Usually the demand for loans for seed and cattle (so described but mostly intended for general family maintenance in the later part of the season) would run up to any figures if allowed, and the main problem is to substitute the agency of co-operative societies. The demand for loans for land improvement is also usually more than the supply, and this demand is mainly due to the low rate of interest charged. If however it is desired to encourage this demand for loans still further, something should be done to enable the loans to be granted more promptly and to eliminate formalities.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) The main causes of agricultural indebtedness in my opinion are,

(1) social customs, *e.g.*, excessive expenditure over marriage and death ceremonies,

(2) lack of facilities for obtaining the money advances necessary for regular cultural operations (*e.g.*, seed, manure, labour) from agencies which will not take deliberate advantage of the ignorance or simplicity of the cultivator.
Consequently,

(3) prevalence of landlordism, as a result of which most of the profits of agriculture go into the pockets of persons, largely non-agriculturists, who regard the land mainly as a safe investment for their capital. This demand for land as an investment is again due to

(4) lack of regular banking facilities and opportunities for safe investment of money apart from lands.

The consequent decline of the peasant proprietor class is greatly assisted by the provisions of section 86, Bombay Land Revenue Code, which are wholly favourable to the landlords.

(*b*) and (*c*) I would recommend firstly the repeal of section 86, Land Revenue Code, and the connected sections, and secondly the withdrawal from Civil Courts of all jurisdiction in money suits against small farmers unless brought by a co-operative society. The result of these measures would

be to drive people to co-operative societies for their finance and to compel investors to invest their money in such societies, which have their security in land, rather than to invest it in land on their own account.

If the measures here recommended were taken, there would be no need to restrict or control the right of mortgage or sale; but I certainly think that non-terminable mortgages should in any case be made impossible; care would however be necessary to prevent evasion of such restrictions by formal renewals of the transactions.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(*a*) and (*b*) While admitting the great desirability of reducing fragmentation and consolidating holdings I doubt whether the State can legitimately claim to control the disposal of private property by any direct method. The only proposals for the consolidation of holdings which I have seen are contained in the Bill now under the consideration of Government; and so far as I can see this Bill would infallibly remain a dead letter, even if passed, because the required proportion of consenting landlords would never be obtained.

As to the provisions of the same Bill for the prevention of fragmentation the great danger is that any such measures would give scope for underhand dealings in which the cleverer or richer party would as usual get the better of the simpler or poorer. The only safe method of dealing with the fragmentation in my opinion is to leave it to the common sense of the people and to give an indirect stimulus to consolidation by placing all possible minor disabilities on the owner or creator of the fragmented holding, *e.g.*, disabilities connected with the payment of assessment. At present the measurement and recognition of sub-divisions of Survey Nos., however small, affords not the slightest check in this direction. I also think that schemes of consolidation would be a legitimate object of *taccavi* provided that small holders were protected from absorption by their larger neighbours.

QUESTION 8.—IRRIGATION.—(*a*) The Kaira district is well adapted for (1) a big scheme of canal-irrigation, such as the Mahi river scheme now under investigation, and (2) expansion of well-irrigation, especially with power pumps. Much progress has been made in this district already in the latter direction, but there is still a large demand for *taccavi* for fresh pumping installations.

QUESTION 10.—FERTILISERS.—(*a*) In the district of North Kanara there is a great field for the introduction of artificial manure in the cultivation of rice land. At present the manure chiefly used consists either of "Soppu" (green leaf manure) or "Darku" (dry leaf manure). The collection of these materials is very laborious and wasteful of time and involves the destruction of forest upon which the people depend. Experiments are now being made at the Kumta Agricultural Farm to find artificial substitutes.

QUESTION 11.—CROPS.—(*a*) (*iv*) Damages by wild animals fall under two heads:—

(1) Pig and other jungle animals in tracts near forests.

Here the whole case turns on the problem of fencing, the importance of which is only just beginning to be realised by the cultivators. Wire fencing with suitable iron uprights should be made available in very much larger quantities and if possible at much cheaper rates than at present. People are ready to take *taccavi* for purposes of wire fencing but in my experience it usually had to be ordered from England and the delay was great while the expense could not be determined beforehand. Walls have also been used successfully for pig protection purposes in tracts where stone is plentiful. If constructed in the right manner and maintained in good order by means of co-operative societies, these afford adequate protection even from pig and result in an immediate increase in the value of the lands enclosed.

(2) Monkeys, *nilgai* and black buck in the open tracts, specially in Gujarat.

The damages caused by monkeys alone and the expense of employing watchmen to scare them out of the crops must amount to an immense loss every year to the cultivators of this tract, but it is useless to provide them with means of destroying these pests since they regard their life as sacred,

and thus they must apparently continue to suffer under a self-imposed disability.

QUESTION 14.—IMPLEMENTS.—(*b*) All I have to say under the head of improved implements is that before they become a practical proposition there must be numerous workshops in every district capable of repairing them and supplying spare parts. It is useless to push propaganda for the adoption of improved implements until this is done.

QUESTION 16.—ANNUAL HUSBANDRY.—(*b*), (*c*), (*d*) and (*e*) in the Kaira district the principle of growing fodder crops and stacking fodder as a reserve against famine in future years is well understood. All valuable cattle are stall-fed and in normal years there is sufficiency of grazing, although I think too much grazing land has been given out for cotton cultivation. The shortage of fodder usually occurs only in May and June. It is to some extent relieved by growing fodder *juari* (*sundhia*) by means of well-irrigation. This is one reason for encouraging the extension of well-irrigation in this district as recommended under question 8 (*a*).

QUESTION 18.—AGRICULTURAL LABOUR.—(*a*) (*ii*) The only area of the kind described with which I am acquainted lies in the Mundgod Peth on the eastern side of the North Kanara district, where large tracts of good rice land were lying uncultivated in 1923-24. It was found in this case that there was a strong tendency towards colonisation from the adjoining parts of the Dharwar district. Government assisted in this process by giving out the land on easy terms to capitalist farmers who themselves undertook the expense of bringing the land under cultivation, brought tenants from outside and built houses for them. Many more smaller farmers would have taken up these lands but for want of capital, and the experience gained seems to suggest that if Government had been prepared to spend money in putting the land in order and in providing houses, a very much larger area would soon have come under cultivation.

In other cases in North Kanara, especially the spice garden tract, the problem of importing labour sufficient to keep land from falling out of cultivation appeared to be almost hopeless, as only persons born and bred in that tract would consent to live in it. Here a better provision of medical facilities might have done much, coupled perhaps with a more generous forest policy.

(*c*) The only place I am aware of where real and chronic shortage of agricultural labour exists is in the tract mentioned above. Everywhere else there is naturally a seasonal scarcity of labour owing to the limited time within which active agricultural operations have to be completed; but complaints of scarcity at other times are due mainly to the unwillingness, inefficiency and irregularity of the workers. This feature again is due to the high rates of wages established during the war, which have not led to an increase in the efficiency of labour but have merely provided the means of increased absenteeism.

QUESTION 19.—FOREST.—(*a*) Forest proper is itself a semi-agricultural crop grown by the State and should not be regarded as an accessory to other cultivation which, even if successful, is less valuable to the resources of the country. At the same time where valuable cultivation occurs in areas where forest proper predominates, considerably greater latitude could be allowed to cultivators in obtaining their agricultural requirements from forest. In my experience in North Kanara, even in tracts where forest was not capable of exploitation many of the restrictions imposed on the use of forest produce were quite needless. In valuable forest areas, however, where cultivation is very scattered and is of no value, I think it would be better to acquire it for inclusion in forest and to move the cultivators elsewhere, so that no conflict of interests need arise.

In minor forest tracts, where large areas of cultivation exist, the cultivators have to be prevented from destroying the forests on which they depend to a very large extent. By the creation of the Minor Forest Division in North Kanara, the principle has been recognised that these forests

ought to be managed for the benefit of the agriculturists, and this recognition, I believe, is resulting in a constructive and not merely protective policy which in course of time should develop much further. Up to date however I think that too many petty restrictions are still in force in minor forest areas and there is too much effort to make these forests a source of forest revenue.

(*b*) and (*e*) The supply of firewood in rural areas may be increased by abating the assessment during the period of growth on Survey Nos. planted up for fuel purposes, *e.g.*, planted with casuarinas. The assessment in such cases could be recovered at some suitable rate when the crop was capable of yielding a return. Something might also be done by systematically planting waste areas in charge of the Revenue Department. These areas are now left entirely to look after themselves.

(*c*), (*d*) and (*f*) Undoubtedly in many places the deterioration of forests, due to excessive grazing and other circumstances, is not only leading to soil erosion but is exposing the tracts concerned to disastrous floods in heavy rains, while depriving them of moisture in the dry season. The valley of the Shiravati river in North Kanara is an instance in point. I think the process tends to be assisted by the practice lately adopted by the Forest Department of burning down heavy evergreen forest and in its place planting teak and other deciduous varieties in order to increase forest revenue. The only remedies which I can suggest are :—

(1) To make the minor forests capable of supplying the grazing and all other agricultural needs of the villages depending on them. There are, for instance, large areas of minor forest in North Kanara which owing to the denudation of soil now produce nothing. Careful experiments are necessary in such areas to ascertain the best methods of encouraging the growth of grass and trees useful for fodder or for agricultural implements.

(2) To keep sporadic cultivation out of the big forests as suggested under (*a*) above.

(3) To pay more attention to reclothing the hill-tops with forest even in areas where immediate exploitation is unlikely; and to be very firm in refusing to disforest hill-tops and hill-sides for cultivation.

QUESTION 22.—CO-OPERATION.—(*a*) Please see answer to question 6 (*a*) and (*b*).

In my opinion the co-operative movement will remain at some disadvantage unless it can manage to reduce the rate of interest on the loans given for co-operative schemes of development where the capital involved is large. This disadvantage is illustrated in the answer next below.

(*b*) (*iv*) The North Kanara district offers almost unlimited scope for societies for the construction—or very often only the maintenance—of protective works, particularly common *bunds* and fences or walls. Scarcely any progress, however, has hitherto been made in the formation of such societies. In two important fencing schemes with which I had to deal, the people preferred to take *taccavi* direct from Government on a joint bond owing to the comparatively high rate of interest charged by the Co-operative Bank. In other cases, especially those of protective *bunds*, the failure has been largely due to the indifference of absentee landlords, and to mutual distrust and general absence of the co-operative spirit. It is with this experience in view that I have suggested in the answer to question 5 (*a*) that Government itself should be ready to take the initiative in such schemes.

(*c*) Legislation on the lines indicated has actually been proposed in this Presidency, but the suggested measures, depending on the consent of a large majority of the landowners and involving an elaborate procedure with indefinite possibilities of delay, appear too weak to achieve anything. If any such legislation is undertaken I think the initiative, at least in protective schemes, should be made to depend on the Collector's certificate of the necessity of the scheme. Non-protective schemes of improvement might still be

left to co-operative effort assisted by provision for acquiring the lands of any recalcitrant minority.

QUESTION 24.—ATTRACTING CAPITAL.—In the colonisation projects mentioned in the answer to question 18 (*a*) (*ii*), and again in the recent extensive reclamation of "mal" lands in the Kaira district, the offer of specially favourable terms by Government proved sufficient to induce capital to come forward. Apart from such large speculative projects, the amount of expenditure which owners are prepared to put into the ordinary cultivation of their lands seems to depend partly on the competition for land in the locality and partly on the responsiveness of the soils, *e.g.*, the Charotar tract of Gujarat, there is much competition for land, values are consequently high, holdings are proportionately small and cultivation, on a soil well adapted to it, tends to be intensive. In the absence of such strong inducements, however, the great uncertainties of the rainfall of most parts of this Presidency must necessarily dispose people to risk as little as possible on one year's harvest; and to some extent the liability of the assessment to periodical revisions must operate as a deterrent to capital.

QUESTION 25.—WELFARE OF RURAL POPULATION.—Most village sites are much too crowded, but such a habit has been adopted largely for reasons of security and it is probably due to this tradition that compact holdings are so rare, since there was little inducement to acquire lands in a compact block when the farmer did not intend to live there. Now the results, in the shape of scattered holdings, militate against any general movement to set up farm houses on the land, and it is difficult to relieve overcrowding in any other way.

(2) I would suggest that far more numerous dispensaries for the treatment of outdoor patients are a prominent necessity for the improvement of general well-being in rural tracts.

सत्यमेव जयते

Oral Evidence.

6214. *The Chairman:* Mr. Maxwell, you are Collector of Kaira?—Yes.

6215. You have put in a written note of the evidence which you propose to give. Do you wish to make any general statement supplementing that in any way?—I do not think I have any general statement to make.

6216. Then we may proceed at once to question and answer. I think you have dealt very clearly with the questions you have answered, and I therefore propose to ask you only a very few questions. The Commission is greatly obliged to you for the trouble you have taken to collect the material and present it in the form in which you have. On page 336, in answer to question 2, you are talking about agricultural education and you say that a good many of those who pass through the system are subsequently employed in Government service. Do you deplore that?—Yes. If you are going to go to the expense of providing specialised agricultural education, it is a waste of that expenditure and the special training given if these people afterwards follow occupations which have no real connection with agriculture.

6217. Do a certain proportion go, for instance, into the Revenue Department?—A certain number do.

6218. Do you think it is no advantage to a Revenue officer to have a certain knowledge of, and sympathetic attitude towards, agriculture?—I have not really observed that it makes very much difference in their work as Revenue officers.

6219. Now, as to the various methods of demonstration and propaganda which you deal with, I think the weight of the evidence before the Commission is that the most promising field for demonstration is the cultivator's own plot. Is that in line with your own experience?—Yes. Generally speaking that is what I should consider the best form of demonstration.

6220. In other circumstances there is always the fear in the cultivator's mind that the whole resources of Government are at the disposal of the demonstrator, and that he, the cultivator, could not achieve the same result on his own fields with his own financial means?—Exactly, I am sure that would be the feeling.

6221. I was really surprised to notice that on page 337, where you deal with the main causes of agricultural indebtedness, you have not put down the uncertainty of the season and the occasional failure of the monsoon as one of the principal causes of that indebtedness. Probably you thought we would take that for granted. You probably do agree that the failure of the monsoon is one of the principal reasons?—I should not regard that as one of the principal reasons. I think the tendency of the agriculturist in this country is not to put too much money into any one year's crop, and therefore if that crop is a failure the agriculturist is not really very hard hit. I do not think it makes very much difference to his general financial position.

6222. You do not think that the uncertainty of the season has a bearing upon the rate of interest claimed not merely by the moneylender but also by the co-operative associations from the agriculturists?—I do not think so. So far as my experience has gone the frequency of really bad seasons in which the cultivator would be left completely insolvent is not very great. The average amount of suspensions outstanding in any district so far as land revenue is concerned, which is an index of financial insolvency, is not very large compared with the total amount of the revenue collected.

6223. Do you think if, over a period of twenty years, there were no failure of the monsoon that would make no contribution towards the liquidation of an important part of the debt of the cultivators?—I do not really think that it would make a great deal of difference. I think it would make the landlords and moneylenders flourish more greatly, but the average cultivator would not score very much.

6224. The extent of his credit is the measure of his debt?—Yes, that is about it.

6225. Just below that, on page 337, you say, "The consequent decline of the peasant proprietor class is greatly assisted by the provisions of section 86, Bombay Land Revenue Code." Do you suggest there is a progressive decline?—That is my general impression, but I cannot quote figures to prove it.

6226. You mean a progressive economic decline?—The tendency is for the land to pass into the hands of the landlord class rather than the peasant proprietor class.

6227. Do you think statistics indicate that there is a reduction in the totality of land in the hands of small proprietor cultivators?—I think if you could go back far enough and get accurate statistics they would.

6228. With reference to what you say about the Land Revenue Code, the Commission is quite prepared to hear your views as to the Land Revenue Code having a bearing on agricultural prosperity or the reverse, and I have not removed what you say on that from your note, but in the view of the Commission any suggestions for the repeal or amendment of any part of the Land Revenue Code would be beyond our terms of reference. If you wish to say anything as to the extent to which these sections of the Code bear upon the cultivator's prosperity you may develop the idea. Do you wish to add anything to what you have said?—One of the suggestions which I made in answer to another question has a slight bearing on it, namely, that at the present moment in the Land Revenue Code there is no provision by which Government can itself undertake the improvement or development or protection of agricultural land and then recover the expenses or interest on the capital expended by Government in that way in the form of an additional cess on the land. There is no provision in the Land Revenue Code which enables Government to do that, and consequently it is not done.

6229. Have you the wording of the section of the Code to which you refer?—I have not got it here.

6230. Perhaps you will tell the Commission what its effect is?—Section 86 is the section which enables the landlord to recover rent from his tenants (that is, the ordinary rent which they have agreed to pay him on their lease) through the revenue courts as an arrear of land revenue.

6231. *Mr. Calvert.*—Through execution?—No. He applies to the revenue courts in what is called a rent or assistance suit. That suit is adjudicated and a decree passed against the tenant, if he is adjudged to be liable, and then after that the execution is also carried out by the Revenue Department in exactly the same way as land revenue arrears are recovered.

6232. *Dewan Bahadur Malji:* That is limited to the current year?—Yes. He can only sue for one year's rent, but the rent is not limited to the current assessment.

6233. *The Chairman:* On page 338 you deal with the provision of fencing to protect crops from damage by wild animals and you say, "Wire fencing with suitable iron uprights should be made available in very much larger quantities and if possible at much cheaper rates than at present." How do you suggest that could be done?—I think if Government were to make arrangements to import this material and have it ready in the country at special contract rates it could probably be got more cheaply than by ordering it through ordinary commercial firms.

6234. Government might buy in bulk?—Yes, and they need not make a profit out of it.

6235. You are not suggesting that the general taxpayer should come to the assistance of the cultivator?—No, certainly not.

6236. Some people do make suggestions of that sort, do they not?—I should never suggest that.

6237. On page 339 under 'Animal Husbandry,' I was very interested to see that you say, "In the Kaira district the principle of growing fodder

crops and stacking fodder as a reserve against famine in future years is well understood." What do you think are the reasons which make that practice peculiar to certain districts?—The Kaira district is the only district in my experience which does that to any considerable extent, and the peculiarity of the Kaira district is that there is very little waste land; nearly all the land is available for cultivation and is actually cultivated; and consequently there is very little outside fodder reserve. Also they have a very good breed of cattle and traditionally they go in for milch cattle a good deal and make a certain amount out of dairying.

6238. But do you not find there a large number of more or less worn-out animals eating up the grazing?— Surprisingly few.

6239. What happens to them?—I suppose they die out. As a matter of fact the ordinary cultivator in Kaira does not keep a large number of waste, useless cattle. The general stock of cattle remains chiefly in the hands of professional graziers like *Banjaris*, who take them away and graze them in areas where grazing is available. The cultivators buy from them very largely. The ordinary cultivator only keeps the milch or ploughing cattle he needs.

6240. *Sir Henry Lawrence:* He buys from these *Banjaris* and sells them to them?—I do not know how they dispose of the worn-out cattle. I think they eventually die out.

6241. *The Chairman:* You do not think they buy these cattle at the beginning of the working season and sell out at the end?—I do not think there is an annual buying and selling; a man buys them and keeps them as his own cattle.

6242. Have you had much experience of the carrying out of minor irrigation schemes by co-operative effort?—I have had experience rather in the other way, that where it is obviously desirable that these things should be done by co-operative effort, co-operative effort has failed to achieve them. I do know of one important scheme in Kanara where a co-operative '*bund*' society was started and that has been working satisfactorily. In other cases I know of where an effort was made to get them to co-operate for such purposes it proved impossible to get them to combine.

6243. Was it due to want of propaganda over a sufficient period of time, do you think?—In one case I brought all the pressure I could on the landholders to get them to combine and start a society. It was quite a simple thing and required no large amount of capital. Their lands were being destroyed gradually by the overflow of flood water on to the land.

6244. Why did you fail?—Largely on account of absentee landlords. They lived far away from their lands and they did not care what happened to their tenants so long as they got their rent.

6245. Where was that?—On the banks of the Shiravati in Kanara.

6246. On page 341, you say: "Most village sites are much too crowded but such a habit has been adopted largely for reasons of security and it is probably due to this tradition that compact holdings are so rare." Do you mean to suggest that the tradition of the crowded village sites has some bearing on the sub-division or fragmentation of the land?—It may have contributed to it, because it removed a prior objection. If you have a farmer living on his lands, naturally his tendency is to keep his lands together. But if he lives in a village site far away from his lands he does not care very much in how many small pieces he holds them.

6247. I do not quite follow the logic of that. If a man had to walk one or two miles to a piece of his land, I should have thought he would have all the more reason to wish to have his lands compact, so as to avoid wasting further time?—But if he lives in a central village site he has to walk one or two miles whether his land is in one place or not. He cannot possibly have his land near his actual residence.

6248. *The Raja of Parlakimedi:* You say in your statement that the number of agricultural demonstrators is rather small?—Yes.

6249. To meet that difficulty do you not think the Collector can persuade the District Board to start some training schools to train villagers as Demonstrators, not on a very scientific basis, but to demonstrate simple methods of manuring, sowing of seed and so on?—I do not think half-trained Demonstrators would be of great use. If you are going to have a Demonstrator he must be an expert and not a person who has been given a short training at the expense of the Local Board.

6250. They can confine themselves to certain important crops of the district?—I think myself that the ordinary Demonstrator has not very much to show to the ryot with regard to the important crops of his district. The ryot knows very well how to grow his own crops. The aim of demonstration is to show him any crops he can more profitably cultivate but which he does not know about.

6251. In addition to the lantern slide exhibitions, do you think district agricultural shows will be effective in showing to the villagers the possibilities of their village and how they can improve their agriculture?—I doubt whether district agricultural shows would achieve very much unless you had some definite propaganda which you wanted to push. If, of course, you want them to introduce an improved strain of seed of some kind or other, it might be of some use. But you do not need to have an agricultural show for that. If the ryot sees that there is a strain of seed which he can cultivate with advantage and which is better than what he has been using he is ready to take it if he can get the seed, as has actually happened in some districts. There is, for instance, Kaira, where improved tobacco seed has been introduced to some extent.

6252. They might do something to improve the breed of cattle?—From my experience of the Kaira district I know they have very good cattle already. I do not think they are suffering from want of good cattle there.

6253. Are proper steps taken to protect grazing grounds?—No. In general, nothing is done about grazing grounds. They are just left to look after themselves.

6254. Are there forest areas or communal lands for grazing?—In my present district (Kaira) there are no forest areas. In the district where I last had charge, grazing was entirely in forests. It varies from district to district according to the presence or absence of forests, but even where there are forests nothing is done to make them more fit for grazing.

6255. *Professor Gangulee:* As regards agricultural education, you refer to a separate branch of secondary education. Do you suggest special agricultural schools?—Yes. I should like to see the ordinary education that is now imparted confined to a much smaller number of schools which could be used by those people who wish to have a general education with a view to getting service under Government or with ordinary commercial firms. For agriculturists, however, I should like education to begin and end with agricultural education, and not to lead further or by any avenue to Government or commercial employment.

6256. You would not give them a general education but only an agricultural one?—I would not give them a general education.

6257. As regards the standard of the agricultural degree at Poona College you say on page 336, " At present I fear that agriculture is studied mainly as a means of getting a comparatively easy degree." Do you refer to the degrees of B.Ag. and L.Ag. of the Agricultural College here?—Yes.

6258. Is the standard low at present, in your opinion?—I think it is probably easier to get a B.Ag. than to get an ordinary B.A. I am not an expert on the point, but that is my impression.

6259. On page 337 you say that agricultural propaganda is largely conspicuous by its absence in your district. Did you bring this matter to the notice of the Director of Agriculture?—No. The facts are within his knowledge. He knows to how many people he has got to demonstrate.

6260. As you are in charge of the district, and you say that in your district it is conspicuous by its absence, I wanted to know whether you ever brought this matter before the Department of Agriculture, which is another Government Department?—I have not written to the Director of Agriculture about it. I have as a matter of fact spoken to the Deputy Director on one or two small points which came to my knowledge, but obviously the general question of the agricultural staff is a bigger thing; it is no good my pressing that the staff in the Kaira district should be doubled or quadrupled, when it is not being done in other districts.

6261. When the Deputy Directors travel in your district, do they come and see you sometimes?—Yes.

6262. And bring their difficulties to your notice?—Yes.

6263. *Mr. Calvert:* Do you think that the system of child labour prevents the parents from sending their children to school?—Undoubtedly.

6264. Do you or your Deputy Collectors regularly visit the Poona College, say once a year or so?—No.

6265. Is there any system in Bombay whereby you are given permission to visit the Poona College?—I could visit the Poona College at any time I was in Poona.

6266. But not go there specially from your district?—No.

6267. There are no standing orders about going there once a year?—No.

6268. Do you think that the Agricultural Department has got down to the small cultivator, the man who cultivates 5 acres or less?—No.

6269. You say that agricultural propaganda should be carried to their doors. Have you any experience of propaganda through co-operative societies, such as "better-farming" societies?—I have had no experience of "better-farming" societies. I have some experience of Taluka Development Associations, which are co-operative in their lines. I know of one society of the kind which has done useful work, and will probably go on to do better work; it was fairly recently established when I knew it, but I think it was working on the right lines.

6270. There are no specific societies in your district for better farming?—No. Nothing of the kind, so far as I know.

6271. If as the Collector of the district you were to push a campaign for using improved seed, would you be able to get seed in sufficient quantity? Have you any experience of that kind of campaign?—I have no experience of that kind of campaign. Of course, the supply of seed would depend on the supply raised in the seed farms which supply that particular sort. I believe a large amount of cotton seed is now raised in seed farms in Gujarat, but not in my district. In my district tobacco is now being raised and gradually distributed but the amount available for distribution at present would not be enough to stock the whole district, by any means.

6272. But have you ever found that your efforts to popularise seed have been defeated through the inability of the department to provide the seed?—No. I have no experience of that.

6273. On the question of finance, you discuss reclamation, protection or improvement of land. Do you think that there are in your district schemes, both practical and economic, of land improvement?—In my present district, very little, because the value of land is such that capitalists have taken up the matter already. I was thinking, when I wrote that, of the North Kanara district and other less advanced districts where plenty of schemes of improvement might have been carried out with great benefit to the cultivators.

6274. Later on, you say that the demand for loans for land improvement is also usually more than the supply. Am I correct in gathering that the question of land improvement has been held up owing to insufficient allotments under the Land Improvement Act?—I think that a certain number of applications have to be kept over until the next year when the grant for such

purposes is exhausted. I am holding over 5 or 6 applications at this moment for things like pumping plants and so on.

6275. As Collector, you cannot get all the *taccavi* you require?—I have yet to see, because I have written for more money, as a matter of fact, for current requirements, but it has not actually been provided. I have not got the money at present.

6276. Then you say that something should be done to enable the loans to be granted more promptly and to eliminate formalities. I think that is a very general complaint. Can you make any suggestions as to how to eliminate these formalities?—I think a little more might be left to the discretion of the Collector. I have had recent experience of two applications for *taccavi* loans for pumping plant, or something of that kind, in which I was quite satisfied myself that the man understood what he wanted to do, and that the thing was capable of paying, and that he understood the kind of machinery that was needed; the security was all right, but one of these cases has been held up for a considerable time, because, under some resolution passed a great many years ago, it has to be inspected by the Agricultural Engineer, and consequently nothing further can be done until he is able to arrange to visit the place.

6277. Under the Land Improvement Act, what is the limit of the sum you can advance? Is it Rs. 10,000?—I think it is Rs. 5,000, but I cannot remember exactly; it is less than Rs. 10,000.

6278. On this question of indebtedness, is the Usurious Loans Act made use of in your district?—Not as far as I know.

6279. Can you explain that?—If it were made use of, it would be under the civil courts. I do not know what kind of decrees they pass. When the decree is passed it comes to me for execution, if the debtor is an agriculturist.

6280. You, as Collector, have not made any special efforts to make the Usurious Loans Act known throughout the district?—No.

6281. Do the Co-operative Department make it known?—I am afraid I do not know what the Co-operative Department are doing in that respect.

6282. In your district, have the people the power to mortgage their land?—Yes.

6283. What, would you say, is the proportion of secured to unsecured debt? About fifty-fifty?—I think it would be impossible to find out exactly. One never knows the amount of unsecured debt.

6284. Fifty-fifty is the general thing, but you have no data?—I have no data on the subject. I am afraid I could not give you any useful information.

6285. Do you think that a non-terminable mortgage is good for land development?—Good as a means of enabling the cultivator to do something, do you mean?

6286. As a matter of actual historical fact, is the non-terminable mortgage used to secure funds for land improvement?—No, except, of course, the land is mortgaged for *taccavi*, when taken from Government.

6287. With regard to fragmentation of holdings, you think the required proportion of consenting landlords would never be obtained?—Yes.

6288. Even if they knew the value of their rent might go up by 25 per cent. would they not agree?—I do not think so.

6289. With regard to the high price of wire-fencing I see you think it important that that should be reduced. Do you think the price is affected by the protective duty of 15 per cent.?—I think it is bound to be.

6290. The protective tariff is a difficulty in keeping pigs out of the field?—Certainly.

6291. With regard to animal husbandry, you say in the Kaira district the principle of stacking fodder as a reserve against famine in future years is well understood. Could you suggest any means whereby that could be popularised in other districts? The extraordinary fact is that it is known in

some districts and not in others?—I cannot suggest any means of giving an inducement for it.

6292. I think that people are capable of being taught to do it. If they can learn to do it by hard experience in one district they ought to be able to learn in another. We are often told that fodder stacking and stall-feeding should be encouraged, but we are never told how?—You will never succeed in encouraging it, unless the cattle are worth it. In the Kaira district the cattle are worth it.

6293. They are high-grade cattle?—Yes.

6294. Let us assume for a moment you are pushing on this cattle-breeding. Would you have any difficulty in getting a sufficient supply of good pedigree bulls?—I do not think so; not in my district.

6295. You have a good stock?—Yes.

6296. With regard to forests, you suggest the encouragement of the growth of grass and trees on ravine land. Under what department would you place the reclamation of ravine land, Forest, Revenue, or Agriculture?—Forest, I think. Perhaps, Forest and Revenue combined. Forest officers might be attached to the Revenue Department for looking after these areas. It would rather depend on their situation, whether they were in forest or between forest and cultivation.

6297. The Forest Department are supposed to show a profit on their year's turn-over?—Yes.

6298. They cannot take up propositions which are not economic?—No. Forests are semi-commercial.

6299. Would that be an argument in favour of the Revenue Department taking it over?—Not necessarily. If the Forest Department were given to understand that they were not expected to make a profit on every square mile of forest they had, they could do it very well. They have the technical knowledge necessary for this purpose. The Revenue Department could not do anything without their assistance.

6300. *Mr. Kamat:* You make a recommendation, in the interest of the cultivator, I presume, that section 86 of the Land Revenue Code should be repealed. I believe, under this section, assistance is given by the courts to recover debts from cultivators. Is not that the case?—To recover rent from the cultivator, not ordinary debts.

6301. The effect of its repeal would be that probably you would make it more difficult for the cultivators to borrow. Would not that be the indirect effect of it?—No, I do not think so. The difficulty would fall on the landlord rather than on the cultivator, if you regard the cultivator and the landlord as two separate persons. Section 86 is in favour of the landlord and against the cultivator.

6302. Quite so, but if that assistance which the landlord gets through the Courts, were taken away, the result would be to make things more difficult for the cultivator. He now feels some confidence in the Courts, but as soon as that confidence on the part of the landlord is gone, he will not lend in the same manner as he is doing now?—I am talking about leasing and not lending; and the landlord has got to lease his lands, otherwise they are of no use to him.

6303. The effect of this would be that all investors would deposit their money in co-operative societies?—There would be an inducement to do so. I do not say they all would.

6304. Is that not the logical conclusion, that on the repeal of this section investors wishing to invest their money would go to the co-operative societies rather than put it in some other investment?—Not necessarily. Those who wished to lend on the security of land could take the risk and do it direct or invest in co-operative societies.

6305. What happens under your scheme in areas where there are no co-operative societies?—I am not aware of any such areas. Besides, co-

operative societies will naturally grow in proportion to the demand for their assistance.

6306. In some districts they have spread very well, in others they have not?—The movement has spread well in both the districts I have last been acquainted with. The only reason why they are not spreading further is the absence of a demand for more societies.

6307. In districts where the movement has not spread so far, how would your scheme work?—It would have to spread; the co-operator would then have an advantage behind him.

6308. *Dewan Bahadur Malji:* Your district is mostly Narvadari?—Not mostly.

6309. Which talukas are Narvadari?—Anand, Borsad and Nadiad are the three principal talukas.

6310. Where the Narvadari tenure obtains, does it affect the credit-worthiness of the agriculturists, as they cannot alienate unrecognised portions?—That does not affect them much. They do alienate.

6311. Do you permit them to do so?—We let them go to the civil court if they want to upset it.

6312. Ordinarily, you do not interfere?—No.

6313. May I take it that practically in your part of the country, the Narvadari law is a dead letter for such purposes?—It is not a very live letter; but I would not say it was a dead letter.

6314. Such alienations are hardly interfered with?—They are not interfered with much by the revenue authorities. What they do in the courts I do not know.

6315. Have you come to know that this tenure is more or less making the agriculturists dishonest to a certain extent?—No, I do not know anything about that.

6316. Do you know that in the neighbouring Gaekwar villages, Petlad for instance, there did obtain such a tenure before?—I am afraid I do not know much about the Gaekwar territory.

6317. Have you come to know that the Narradari tenure is mostly done away with in that part of the country, by the efforts of His Highness's Government?—I have not heard of that.

6318. As regards indebtedness, which taluka of your district is in more indebted circumstances than others?—I could not say. I have not seen figures; I do not think figures are available.

6319. Is it a fact that Matar, and in particular the Daskoshi portion of it, is the most deteriorated taluka of your district?—Lately, certain parts of the Daskoshi tract have been dropping behind. This year it is all right.

6320. On account of the incessant rains?—Yes.

6321. With regard to your revenue rule of three successive failures only entitling a man to remission, do you think that is very hard on Matar?—That is not the revenue rule. The rule is that you cannot have more than one year's revenue outstanding for collection, and any amount that falls into arrears beyond that is remitted automatically.

6322. It is not necessary that the outstanding debt should be three years?—No. That has been changed.

6323. The *taccavi* debts in Matar taluka are very old, some extending to 10 years?—We have recovered nearly all those.

6324. They are recovered at the expense of the societies' loans; the *taccavi* loans take priority according to law. In the Daskoshi villages, if there is a good year in which these old arrears can be recovered, these *taccavi* loans are given precedence according to law, and the co-operative societies have remained in arrears considerably. They cannot make headway?—I have only had one or two cases in Matar in which the co-operative societies have asked the Collector to recover.

6325. On liquidation?—Against individuals, yes.

6326. In the case of execution proceedings against agriculturists which are transferred to a Collector, to your knowledge is every effort made to recover these debts by farming out the holdings attached, the Collector providing the money and management?—No.

6327. Generally, you sell off the property?—Yes.

6328. That is more or less to the detriment of the agriculturist?—Yes.

6329. Do you know that poundage fees are being charged to agriculturist debtors when sales are held through the Collector by the civil court?—Yes.

6330. In this the agriculturist's debts, instead of being reduced, are added to, for there are no Collector's fees to be charged in case of sales through courts, but here they have to pay double fees, poundage as well as your sale fees, under the Land Revenue Code?—I cannot remember how that matter was solved. I am aware of the question having been raised. I do not think they have to pay both fees.

6331. You can take it from me they do. If that is so, it is unfortunate?—Yes.

6332. *Sir Henry Lawrence:* With regard to your proposal to repeal section 86 of the Land Revenue Code, has this matter ever been put forward by you and discussed with other officers or by Government?—I have often had a hit at it when the opportunity arose, but I have not actually put it forward as a separate proposal and asked for it to be considered.

6333. You have never seen the views of other officers on the point officially recorded in any Government Resolution?—No.

6334. What is the object of this section 86?—To secure the revenue only.

6335. It is not to assist the small holder by keeping him out of the civil court? Is it not to provide an easy and quick decision for a question which might occupy a lot of time in a civil court, and cost the parties a great deal of money to obtain a decision? Is that not the purpose of the section?—It would not have struck me that that was the purpose of it.

6336. You do not think that, as a result, it does relieve the debtor of heavy expenditure in civil litigation?—The way the section works is this; every landlord, if he fails to recover the full amount of his rent, takes the tenant to the *mamlatdar's* court for assistance against him. Had he to go to the civil court for that purpose, he would compound the matter, and if he got reasonable payment from the man he would not carry it any further.

6337. That is an intelligible view; and in your view, then, it is the small man who is injured by it?—Yes.

6338. I think it would be interesting to have that discussed by Government. On page 339, you speak of the use of forests. You have had a great deal of experience of forest matters?—Yes.

6339. You have been Forest Settlement Officer for how many years?—I have not been a Forest Settlement Officer. I have been in a forest district as Collector, but I have not actually done forest settlement.

6340. You were there for some years?—Yes.

6341. For how many years?—In Kanara, for 7¼ years altogether.

6342. Have your views here regarding the exclusion of the local residents from the benefits of the forests been put forward? Have you made any suggestions or proposals at any time?—I did make certain proposals when I was Collector of Kanara.

6343. Were they accepted?—I was transferred before I knew the result and I have not heard what has happened since. I was able to do a certain amount in the way of easing unnecessary restrictions, but I do not know what eventually happened, because the matter was still under correspondence when I left the district.

6344. How did you get these unnecessary restrictions removed? By what means or agency was it done?—That was in correspondence with the Commissioner on various matters like the privilege rules or the permit rules, when

they were under revision or consideration. Certain proposals were made from time to time to improve the working of those rules.

6345. These improvements were ordered by the Commissioner and the Conservator in consultation?—Yes, I think so.

6346. But there are still, in your view, other matters which require further consideration for the relief of the local inhabitants?—Yes, unless they have been disposed of during the two years since I left the district.

The Chairman: I want to refer to the question relating to the terms of reference which I mentioned a short time ago. The terms of reference say that it will not be within the scope of the Commission's duties to make recommendations regarding the existing system of landownership and tenancy or of the assessment of land revenue. Since my reference a few moments ago to the matter, I have had before me section 86 of the Land Revenue Code, and I wish to modify the ruling which I then gave to the extent that so long as any provision of that Code does not apply directly or indirectly to the assessment of land revenue or to the existing system of landownership or tenancy, there is no reason why such a provision should not be dealt with in evidence before the Commission.

6347. *Sir Ganga Ram:* Is your district subject to famine?—Yes; it is rather liable to famine.

6348. What is that due to? Is it the rainfall? You have a good rainfall, have you not?—Yes; this year there is no famine.

6349. The rainfal is precarious?—It is very precarious.

6350. In your district have you no canal-irrigated areas?—There is a small canal-irrigated area in the north-west corner of the district, in the Matar taluka.

6351. About how much?—About 7 or 8 villages; I could not give you the actual area.

6352. The rest is well-irrigated?—Yes.

6353. How many acres does each well command?—I could not say exactly. They vary tremendously according to the water-supply.

6354. At what depth is the water from the ground level?—50 feet, 80 feet, or even 90 feet.

6355. Do they draw the well-water by bullocks?—Yes.

6356. Not by power machinery?—In more advanced talukas they are using power pumping plants to an increasing degree.

6357. What area is commanded by well-irrigation? How much does an individual well command?—I am afraid I cannot say exactly. I think it varies a great deal. My idea is about 4 to 5 acres.

6358. Can only 4 or 5 acres' produce pay for the lifting of water from wells? If you use power pumping machinery you will irrigate a larger area, if you have the water-supply in the well. There are some wells, where there is a good water-supply and the pump is working for long hours, which irrigate a much larger area.

6359. How much area?—I am afraid I cannot give you the figures. I have not studied them.

6360. Are the wells giving a sufficient supply of water? Is there any deficiency?—They are very uneven. In some of them, if they are sunk on a flow, the water-supply remains constant, but the majority of the wells in that district are sunk on percolation areas.

6361. You could not say what is the discharge of each well?—No. They must vary from well to well.

6362. Do you think that the supply of water from wells can be improved? Is there any necessity to improve it?—There is a necessity for sinking more wells in the right places; that is what they want in the Kaira district.

6363. You do not know whether the zamindars require the supply to be augmented by some means?—They certainly do. Well-irrigation cannot do all that is to be done.

6364. Do the Agricultural Department pay any attention to it?—I think they are always paying attention to it. It is the main topic of interest.

6365. Are they paying attention to increasing the supply from wells?—They cannot do anything to increase the supply. There has been a great complaint in recent years that the supply was diminishing. That matter has been under investigation, but nobody can do anything to increase the supply, except send round the Water Diviner.

6366. I find in your district the average acreage per head is about ·92, and if you take away from that the oil-seeds, it comes to ·90 only. Is that sufficient for the people to grow their own food? Do they grow their own food, or do they import it?—I do not think they are importing food. I think in a normal year they grow their own food.

6367. They have not got any surplus to export?—No. Their exports take the form of cotton and other non-food crops.

6368. They grow their own food for their consumption and sell the cotton? —Yes.

6369. Or, have they to sell cotton in order to make up the deficiency in food?—I do not think so. The district on the whole, I think, probably grows its own food supply, but I have not got the figures of imports.

6370. I see that you grow a large amount of *ragi* which is very inferior stuff. In those places, can they not grow wheat or any other superior stuff? —Not in the rainy season. *Ragi*, that is *bavto*, is grown in the rainy season. You could not grow wheat in that period. It is done in the present season.

6371. What are the crops in the *rabi* season? You grow very little wheat. Do you grow any food crops in the *rabi* season? Have you tried to grow wheat in the *rabi* season?—Wheat is always grown in the *rabi* season.

6372. It is very small in quantity?—It can only be grown where it is irrigated or in suitable soil. It is mostly grown in places like the Daskoshi tract, where you have soil suitable for wheat.

6373. I am not prepared to admit that. We have grown wheat where it had never grown before. On page 336, you talk of demonstration farms. Is it not possible for you to get areas of land on lease and give it to the Agricultural Department to start demonstration farms? Then they could show to the people improved methods, and people would adopt those methods?—That is one of the ways of doing it. The land could be leased, I have no doubt, for demonstration purposes.

6374. They need not buy it?—No.

6375. You say something about cheap fencing. The only wild animal which is troublesome in your district is the pig?—In my district there are no really troublesome wild animals except monkeys. In other districts fencing is needed for protection against the pig, and also against other forest animals, such as *chital* and *sambar*.

6376. What is the minimum height of the fencing that you would supply?—5 feet.

6377. Not less than that? The pig does not require a fencing of that height?—The pig can jump a good height, I think.

6378. What is the cost of fencing now?—I am afraid I could not give you the exact figure. I know of one case in which the people wanted to build a wall 4½ miles in length, and they asked for Rs. 10,000.

6379. *Sir Thomas Middleton:* In reply to Sir Henry Lawrence, you indicated that you had had a good deal of experience in the forest districts of North Kanara. You say the principle has been recognised that these forests ought to be managed for the benefit of the agriculturists. For the benefit of those of us who do not know the conditions, would you indicate what the changes were that were accomplished during the period you were in North

Kanara?—The coast of North Kanara is very thickly populated. The tract which is principally cultivated is along the coast. It is this coastal strip that makes the largest demand on the forest for dry and green leaves for manure, for cattle grazing for fencing and for wood for agricultural implements. They depend upon forests for carrying on cultivation along the coast. During the time I knew Kanara the whole coastal strip was made into a minor forest division and put under a separate forest officer, who worked in close liaison with the Revenue Department to conserve the resources of this tract of minor forest and, as far as possible, to enable the cultivators to get what they wanted without a great many restrictions and difficulties.

6380. Was any attempt made to regulate grazing with the object of getting better grass?—No, there was no way of regulating grazing unless you were prepared to fence, and though some private individuals did so it was not done officially on account of expense.

6381. In that particular area is the grass really abundant?—Not nearly abundant enough because the soil is very rocky and has been largely denuded by cutting down the forest.

6382. From your reply to Mr. Calvert I inferred there were certain things to be seen in Kaira from which other parts of India might benefit. Mr. Calvert asked whether you could popularise the practices of Kaira?—That was in relation to stacking of fodder and the management of cattle, the principle of growing fodder crops and of stacking against bad years.

6383. The district to which you refer is mainly light soil, I think?—Yes.

6384. The soil is very similar in its character to the alluvial soil of Northern India, and there are widespread tracts of similar soil throughout India?—Yes.

6385. Why should it be only in that particular area that we find this superior management of cattle? You say the people look after their cattle because they are good, but are not the cattle good because the people look after them?—Of course, the ruling feature of that tract is that there is a great pressure of population and great competition for land and the land is very good and very valuable. Therefore cultivation tends to be rather intensive, and that leads to better and fewer cattle.

6386. But the cattle are good because the people look after them; I think that is the answer, and not that the people look after them because the cattle are good?—It is not only that. I think a particular tract which is favourable to cattle-breeding produces a good breed of cattle just as the Deccan produces a small and hardy race and Gujarat a large and heavy race.

6387. You instance good breeds and little common grazing as being two factors that have accounted for the Kaira cattle. Is there not a reason why we should link these two things together? What about the enclosure of land in Gujarat? Are the fields more or less commonly enclosed than in other districts in which you have worked?—Very much more enclosed; nearly every field is enclosed.

6388. Is not this district an ordinary example of the effects of enclosure? Gujarat has been reproducing the experience of many other countries?—It certainly is a very strong feature of Gujarat and more particularly in parts where land is more valuable.

6389. It is a special feature of Gujarat as distinct from other areas?—Yes.

6390. Gujrat farming is an after-effect of enclosure?—Yes, that may have something to do with it.

6391. I think it has more than "something;" it is at the root of the matter. There is one other point. If there is very little common grazing, how do cultivators manage to get grass for their cattle?—They do not feed them on grass; they feed them on the produce of their food crops.

6392. Is it not common in the Kaira district, as it is a little further south, to have the field *shedha* or border?—They have these *shedhas* in Kaira, but I do not know if they contribute very much to the stock of fodder. They mainly depend upon the *bajri* crop for fodder.

6393. When the cattle have a breathing space, have you noticed how the grass on the field border is utilised?—I suppose they stack it.

6394. The cattle graze on it. That is the second contributing cause to the quality of the cattle. They have always got some food in the interval of work? —Yes.

6395. *Dr. Hyder:* You say, on page 337, that Government, as the ultimate owner of the soil, should as one of its duties be prepared to carry out work for the improvement of its lands. Have you considered whether the re-grouping of scattered fields might be one of those improvements?—No. I had not got that in mind when I wrote that.

6396. You say that the action contemplated by the State in regard to fragmentation would be ineffective. Would you have that provision deleted from the proposed Bill?—It does not apply to fragmentation, which is a matter of private interests. What I meant was that the State is the ultimate owner of the land, and it seems to me properly the function of the State in some cases to undertake protective or improvement works so as to improve its own lands. The State, as the ultimate owner of the soil, benefits in the end by any way in which the land is protected or improved.

6397. If the State is the ultimate owner of the soil, surely the landowner should compel the tenants to re-group their lands so that the land may produce more?—I should call that an illegitimate extension of the interference of the State. What the State ought to do is to look after the general improvement of its property, and not interfere with other people's management of their own rights.

6398. *Sir Chunilal Mehta:* Is the storing of fodder and stall-feeding exclusively confined to Kaira?—I have not met it anywhere else, but I have no experience of many other Gujarat districts.

6399. Take the Deccan, the Satara district. Do they not store fodder there and adopt stall-feeding especially for draught bullocks?—I have not served in the district, so I cannot say.

6400. You are speaking of Kaira only here?—I am speaking of Kaira compared with Kanara.

6401. Have you any agricultural bias schools in your district?—One or two; one and a half really, because one school is not a true agricultural bias school. There is only one real agricultural bias school, which has 14 boys.

6402. Do you think it might meet your requirements as mentioned in your first paragraph?—As far as I understand their working, I think they are distinctly the right sort of thing and ought to replace the ordinary primary schools entirely.

6403. With regard to fragmentation, have you seen the Draft Bill that Government have recently prepared?—I saw the Draft Bill that was sent round for opinions. I do not know whether it has been recast since I saw it.

6404. Can you tell us whether the cultivators in Kaira have got sufficient spare time for which spare-time subsidiary industries could be introduced?—Generally speaking, no. The cultivating season in Kaira goes on for a long time. Actually you find crops on the fields right up to the end of March. Cotton is a very late crop. I do not think cultivators in Kaira have a very long period of idleness.

6405. Therefore there is not much scope there for spare-time occupations? —I should say no.

6406. Not even in the evenings?—I do not think you want to press the cultivator to work in the evenings.

6407. Was not propaganda of an intensive kind for this purpose carried on in your district?—Yes.

6408. With what result?—None.

6409. Regarding these assistance suits under section 86, have you had many examples of requests for assistances?—I have had assistance suits to deal with as an Assistant Collector. They do not come to the Collector. As an Assist-

ant Collector, however, I used to hear the appeals from these suits, and my sympathies were always with the cultivators.

6410. With regard to your proposal on page 340 about planting of casuarina trees for fuel purposes, does that apply to Kanara only or to other parts as well?—I have seen it working in Madras. There are many survey numbers entirely planted with casuarinas, which must obviously supply the demand for fuel in those parts very largely.

6411. Will that be possible in Kaira?—I do not know whether casuarina would grow there. It has never been tried. Something else might be tried. It is a good tree-growing area and they should grow some kind of tree.

6412. Have you put this idea before the Forest Department at any time?—No.

6413. *Sir Ganga Ram:* Are there any big landlords in your district?—Yes.

6414. Who do not cultivate themselves but let the land to tenants?—Most of the biggest landlords in my district cultivate themselves, either they themselves or members of their joint families.

6415. Do they take cash rent or participate in kind?—Some in cash and some in kind. They have a system of a half-share in the produce or else cash rent.

6416. Do you store any fodder for times of famine?—It is going to be done. Government have recently leased big grass-growing areas in a certain taluka to a contractor on condition that he should store a certain amount against famine.

6417. What kind of fodder?—Grass. The people themselves store the other.

6418. Is not the stalk of some food crops used? The *ragi* stalk, for instance, is very good?—The cultivators keep every stalk of *ragi* for their cattle.

6419. Cannot you bale it and keep it in stock in large quantities? Cannot it be had cheap when there is a bumper crop?—Cultivators know that and they stock it for themselves. It is not wasted. They always reckon on having at least one year's supply of fodder in stock.

6420. What about *juar*?—*Juar* is replaced by *sundia* in Kaira. They grow it very largely by well-irrigation after the other crops. It is a *rabi juar*.

6421. *Mr. Kamat:* I want to be sure of your opinion with regard to section 86. You said that these suits were chiefly for rents. Apparently that is the case, but in actual practice in many cases, is it not true that a man who wishes to lend money, say Rs. 1,000 at 9 per cent. and has to recover Rs. 90 by way of interest, takes a rent-note from the cultivator, although it is not a real rent-note, and files the suit?—Yes, and that is why I have put it down as one of the causes of the present indebtedness.

6422. It is not between the landlord and the tenant but between the lender and borrower?—Yes.

6423. *Professor Gangulee:* How many Taluka Development Associations have you in your district?—Two were formed in the Kaira district during the last rains. I have had experience of one in Sirsi, in the North Kanara district, which worked quite well; they obtained good sugarcane crushers and let them out to members of the Association.

6424. Did these Associations seek your assistance and advice?—They used to consult frequently on various points.

(The witness withdrew.)

Mr. C. O. LOWSLEY, Superintending Engineer (on Special Duty), Bombay Presidency.

Replies to the Questionnaire.

Introductory.—The appointment of a Superintending Engineer on Special Duty to investigate minor irrigation works as a means of protection against famine has been in existence since September 1925.

The investigation is confined to the scarcity tracts of the Bombay Presidency (excluding Sind) and although the period of one year in which investigation has been in progress is too short to form definite proposals much information has been obtained which, combined with previous experience, may be of use to the Royal Agricultural Commission.

The scope of the investigation is given in G. R. No. 4142—24, dated August 24th, 1925, a copy of which is attached.*

The subject deals closely with agricultural improvements especially in connection with the utilisation of all natural resources of water-supply which can be applied to the whole Presidency proper without restriction.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*b*) I would recommend the construction of model schemes of all types of land improvement and the conservation and utilisation of water resources in suitable and most accessible agricultural centres as object lessons to the cultivators.

Such schemes should be carried out by a reliable agency and the working of the scheme handed over to the Agricultural Department.

One such scheme is about to be constructed in the Ahmednagar district. On completion of construction the owner of the land will farm it under the instructions of the Agricultural Department fulfilling a two-fold object, *viz.*, first hand experience to the cultivator and the acquisition of reliable information on the cost and return which may be expected from farming under such conditions.

(*c*) By providing an agency for preparing schemes and carrying them out. Up to a few years ago the only means a cultivator had of obtaining expert advice was the goodwill and friendship of Government officers and subordinates working in his area. A Land Development Officer (an Assistant Engineer of the Public Works Department under the Agricultural Department) was appointed for the Deccan three years ago to investigate and prepare rough projects of minor irrigation schemes. One man in such a large area was naturally swamped with work, and there was no special agency to carry out his recommendations.

Co-operative Societies and Taluka Land Development Associations are taking keen interest in this work and are able to arrange for financing small schemes but they have not the technical knowledge necessary to prepare and execute schemes of any magnitude.

On the appointment of a Superintending Engineer on Special Duty to investigate natural resources for the protection of lands from famine in the scarcity tracts of the Bombay Presidency it was found that the duties of the two officers overlapped with the result that the post of Land Development Officer was abolished and two subordinates under the designation "Bunding Officers" were sanctioned for giving advice to cultivators outside the scarcity area.

The Superintending Engineer on Special Duty at present has a staff of 3 Assistant Engineers and 8 Survey Parties each party consisting of a Surveyor and 4 Assistant Surveyors. This staff which is undoubtedly of

---

* Not printed.

great use has to work over such a large area that it only touches the fringe of the problem. The scarcity area as at present defined covers some 40,000 square miles and it is obvious that many years must elapse before individual agriculturists can have a hope of obtaining the advice they require.

From my experience of the past year and my experience as an officer on ordinary duty, I am convinced that a large percentage of cultivators will adopt expert advice if means are provided. With the increase in outturn of trained men from Agricultural Colleges the demand for a special agency will gradually decrease but until trained men are available and spread over the Presidency a special agency is a necessity and needs expansion.

Formerly the individual cultivator with a view to improving his lands and utilising the natural resources of water-supply applied for a loan to carry out his proposals. Enquiries into the conditions resulted in the sanction or refusal of the loan. In the former case the cultivator was left to carry out his scheme without expert advice more frequently than not resulting in failure. With a special agency of sufficient proportions his scheme can be worked out for him and carried out for him.

The cost of this agency must of necessity be high. The survey of a small scheme is practically the same as that for a large one, often a large amount of time must be spent on the preliminary survey of a scheme to ascertain its feasibility and rejected schemes add to the overhead cost.

To sum up, I would advocate a special agency to work in districts outside the famine area in addition to the special agency now employed, within the famine tracts. Whether this agency could be carried out under the existing divisional staff is a matter for later decision but I strongly recommend that additional staff in a Division should be for this special duty only and not linked up with the ordinary duties of the present staff.

QUESTION 5.—FINANCE.—(*b*) I think fuller use of the *taccavi* system will be made if loans are given on easy terms for carrying out land improvements and minor irrigation works when such schemes have been prepared or approved by expert staff.

In this connection Agricultural Associations can give much help to the individual cultivator in arranging for the loans.

The security would be on the lands concerned but as compensation for the easy terms proposed Government would have the satisfaction of knowing that the schemes were sound and that the loan would be utilised for the purpose for which it was intended.

QUESTION 8.—IRRIGATION.—(*a*) (*i*) In the course of my tour of investigation during the past year I have met with demands for large irrigation schemes in Gujarat for the Ahmedabad and Kaira districts which are being investigated by the Irrigation Department.

Irrigation in Gujarat is chiefly from small tanks, the obstacles to improvements and extensions are dealt with below.

(*ii*) In many districts of the Presidency, the Deccan especially, there are sites for small tanks. Although most of them will not have sufficient storage capacity for direct irrigation much can be done by constructing such tanks as percolation tanks to improve the supply in wells.

Sites for such tanks are being investigated and surveyed in the scarcity tracts at the present time but there is no reason why the operation should not be extended to normal tracts.

Such schemes will not give a high return on the cost involved but there will be much indirect benefit to the agriculturists generally.

(*iii*) Throughout my tour of investigation I have met with demands for boring machines and I think there is scope for increasing the plant and staff under the Boring Works Division and the Agricultural Engineer who are employed on this work.

The demand is especially great in the Kaira district of Gujarat where the subsoil water level has fallen and the wells have ceased to give an assured supply.

The obstacles to the extension of irrigation by each of the above methods are:—

(*i*) I consider the chief obstacle to the extension of irrigation by canals is financial. The cost of labour and materials has increased out of all proportion to the revenue realised from irrigated crops with the result that otherwise satisfactory irrigation projects are not productive works.

There is also the question of the value of irrigation water in different tracts. In a tract of erratic rainfall there may be great demand or no demand at all for irrigation water.

(*ii*) The obstacle to the construction and improvement of small tanks is chiefly the silting which occurs and the subsequent losses by evaporation and absorption which increase as the tanks become shallower.

The cost of clearing silt from a tank may be taken at Rs. 30,000 per one million cubic feet whereas the value of one million cubic feet of water for irrigation purposes is about Rs. 60. It is obvious that silt clearance to increase the capacity of a tank is financially impossible.

In course of time there is the hope that cultivators will appreciate the value of tank silt for improving their lands and that permission will be sought to remove silt from tanks gratis.

Another obstacle to the construction of tanks in areas in which they are badly required is the small flat catchments; this is especially the case in Gujarat where the well-water is frequently brackish and a tank is the only means of providing a village water-supply.

The rainfall in Gujarat has been on the decrease for many years and the shortage of tank supply has become chronic.

Fortunately this year the rainfall throughout Gujarat has been almost if not quite a record, (Ahmedabad 49 inches compared with the normal of 28) which should alleviate these conditions and give time for investigation regarding improvements.

(*iii*) *Wells.*—The obstacle to the sinking of wells is the uncertainty of success. The individual cultivator who desires to have his own well is loath to take a large advance which is a burden for a generation if the well proves a failure.

The failure may be in not striking water or in obtaining brackish water. The activities of the Agricultural Engineer in carrying out borings and the Water Diviner in selecting sites for wells is increasing the demand for wells.

QUESTION 9.—SOILS.—(*a*) (*iii*) Apart from forest operations for this purpose the only means are by terracing and by *tals* (earthen embankments).

The terracing at present carried out by the average cultivator is decidedly good and little in the way of improvement can be suggested. The chief features of good terracing are to obtain the maximum area of level land—sufficient area to facilitate ploughing—with the minimum amount of earthwork.

The faces and edges of *tals* require protection and a slight reverse slope to the terrace is advantageous.

Tals as at present constructed by the cultivator can be greatly improved. The cultivator has no means of finding out the best site and alignment of his *tals* and he generally favours low ground which necessitates unnecessary earthwork and endangers the safety of the *tal* in times of abnormal rainfall. Advice is being given to individual agriculturists in the scarcity tract by the staff on special duty and there would be considerable scope for extending this aid through the agency suggested in answer to question 3 (*c*).

QUESTION 25.—WELFARE OF RURAL POPULATION.—*General.*—The most urgent need of the rural population is a village water-supply and although in most disrticts this need has been met there are still numerous villages, in the

scarcity tracts especially, where the village water-supply does not last throughout the year and for months man and beast obtain water from a distance extending to 5 miles.

A survey of such villages would be most useful and each district should have a list of villages with a failing water-supply. A definite programme of investigation and construction could then be proceeded with.

In the course of my general investigation I have been given numerous instances of villages suffering from this want and my staff is quite insufficient to deal with such cases at the pace which the amelioration of these conditions demands.

Oral Evidence.

6425. *The Chairman:* Mr. Lowsley, the Commission is very much obliged to you for your written evidence. I think the germ of your ideas is formulated on page 357 of your notes. You state, "I would advocate a special agency to work in districts outside the famine area in addition to the special agency now employed, within the famine tracts?"—Yes.

6426. Do you think the nature of the problem differs as between these two districts, or are you more concerned with the extension of the agency?—I am concerned with the extension of it.

6427. You do not think that the problem is different as between these two places?—I do not think so. Possibly the schemes may be better outside the famine tracts.

6428. On page 356 you recommend the construction of model schemes of all types of land improvement and the conservation and utilisation of water resources on suitable and most accessible agricultural centres as object lessons to the cultivators. How do you propose to finance these?—Government will finance them.

6429. Would you hand them over ultimately?—My idea is that Government should carry them out by a Government Department and then hand them over to the Agricultural Department, the schemes to be run by the cultivators but supervised by the Agricultural Department.

6430. They will cost Government a certain amount of money?—The man would probably be prepared to pay something either as a loan when carried out, if he gets them back, or they might be given to him. They would be small schemes—they would not cost much. These small schemes only cost Rs. 10,000 each.

6431. But in the aggregate, over a large area?—These are model schemes for which I think a matter of ten in each district, or even less would more than suffice.

6432. I was interested in the figures you have given on page 358. You give there the cost of clearing silt from a tank as Rs. 30,000 per million cubic feet, whereas the value of a million cubic feet of water for irrigation purposes is about Rs. 60, a proportion obviously insufficient to pay interest and amortisation. That really means that you cannot dig a tank at a profit?—No. The only way is to put an embankment round the tank and make it that way.

6433. It appears that cultivators are able to design small schemes without assistance up to a certain point, are they not?—On a very small scale. They are capable of putting small dams across *nullahs* and embankments to a certain extent.

6434. Is there a sort of local inspection in such matters, or does each cultivator think for himself?—Each cultivator thinks for himself, but for the last 2 years the Agricultural Department have had their own Bunding Officer and Land Development Officer, both of whom give advice and help.

6435. How do the cultivators fix the levels?—I am afraid they have no means at all, unless they can get the help of some subordinate in the vicinity. They have no levels.

6436. Do they take a trickle of water with them and see how it runs?—I think they do it by eye. A great feature is that they try to have their *tals* on their survey boundaries, and will often sacrifice the efficiency of the *tal* simply to have it on their own boundary.

6437. Do you think that if this scheme of minor irrigation works is fully developed up to the limit of economic possibility a great contribution to the improvement in agriculture in this Presidency can be made?—I think so, because we should be harnessing the small *nullahs* which at present fill the rivers and go to waste. Big rivers are difficult to harness, but by harnessing small streams at their source we could have small schemes which would pay and improve the general condition of the districts.

6438. Have you ever attempted over a given unit of cultivable land to estimate what the aggregate increase in crop production might be as a result of the development of this idea?—No, but in 1908 the Director of Agriculture carried out one of these schemes at Rahuri in the Ahmednagar district. He had a scheme of flooding the land. The land which was soaked gave a return of 921 pounds of *juari* and 1514 pounds of fodder. The ordinary land alongside gave 312 pounds of grains; the fodder is not recorded. With wheat the soaked land gave 493 pounds of grain and 452 pounds of *bhoosa* stalk; the ordinary land gave 240 and 200 pounds.

6439. What scheme was that?—A scheme for soaking land, much as I am trying to do it now, by leading water from small *nullahs* on to the land and soaking it and then growing a *rabi* crop after one or two soakings. It was done in Rahuri with those results, but after that, apparently, it was lost sight of. I quote from the Report of the Department of Agriculture for 1908-09, page 37.

6440. Was it a normal season?—The rainfall for that year was 21 inches. I think that is about the normal.

6441. *Sir Henry Lawrence:* It gave three times as much *juar* and twice as much wheat?—Yes.

6442. *The Chairman:* Cultivation being carried on under the direction of the department?—The land was hired from Dr. Ballantyne, who is a missionary there. Whether it was farmed by him or by the Agricultural Department is not stated, but I came across this and I thought it was very interesting.

The Chairman: The figures are very significant.

6443. *Sir Henry Lawrence:* Have you any idea as to the total area over which your operations are capable of extension? How many acres of land can you improve? You have given us these striking figures to show that the outturn might be increased three times with *juari* and twice with wheat. Over how many thousand or hundreds of thousands of acres do you think such improved results are possible? Have you ever worked that out?—I have not worked it out. I have an idea as to what can be done each year, but I do not know what the total area would be.

6444. Can you work out a scheme to show what is the maximum profit possible from the continuance of your operations over a number of years, and let us have that?—Yes.

6445. *Sir Ganga Ram:* Do you issue an Annual Report of the Irrigation Department of the Bombay Presidency?—There is an Irrigation Report.

6446. An Annual Irrigation Report?—Yes. My appointment has been in existence only one year, and there has been no report so far, but an Irrigation Report for the whole Presidency is issued annually.

6447. Have you studied the Irrigation Reports of the Punjab? Have you ever seen them?—I have seen them; they are circulated.

6448. Your service has all along been in this Presidency?—Yes, and in Sind.

6449. As regards the figures which you give on page 358, do you not think that you have made a mistake? You say Rs. 30,000 per million cubic feet. That works out to how much per thousand cubic feet?—Rs. 30.

6450. This is the figure I get, but is that really the cost?—The lead is the question.

6451. We generally put down Rs. 3 per thousand?—That is for ordinary canal clearance, which is an entirely different thing. This is for tanks.

6452. What is the depth you go to?—To do any good you must go to 8 or 10 feet, or even more; but it is the lead that costs the money.

6453. If you allowed the zamindars to dig it and take it away themselves, would not they appreciate the value of it?—They do not yet. Occasionally we get a demand for the silt, but there is very little at present.

6454. It is quite worth the money. Do these minor irrigation works come under your duties?—Yes.

6455. Extension of minor works?—Yes.

6456. When you submit a project to Government do you show the direct water rate?—So far I have always been dealing with *bandharas* and *tals*.

6457. Do you show the direct water rate?—Yes.

6458. Do you not show the indirect benefit through enhancement of revenue?—I note in my report what it is.

6459. When do you show the return of the project by adding the two together?—I generally deduct the protective value from the ultimate cost and work out my return on the balance. There is a protective value which has been worked out by the Famine Commission of 1906, which proves that in the famine tracts it will pay Government to protect land at Rs. 171 an acre. If I prepare a scheme costing Rs. 60,000 to protect, say, 50 acres, I deduct from the cost of that 50 times 171 and work out my return on the balance.

6460. Why do it by this indirect method? Why do you not say the direct receipts by water rates are so much, sale of trees so much, indirect receipts through enhancement of revenue so much; total so much; percentage so much? Is not that a more intelligible way of doing it?—I think mine is quite direct. It gives all the information required, and also you have got the direct return on the whole capital and also on the capital after the protection.

6461. What I am driving at is this. Is the indirect advantage through enhancement of revenue taken into account when you determine whether the project is paying or not paying?—That is shown, and it is taken into account in the famine tracts.

6462. If both these items taken together show that the thing is paying 5 per cent. or 6 per cent. would Government be satisfied?—Government would be perfectly satisfied.

6463. You say, three times *juari* and twice wheat. That is, how many maunds per acre?—It was *juari* 921 lbs., *i.e.*, 11 maunds; and on the ordinary land it was 312 lbs., *i.e.*, 4 maunds. Wheat was 493 lbs., *i.e.*, 6 maunds; on the ordinary land it was 240 lbs., *i.e.*, 3 maunds.

6464. Then, by irrigation you only expect about 12 maunds?—It is not irrigation. It is by soaking the land.

6465. How much do you expect the yield of wheat to be by irrigation? How many maunds per acre?—I am afraid I cannot give that figure. This is from an experiment.

6466. You have given figures?—This is not irrigation. It was the result of an experiment conducted by soaking land. There was a small *nullah* running through the land which was dammed and the water was diverted to land and held up by *bunds*, and the land was soaked. Then that land was allowed to dry, and after that a *rabi* crop was planted. Alongside of that there was land which was not soaked with water and which only got the benefit of the monsoon.

6467. That shows the advantage of making *bunds*, not of irrigation?—No. You cannot call it irrigation.

6468. Does boring of wells come under your purview?—No. That is under the Agricultural Engineer.

6469. Do they bore in existing wells or do they make new wells?—In some places they bore in the existing wells, and in some places they bore new wells.

6470. Does boring in the existing wells augment the supply?—Yes, in Gujarat, certainly.

6471. By how much?—I cannot give you definite figures.

6472. To what depth do you go?—It varies. For an ordinary well they generally go about 60 feet, I believe, in the part of Ahmedabad where I was. But deep borings are taken to 2,000 feet.

6473. Can they go as far as 2,000 ft.?—I think they have gone to 2,000 ft. in Viramgam.

6474. What is the size of the tube?—I think it is five inches, but it is not my department, and I would rather not give any definite information on the subject.

6475. *Sir Thomas Middleton:* Your work involves the carrying out of a number of surveys?—Yes.

6476. What is the main work involved in the survey itself? Is it a question of levelling work or does soil examination come in?—There is no soil examination, beyond seeing that it is suitable soil for my schemes, that is all I am concerned with.

6477. Your survey is engineering?—Entirely engineering.

6478. *Dr. Hyder:* On page 358 you say that the chief obstacle at present to the construction of these works is financial?—Yes.

6479. Are your rates pretty low?—I should think they are.

6480. If you increased the rates would the increase in yield be enough to justify the cost of the works?—I think it would. You mean with a view to increasing the rates?

6481. Yes. The point is this. You say that the chief obstacle is financial. I submit that if the project is satisfactory it can only mean that it will bring extra yield. If from that extra yield you can get for your department so much that it can balance the cost incurred, would you consider that project to be satisfactory?—Yes.

6482. Then the present rates are too low?—I think so, because in places I have been to and asked the people what they are prepared to pay, they are often prepared to pay higher rates than are at present in existence if they can get a scheme.

6483. Have you or your Government ever ascertained the value of water in the different tracts in the Deccan?—The rates vary according to the tract, but I think it might be on a more detailed basis?

6484. At present the Bombay Government or your department does not possess the data on which to base the rates?—They are all based on settlement revisions which are carried out every 30 years, and the rates are revised from time to time.

6485. Quite so, but neither your Government nor your department know what is the value of water in different tracts?—Not to my knowledge.

6486. Please look at the same page. The cost of clearing silt is high?—Yes.

6487. Then, you say that the value of one million cubic feet of water for irrigation purposes is about Rs. 60. If the financial aspect of these projects is as you have stated, then you would not think that the State can incur this huge expenditure?—On the clearance of silt?

6488. Yes?—Certainly not.

6489. Is there any method which the people of this Presidency can adopt other than voluntary or forced labour, by which they can do the clearing for themselves?—I hope that in time they will appreciate the value of the silt and carry out the work themselves.

6490. Do you not think such works were carried out in the past by co-operative effort on the part of the people themselves?—Yes, I think most of the old tanks were constructed by voluntary effort and co-operation of the villagers.

6491. At present they do not undertake such co-operative work, but rely on the State?—They say they will give help by giving so many men for a certain time; they will undertake to do so much earthwork themselves. There is that amount of co-operation, especially in Gujarat; they have told me that if I will get the project through they will provide so many men for a certain time; they say, "We will do so many cubic feet per head;" they undertake that.

6492. Then I suppose the extension of such works both in Gujarat and the Deccan would be possible if the State provided a certain amount of money and for the balance you relied on the co-operative effort of the people?—Yes, that is the object now. In the carrying out of all these village tanks they are prepared either to give something in labour or a contribution.

6493. And that is the policy which is being carried out now?—Yes.

6494. The Bombay Government have adopted that policy?—Yes.

6495. *Sir Chunilal Mehta :* Your department was specially created in order to deal with famine tracts?—Yes.

6496. Because the money could only be provided from the Famine Fund?—Yes.

6497. Government had no resources otherwise to enable you to undertake your investigation in any except scarcity tracts?—Yes.

6498. It has been in existence only about a year?—Yes.

6499. In answer to Sir Henry Lawrence you said you would be willing to supply the Commission with the possible area that might be covered by these small schemes?—Yes.

6500. How will you arrive at that area?—By going round and seeing from the maps of the cultivable areas where I can put any schemes into operation; that is my idea. I can get a very good idea of the area. I do not say the figures will be accurate, but they will give an idea.

6501. Wherever you have been, have you found a great demand from the people for such schemes?—Great demands.

6502. Are they in a position to tell you whether in their opinion a scheme in such and such a position will be possible?—Yes, they have always got a site, and their ideas are generally quite good. In the vicinity there may be a better site close by, but they have a very good idea of what can be done.

6503. So that from such data also you can collect roughly the information that is being asked for?—Yes.

6504. In calculating the acreage that will be benefited by these schemes, what will you do with regard to tank sites? You bund up the water of a *nullah,* and create a sort of small tank?—Yes.

6505. You do not propose that from that tank water should be given direct?—It depends on the tract.

6506. In your note you say the result will be only to supplement the wells below the *nullah*?—Yes.

6507. In calculating the area that will be benefited, you will have to allow for the area which will be cultivated by the wells which are not useful?—Yes.

6508. There is a demand in all districts; it is not limited to the Deccan; it exists in Gujarat and in Khandesh. Everywhere people want these works to be done?—Everywhere.

6509. You find this demand comes through Taluka Associations, and wherever there are not Taluka Associations people come forward and ask for them?—Even individuals come forward and ask for these works to be done.

6510. You have told the Commission that you have no accurate figures as to the increased produce that cultivators will get under a scheme, just as in the case of the figures you quoted about this experiment in 1908. You are not in a position to give figures for any schemes you may have undertaken?—Not at present.

6511. But have you any indirect way of judging it fairly approximately in the way of the yield of crops?—No. My work is rather between complete irrigation and ordinary monsoon. It is an in-between stage.

6512. But I suggest to you that you can make this calculation fairly roughly by the fact that the cultivators are prepared to give you by agreement so much return on the capital, say 5 per cent. or 6 per cent. on any scheme that you have got. Suppose you spend Rs. 25,000. On that scheme they agree to pay 5 per cent. on the capital as increased land revenue?—Yes, they say they are prepared to pay a certain rate per acre.

6513. They would not be prepared to pay that rate unless they found that the produce obtained by the water received from your scheme would cover, and more than cover, the tax they are prepared to pay to Government?—Certainly not, they would not.

6514. So that that gives you some idea as to the increased produce that will be available to the cultivator?—Yes, the difference between the present ordin-

ary rate and the rate they are prepared to pay gives an idea. But take the scheme at Nadanvadi in the Poona district. There is a scheme proposed there. The irrigation rate in the vicinity of that scheme is Rs. 8 per acre. The people who want that scheme have told me that they are prepared to pay Rs. 12, which gives an idea of the value of water in a scarcity tract.

6515. *Dr. Hyder:* Would this increase of Rs. 4 cover the additional cost?—The scheme is being surveyed now, but I think it is a very good scheme, and I think we should be able to carry it out with the ordinary rate of Rs. 8; I think at Rs. 8 it will be a paying project. But my idea is that we should prepare these surveys and prepare the project, and not ask whether it would pay 5 per cent., but find out what the rate must be to pay Government, say, 3, 4 or 5 per cent. If the people are then willing to pay that amount the scheme can be carried out. The objection, I am afraid, is that the people will naturally say that if they agree to pay Rs. 12 in a tract where the irrigation rate is Rs. 8, the Irrigation Department will raise the ordinary rate from Rs. 8 to Rs. 12 straight away, and I am afraid there will be a great deal of propaganda against it. But certainly there are sites, such as, for instance, Nadanvadi, where they are prepared to pay more than the existing rates to get the water.

6516. *Sir Chunilal Mehta:* Would you also be able to give the Commission a rough estimate of the cost that would be involved in benefiting the acreage that you want to work out?—Not just at present, but I think in the course of another 6 months or a year, I should get a fair idea of the cost of these schemes per district or per thousand square miles or some other unit. I think I can then give a very fair idea of what the cost will be.

6517. *The Raja of Parlakimedi:* Have you got any artesian wells in the Province?—I think in Ahmedabad there are some.

6518. Are there many?—It does not come under my special duty, nor have I had any experience. I have been round with the Boring Executive Engineer and I have only taken a certain amount of passing interest in it, but I cannot possibly give you exact information on the subject.

6519. They are very useful in dry districts, are they not?—Very useful provided they get sweet water; but I understand that is one of the difficulties in Gujarat, that these wells do not always give sweet water.

6520. There is an instrument now in use to indicate where an artesian well can be sunk, something which indicates the water level?—Yes. I believe Major Pogson, the Water Diviner, has an instrument of that kind with which he checks his results. He is trying to find out whether the instrument is really reliable. He has an instrument of that kind, I know.

6521. For carrying out minor irrigation works do you not encourage local contractors to take them up?—At present all my schemes are carried out by the ordinary district agency, either the Public Works Department or the District Local Board.

6522. As a department?—Yes.

6523. Not through contractors?—If the people are willing to carry them out themselves, they are at liberty to do so. Up to the present time I have only had one scheme which a man wanted us to carry out departmentally, although it was his own private work, and he was willing to pay the 24 per cent. establishment and other charges. I think they will undertake some smaller works themselves, but at the present time they certainly prefer the works to be carried out by a recognised agency.

6524. What is the difficulty? Is it because of the lack of organisation or because payment is not made regularly?—I think that one difficulty is payment; and also they have to engage skilled labour. For most of these works some skilled labour is required; usually the village mason, if there is one, is not good enough, and they have to get men from larger centres. I think that is the chief reason.

6525. What about earthwork, special excavation of channels and such other things?—Earthworks they are perfectly prepared to do; but they always need

some advice and help in the alignment. If they are left to do anything of that kind on their own they do not carry it out satisfactorily.

6526. As regards utilising rivers, have you tried to make use of river water by making a cut at high ground, without having a regular embankment?—I am afraid I do not quite follow.

6527. Near a high bank, we can by deep cutting divert the river for irrigation?—Not without some dam across the river to raise the level; otherwise you get such a distance from the river that you probably lose all your water on the way.

6528. Where you have a good supply of water in the river, that has been tried in certain places, has it not?—I do not know of any place in the Bombay Presidency where it has been done; and it could not be done without some dam across the river or *nullah*.

6529. By means of groins across the river a certain portion of the river water can be made to go to your high cutting?—Groins are the equivalent of the dam. Groins are there to raise the level, I presume. I suppose the idea is that the groins would silt up and raise the level to command your land.

6530. *Professor Gangulee:* In surveying the area that would be brought into cultivation, do you think the Department of Agriculture could be of any use or help?—No, I do not think they can; it is entirely an engineering survey.

6531. Can you possibly develop any scheme without some knowledge of soil conditions, the depth of soil, its texture, its fertility, and so on?—For my soaking schemes I know I must have black soil, and two or three feet of it. The ideal conditions for that are that you have black soil with *murum* or something underneath, so that you get the *murum* soil for the site of the dam and the black soil to retain the moisture.

6532. On page 356, with regard to demonstration and propangada, you say there was no special agency to carry out the recommendation put forward by the Land Development Officer. Have you any idea as to what should be the nature of this agency?—My idea is to have a special agency, somewhat similar to the appointment I now hold, but for the same work outside the famine tract. I think, possibly, it might be done by the existing district staff, with an additional man in the district solely for that work, and not linked up with any other work. I am afraid these smaller works are lost sight of in the ordinary district, unless there is a man specially put on to that work.

6533. Are you familiar with the work of Taluka Development Associations?—I had no experience of them until last year, but I have met Taluka Associations in various districts since I took up this appointment. I think they are extremely useful. Where there is one man who possibly has no means of getting to the fountain head, the Taluka Associations come along, and they are most useful in taking me to sites and suggesting sites; but they have got no one to give them technical advice.

6534. None of the organisers of the Taluka Development Associations have technical knowledge?—No. I have met one or two retired engineering men on them. I met one in the Panch Mahals district. Probably there are others, but I did not know they were retired engineering men.

6535. You think that the organisers of these Taluka Development Associations ought to have some sort of training?—I think it would be very useful if on every Taluka Development Association there was a trained man. I do not see why a retired man in the vicinity, who would work on most of those societies, should not be on them.

6536. In other words, without trained men, Taluka Development Associations could not possibly develop in the way one would like to see?—Not in the same way as my department does.

6537. Village water-supply, you rightly point out, is the most urgent need of the rural population. Are there any possibilities of tube-wells?—In most of the villages, if there is a possibility of a well, they have got a well or wells. Where they chiefly want a tank supply is in Gujarat, where their wells are frequently brackish, and they are absolutely dependent on tank supply.

6538. I was referring to tube-wells?—A tube-well merely supplies an ordinary well. I have had application for boring for tube-wells in Gujarat and I think a good deal can be done in that direction.

6539. At present is there an officer to investigate the possibility of tube-wells?—It all comes under the Boring Division and the Agricultural Engineer.

6540. For tube-wells?—Tube-wells, no; I do not think there is any special agency now.

6541. *Mr. Calvert:* Under whom are you working?—The Revenue Department.

6542. To whom do you report?—To the Secretary to Government, Revenue Department.

6543. I cannot quite understand your finance. The example you give shows that you get 240 lbs. per acre of wheat?—Yes.

6544. Do you mean to say that there is land in this Presidency being cultivated which yields only 240 lbs. per acre?—I should think there is a good deal. This is in the scarcity tract, where the rainfall is precarious.

6545. Practically, that is 4 grains return for one of seed. Is that right?—Those are the figures.

6546. Would you let me know, roughly, the cost of the improvement which doubled the outturn? What would it come to per acre?—Rs. 7 per acre.

6547. The whole cost?—Yes.

6548. Do you consider that your work is a business proposition, or just official philanthropy?—The irrigation will be a business proposition, both by the direct and indirect benefit from the schemes. We have got indirect benefit in the famine tract, which can be put against the capital cost, and we also get some direct return from the rates.

6549. There are two methods of finance suggested; one which suggests that you should report on whether the cultivators would pay a rate which would bring in a fair return on the expenditure?—Yes.

6550. Secondly, you suggest *taccavi* loans?—Yes.

6551. Two quite separate methods of finance?—Yes.

6552. Will these schemes then pay interest and sinking fund?—I doubt it.

6553. Your soaked ground returns you about 6 maunds per acre?—Yes, rather more, 8 maunds.

6554. Three maunds, *i.e.*, 240 lbs., per acre could not possibly pay the cost of ploughing and reaping?—That is wheat. The *juar* is 12 maunds against 4.

6555. I am talking about wheat. The net return on your soaked ground on wheat is about Rs. 16 per acre, that is 3 maunds?—Yes.

6556. Do you think that will pay and be a business proposition?—On the wheat alone?

6557. I am taking the wheat?—That 3 maunds is what they have grown in the monsoon. On that they only pay the ordinary rate of Re. 1 per acre, or Rs. 1-4-0.

6558. *Mr. Kamat:* About your soaking schemes, to what length of *nullah* bank approximately can you carry the water inside the fields?—That depends chiefly on the contours. Do you mean as regards the wastage of the water?

6559. No, I mean reaching the water inside the strip on land which you can sow along the *nullah*?—It entirely depends on the contours of the land, whether it will command it. But my idea of soaking schemes is rather that they should be small schemes up to about 20 or possibly 30 acres. The model at the Agricultural Show is for 13 acres.

6560. I want to know the limiting factor, whether the limiting factor in such schemes would be the volume of water in the *nullah* or the high bank, or the difficulty of *bunding*. What would be the limiting factor?—The first thing would be the flow in the *nullah*, the extent of the monsoon flow.

6561. Your first limiting factor is flow?—Yes.

6562. The second is the high bank along the *nullah*?—The second is the amount of level area which you have got that you can command.

6563. Taking these two or three limiting factors into consideration, what would be the approximate area of land which you could sow from ordinary *nullahs* in ordinary villages?—Can you give me a rough idea; 1,000 acres?—It is rather difficult to say what is an average *nullah*; they vary so much.

6564. I want to know the possibilities?—I should think that probably on a *nullah* of about 20 feet width, you may have two or three of these schemes doing 25 to 30 acres each. That is quite a small scale.

6565. That means two or three schemes, each of about 30 acres?—Yes.

6566. So that the utmost you can do, say on a *nullah* of 20 feet width, is about 90 or 100 acres?—Yes, to begin with; it may increase after. At the present time I am only putting one on each *nullah* to begin with; there will be room for expansion.

6567. We may take it then that the average possibility of *nullahs* like this is about 100 acres per *nullah*?—Yes; I should think so, as a very rough figure.

6568. *The Chairman :* I have not fully grasped the figures that you gave to Mr. Calvert. Do I understand rightly that the cost of improvement works out at about Rs. 7 per acre?—That was so in this case. The figures happen to be given here; the cost of the dam was Rs. 197. The dam commands 40 acres which could be cultivated in the same way if they were levelled and bunded, so that the reasonable cost of levelling and bunding a small water course would be Rs. 7 per acre.

6569. *Sir Henry Lawrence :* That is in addition to the Rs. 197?—Yes, I think it is.

6570. *The Chairman :* The increase in yield in return, of wheat, is Rs. 15 per acre per annum. Is that right?—The value of the crops?

6571. The additional value?—Yes, I should think that is about right.

6572. Are you quite sure?—I am afraid I am not quite sure.

6573. I would suggest to you that you might provide the Commission with a statement, giving the figures, as far as you can?—Yes.

6574. *Sir Chunilal Mehta :* Are *tals* under your charge?—Yes.

6575. Are you doing the *tals* now?—Yes.

6576. Or is the Agricultural Department doing them?—The Agricultural Department are only doing small things in the way of *wads*, much smaller things. I am only taking up more systems of *tals* to cover a greater area; the Agricultural Department are taking up the smaller agricultural schemes; they deal more with the individual man.

6577. Have you done any *tals* yet?—I have not actually done any, but I have got one scheme now in Sholapur.

6578. These *tals* cost very much less than your other schemes like *bunding* and so on?—About the same as the *bunding;* they cost much less than tanks.

6579. I meant tanks. *Tals* would cover a big area. They would be included in the returns that you propose to send to the Commission? They are under separate heads?—Yes.

6580. *Sir Ganga Ram :* Have you any principle on which you give a quantity of water to zamindars? That is to say, supposing a village has 1,000 acres, how much water would you give them? Are you in charge of any irrigation schemes?—Only minor irrigation works. I do not run them.

6581. Do you lay down any principle as to how much water a zamindar is to get?—No, I simply work out the contents of my tank to supply so many acres. That is to get an idea.

6582. How much water per 1,000 acres?—150 acres per cusec for *rabi*, or, if it is contents, 12 acres to the million cubic feet.

6583. One hundred and fifty for *rabi*?—Yes.

6584. What is it for *kharif*?—I do not deal in *kharif*; my schemes are all *rabi* schemes.

6585. But as an Irrigation Officer, what is the duty for *kharif*?—I am afraid I cannot give it you; it varies a great deal; I am afraid I cannot give you the duty for the *kharif* off-hand.

6586. We get 500 acres out of one cusec for *rabi*?—I am taking 150 at the present time.

6587. *Sir Henry Lawrence:* Have you got the figures for the assessment of that area which was producing 240 lbs. of *rabi* wheat?—No, I am afraid I have not.

6588. What is the average rate of assessment?—I should think about Rs. 1-4-0.

6589. The outturn of the land is very poor unless it is assisted by soakage?—Yes.

6590. You are speaking of the taluka of Rahuri and the average dry crop assessment there is about five annas?—I do not know.

Sir Chunilal Mehta: It varies from 4 to 6 annas.

6591. *Sir Henry Lawrence :* If you introduce your scheme, does the assessment go up?—Yes, the assessment will go up, but it cannot go up till the next settlement.

6592. It will not go up in consequence of the improvement?—Not unless they are prepared to pay voluntarily; it will be a voluntary agreement.

6593. It would be a voluntary agreement?—That is my difficulty at the present time, how these schemes are to pay.

6594. Unless there is a voluntary agreement there can be no increase in Government assessment?—No.

6595. And if there is a voluntary agreement, how long does it last? Until the next assessment?—Yes, I suppose it would be until the next assessment, and then either continue the voluntary contribution, or pay more assessment. But the voluntary contribution would probably be greater than the increased assessment.

6596. There is the alternative of either assessing the tax according to the voluntary agreement, or embodying it in the raised assessment?—Yes, there is the option.

6597. You do not know which plan is to be adopted?—It has not been fixed yet how it is to be done. I am taking agreements from these people that they are prepared to pay a certain amount extra.

(The witness withdrew.)

Mr. S. S. SALIMATH, B.Ag., Deputy Director of Agriculture, S.D., Dharwar, Bombay Presidency.

Replies to the Questionnaire.

QUESTION 2.—AGRICULTURAL EDUCATION.—Education given at present in ordinary schools is not helping agriculture which is the basic industry of India. The atmosphere created by the teachers and other literary people, in rural areas of my division, is anything but agricultural development. In addition to reading and writing, education given in rural areas must be mainly agricultural.

In the Southern Division of the Bombay Presidency, Agricultural Education was started with a vernacular agricultural school at Devihosur in Dharwar district. About 150 boys have received training during the last 12 years and it is gratifying to note that 60 per cent. of the boys have gone back to their farms. Some students have done very well and have created good impression in their villages. Their farms serve us as good demonstrations. For the last three years, we have been receiving applications numbering to 100, while we can take only 15 to 20. A genuine demand for such schools has been created one for Belgaum and the other for the Bijapur district. The District Local Boards are taking interest in the matter. Recently we have some agricultural bias schools started and they too are attracting the attention of the cultivators. I have observed however that the short period training, which the teachers are given as a temporary measure at present in Devihosur school for ten months, is not enough. A separate vernacular agricultural training college is a need.

With one vernacular agricultural school of the type at Devihosur for each district and a vernacular training college for each district and a vernacular training college for each linguistic division for training teachers to the agricultural bias schools, I hope we can show considerable progress.

My replies to specific questions are:—

(*i*) Supply of teachers to vernacular agricultural schools to be limited to one at present for each district is sufficient; but for agricultural bias schools—we must train a number of teachers by specially starting a training college for each linguistic division.

(*ii*) No remarks.

(*iii*) Yes; the teachers in the rural areas should be drawn from the agricultural classes. They are more practical and may prove more successful with the training given to them.

(*iv*) The attendance both in the vernacular agricultural school at Devihosur and the bias schools is good.

(*v*) No remarks.

(*vi*) Yes; the pupils in those two kinds of schools are mainly drawn from the agricultural classes.

(*vii*) No; not at present.

(*viii*) Nature study is rather very much neglected and we should have it in all the primary schools. Natural liking for field work is the main incentive. The gift of the produce raised by them to the students should also be a good incentive. In agricultural bias schools we have one acre schoolplots and these are enough. We have a regular farm attached to the vernacular school and it is necessary.

(*ix*) Majority of the students who have passed out from the vernacular agricultural school at Devihosur have gone back to their fields and have created good impressions on the minds of their parents and the surrounding cultivators. The students from agricultural bias schools have not yet gone out.

(*x*) No remarks.

(*xi*) The students trained in Devihosur school are given facilities to be trained further on Government farms in special subjects.

(*xii*) Night-schools with the aid of the magic lanterns and temporary slack season classes are likely to popularise adult education in rural tracts. I have no actual experience however in the matter.

(*xiii*) I have only one suggestion to make. The funds available for education must in greater proportion be devoted to agricultural bias schools and the training of teachers for such schools. These agricultural bias schools are now in the hands of the Local Boards and I suggest that Government in giving grant to primary education should show some preference to these schools.

QUESTION 3.—DEMONSTRATIONS AND PROPAGANDA.—(*a*) Successful measures for influencing and improving the practice of cultivators are:—

(1) Good social and practical demonstrators who can easily win the confidence of the cultivators and can work and live with them when needed. They should be carefully selected for the purpose and trained to do their work.

(2) Selection of progressive farmers in the country for demonstrating agricultural improvements on their farms and continuous touch with them.

(3) Good advertisement of the demonstrations especially through the leading cultivators whose confidence the demonstrators have won.

(4) Creation of sympathy with the Revenue Officers to lead or send parties of cultivators to the demonstrations, if the Revenue authorities take interest in agricultural propaganda the progress will be more rapid.

(5) Arrangements for light refreshments at the time of demonstration with the aid of local subscriptions and Government grant to a certain extent.

(6) Organisation of finance where needed for introducing the improvements suggested.

It is not enough in many cases if we simply explain and demonstrate that a certain thing is good. It may not be within the easy reach of the individual cultivator and we shall have to work for co-operation in the village and often times seek for outside help from the Bank. A propaganda man ought to be the economical student of the tract and a good organiser too.

(*b*) Model demonstration fields of cultivators in different tracts with all agricultural improvements effected by the Agricultural Department to be seen and with simple farm accounts kept there will, I think, be more effective. This requires some Government subsidy to start with.

(*c*) To induce cultivators to adopt expert advice, intensive propaganda is what is needed. The agency of the Agricultural Department is too small to carry it. Sound local unofficial organisations must fill in the gap with Government subsidies. Taluka Development Associations planned by Sir Chunilal V. Mehta are being established for the purpose. Many such associations formed have good programmes of work before them, and they are keen on executing them. Want of funds and dearth of trained fieldmen are the two short-comings at present and it is hoped that we shall be able to overcome them soon. Under the existing rules of the Taluka Development Association, the cultivators of a Taluka are required to raise annually an amount of subscription equal to that to be given by the Government not exceeding Rs. 1,000. It is difficult to raise voluntary subscriptions for propaganda work every year. A few Local Boards are now coming forth with the aid, I fell it necessary, however, to raise permanent funds in years of good harvest which will yield an interest of Rs. 1,000. The idea

is appreciated by cultivators in many talukas and they are willing to give their subscription at the time of assessment in good years. The question of collecting these subscriptions by the village officers have engaged our attention. In Haveri taluka of the Dharwar district a sum of Rs. 10,000 has been collected through the help of an enthusiastic *mamlatdar* in one year and further collections are still in progress. Three other talukas are also attempting in this direction. The burden of subscription on the cultivators under this method is very light and the system needs encouragement from the revenue authorities. As regards good fieldmen for such associations, I feel, selection of candidates and periodical training classes ought to remove our difficulty.

(*d*) Success or failure of demonstrations and propaganda depends on:—

(1) A thorough study of the need of a particular item of demonstration in different localities. A thing which is successful in one locality may not be so in another. I will illustrate this by an instance. The Nahan sugarcane crushing mill gives more extraction than Poona mill, but being smaller the output is less. It was successfully demonstrated in the Mallad tract of my division where bullocks are small and the extraction of juice and the method of *gul* making is slow. The cane growers boil only 3,000 to 4,000 lbs. of juice a day. The Nahan mill gives more extraction and keeps pace with the slow method of *gul* making prevailing there. The advantages were clear and the mill soon became popular. It has now altogether ousted the Poona mill in that tract. In Chikodi taluka, however, the demonstration of Nahan mill was unsuccessful. The cane growers of this tract boil their juice more quickly usually 9,000 lbs., a day and the Nahan mill though it gives more extraction, cannot keep pace with quick boiling. Under the system of labour prevailing there for *gul* making, the gain by extraction from the Nahan mill is not commensurate with loss in the form of labour. The detailed study of the local methods, therefore, is essential before a thing is demonstrated.

(2) Arrangement and advertisement of the demonstration, I know, in many a case where attention was not paid to this, the demonstrations were unsuccessful.

(3) Continuity of demonstration and propaganda. This is essential. Hurried short-time demonstrations have not been successful. If the things demonstrated are removed soon and are not shown until they are fully appreciated, there will be no progress.

(4) Certain items of demonstration and propaganda need co-operative organisation in villages. If this is not done, the propaganda is not successful. Fencing fields with stone-wall or woven fence against wild pigs is an instance.

It does not pay individual cultivators to fence their areas except for sugarcane cultivator, while it does very well to fence large areas even for ordinary crops. Village co-operation has played a very important part on this propaganda in the Southern Division, and we have now 30 miles wall erected to protect an area of about 11,000 acres. The cost of fencing per head is very small when compared with advantages derived from it. The extension of the propaganda on this item of agricultural improvement has large scope; but it depends entirely on co-operative organisation.

QUESTION 5.—FINANCE.—(*a*) In the dry tract finance for ordinary annual agricultural operations is not much needed. For land improvement, however, in the form of field embankments, removal of deep rooted weeds like *hariali* (*cyperus rotundus*), well sinking, etc., it is very much needed. Short-term credit should be very limited so that it will not be misutilised. The co-operative credit societies which are working in the interest of the

cultivator should be very particular about this point. Long-term credit should be arranged by Government *taccavi* loans.

(*b*) *Taccavi* loans should be given from time to time after due inspection of the works and not at once into the hands of the cultivators. In the case of field embankment where some expert advice is also needed, it is better to organise a scheme of work through the agricultural departmental agency. The *bunding* officer with a set of workers under him can prepare plans and inspect works at the same time and see whether they are executed according to the plans prepared. This will not only mean fuller use of the *taccavi* loans issued to the cultivators but also mean better kind of work in the fields which ensures safe repayments. Funds available may be allotted to different Divisions of the Presidency and drawn from Local Government Treasury from time to time by the applicants on the recommendation of the experts in charge of those works. At the suggestion of the Honourable Sir C. V. Mehta I have submitted a scheme to the Director on this line on field embankment work in the Southern Division which is under consideration.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) The main causes of borrowing are:—

(*i*) Poor harvest of crops owing to want of rains.

(*ii*) High competitive rental values of lands followed by sudden fall in prices of cotton.

(*iii*) Expenditure beyond means especially for marriages.

(*iv*) Litigation.

The causes mentioned in (1) above are also the reasons preventing repayment. Taking a series of years farming in the dry tract means mere maintenance to the tenant holders. The majority of the cultivators own small areas of their own and take the rest on lease sufficient for cultivation by a pair of bullocks. My general observations are that peasant proprietor who owns sufficient area for a pair of bullocks or more and cultivates it himself is a progressive farmer. In the case of tenant holders the margin of profits in agriculture is so small that he easily runs into a debt in bad years and once he incurs debt it is very difficult for him to extricate himself from it. The usurious rate of interest charged by the *sowcar* makes matters worse. The debt increases and he will have to sell the piece of land that he owns and turn into a labourer. I have also observed that litigation and expenditure beyond means for marriages will run many cultivators into debt. The cultivator is not generally willing to sell his land until he is forced to do it. He is therefore always to be found in debt.

(*b*) The application of the Usurious Loans Act may help cultivators to a certain extent. But the real remedy should lie in making agriculture more paying and this can only be done by reduction in the rental values of the land. The rental values depend more or less on the sale values of the land. I have observed that lands are being purchased by absentee landlords to a great extent. They earn money from other professions and invest it into lands at any cost. To discourage absentee landlordship either by law or by other means may go a long way to help the matter. Encouragement to the formation of either co-operative societies or joint-stock companies to establish local industries will also be able to help it.

(*c*) I have already explained elsewhere that the land-owning cultivator is not inclined to sell his land unless he is forced to do it. The question of limiting the right of sale therefore is not very important. Limiting the right of mortgage however may help him. For current expenses cultivator should not be allowed to incur a debt exceeding one-fifth of the market value of the land he possesses. Loans for more than this amount should be only for land improvement; but they should be long-term loans.

Either the Government or credit societies or the moneylender should be interested in seeing that improvement for which loans are issued are effected. I have only placed some of my views on the subject but the question of legalising the measures needs more detailed consideration.

QUESTION 8.—IRRIGATION.—(*a*) (*i*) In the districts of Dharwar, Belgaum and Bijapur there seems to be scope for extension of canals by *bunding* rivers and *nallas*. The scope for extension of non-perennial canals by *bunding* *nallas* seems to be more. A good survey is what is needed.

(*ii*) In the Malnad taluka of Dharwar and Belgaum districts there is large scope for extension of tanks and ponds. Good many of the existing tanks also need repairs and improvements. They are silted up and do not hold so much water as they used to do. Paddy crop of this tract mainly depends upon these tanks and all possible efforts to improve the existing tanks and to increase the number, will be greatly appreciated by the cultivators of this tract. There is more scope for extension of economic wells in the transition tract than either in Malnad above referred to or in Yerinad where deep black cotton soil prevails.

In case of *bunding* up *nallas* and construction of communal tanks, State aid and co-operation should play their part. No private individual or company has yet undertaken any irrigation schemes. I suggest that the State should take up as many schemes as possible and should in other cases encourage formation of co-operative irrigation societies by granting long-term *taccavi* loans usually 25 years but extending to 40 in deserving cases. In case of wells and individual ponds too, long-term *taccavi* loans are what are needed.

QUESTION 9.—SOILS.—(*a*) (*iii*) For the prevention of the erosion of the surface soil by flood water, field embankments on contour lines are what are needed. In the Southern Division we have a special officer appointed to prepare schemes for the applicants. The departmental services to the cultivators in this respect have been much appreciated and the demand for advice is much increasing especially in the Bijapur district where rainfall is scanty but in a few heavy showers. Much of the rain that falls rolls down and is not only lost to the cultivator, but it takes along with it silt from the surface soil and forms *gullies* and *nallas* as it runs. In tracts of dry farming the land forms the major part of the capital and if it is not well protected against washings, a rapid deterioration sets in. If the small *nallas* are not protected by effective bunds, they soon grow wider and deeper especially in the black cotton soil and their beds become unfit for cultivation. The cultivators who neglect or fail to remedy them in time, soon find themselves in despair. Walking along the slopes of extensive black cotton soil tract in the Southern Division, one can easily observe the damage done by these *gullies* on a number of holdings owned in particular by the absentee landlords. A general survey of the tract cannot but reveal the paramount need of field embankments on an extensive scale. To carry on this work, extended technical advice and long-term loans are what are needed.

(*c*) In the Malnad talukas of the Dharwar and Belgaum districts, a good deal of cultivable land has gone out of cultivation owing to the attack from wild pigs and prevalence of malaria. On close study of the problem I feel that the reason for depopulation here is mainly the attack from the wild pigs. Malaria did exist as it does at present; but due to the increased attack from wild pigs, the cultivator is required to watch his crops at night time and in so doing he has lost health and has no stamina to stand malaria or any other disease. With the decreasing population and the increased attack of the pigs, many lands, especially near the forests, have gone out of cultivation and the people have forfeited their fields. Protection against the pigs will greatly help to solve the problem. To quote an instance the Hulihond village with 351 acres of land was fenced in 1924 with a stone wall, at the time of fenching only 90 acres of land was

under cultivation. After fencing almost all the cultivable land uncultivated (236 acres) has been brought under cultivation with great benefits.

QUESTION 10.—FERTILISERS.—(*a*) In irrigated tract I feel great use of both the natural manures and artificial fertilisers could be profitably made: but in the dry tract, I think, only natural manures have a large scope. Artificial fertilisers have not been of much use. Improvement is possible in the following directions:—

(*i*) Better preservation of farm yard manure which is the commonest natural manure.

(*ii*) Green manuring in the irrigated fields and in the transition tract where early monsoon rainfall is sufficient. In Chikodi taluka of the Belgaum district *sann* green manuring is a general practice in dry farming, where the rainfall is 32″ and where *juar*, gram after *sann* green manuring and tobacco are rotated.

(*iii*) In many villages prickly pear is found in abundance in waste lands and there seems to be some scope for turning this product into a natural manure.

(*iv*) Ammonium sulphate has been found to be a very useful top dressing artificial manure for sugarcane, bonemeal to a paddy crop, and cake manure to paddy and sugarcane crops, other artificial manures are yet under trial.

(*b*) Giving licenses to dealers and inspection of the stuff they stock is one of the measures. The second would be to allow free trade but make dealers subject to a penalty in cases of fraudulent adulteration. This measure also needs occasional inspection and the analysis of the stuff they stock.

(*c*) Field demonstrations through the District Staff of the Agricultural Department and through the Taluka Development Associations would be the proper methods to popularise new and improved fertilisers and they have been so in the past. The manufacturers and the dealers should, I think, give new fertilisers for trial free of cost for some time.

(*d*) I have observed the use of the following manures to a considerable extent in recent years in places shown against them:—

Ammonium sulphate and cake manure	Chikodi and Hukeri talukas and in Gokak canal tract in the Belgaum district.
Bonemeal	Khanapur taluka of the Belgaum district.
Natural farm yard manure . .	All over the transition and the Malnad tract, especially at and round Hulkoti in Gadag taluka of the Dharwar district.
Sann green manuring . . .	Chikodi taluka of the Belgaum district.

(*e*) Various artificial manures were tried on the Dharwar farm to dry crops like *juar*, wheat, and cotton and they have not been found to be paying in the past. On Gokak irrigated farm a mixture of cake and ammonium sulphate has been found to be the best.

(*f*) The relative importance of cowdung as a manure is being understood by the cultivators; but it is a question of the substitute of a cheap fuel in its place. In the Malnad adjoining the forest lands, wood can be had very cheap. In the transition tract the existing supply of the cotton stalks seems to be insufficient and needs supplementing. The cost of jungle wood from forest areas becomes prohibitive due to the transit expenses. Railway concession to *bonâ fide* agriculturists through Taluka Development Associations may help to solve the problem to a certain extent.

QUESTION 11.—CROPS.—(*a*) (*i*) Cotton, *juar*, wheat, paddy and tobacco are the main crops of the Southern Division. Plant-breeding work is in progress at Dharwar on cotton, *juar* and rice. In cotton, we have two varieties Kumpta and Dharwar American. In both these varieties, we have two strains selected, called selected Kumpta or Dharwar No. 1 and upland or Gadag No. 1. Each of these two strains has covered an area of about two lakhs acres (one lakh from pedigree seed and one lakh from the market seed). The estimated extra profits derived by growing Dharwar No. 1 and Gadag No. 1 cottons are Rs. 5 and Rs. 7 per acre respectively. Attempts to cover the whole cotton area with selected strains and schemes for multiplication of the pedigree seed are being contemplated. Selection in principal varieties of *juar* and rice which are the staple food crops of the division is in progress. We have just given out some selected strains and they are yet to be tested on field scale. Similar work on wheat and tobacco is necessary.

(*ii*) Ground-nut (Spanish pea-nut variety) is a most paying crop that has been introduced on the red and reddish black soils of the transition tract in the Southern Division. Its cultivation is extending. The crop was introduced in 1917-18 and in 1924-25 the area under this crop has been 11,416 acres in Dharwar district alone. It competes well with cotton under its present prices. On *mal* lands (poor red soils) the benefit derived by cultivators has been immense. Ground-nut is grown in place of inferior millets on these lands. Growing crops specially for the fodder has not been taken to and is not likely to be adopted for the cultivators except in the irrigated tract of the taluka of Chikodi.

(*iii*) Good improved cotton seed is the only seed which demands organised distribution on a large scale. In other crops cultivators keep their own good seed to a great extent. Seed cotton generally comes to the market centres for sale where it is ginned. The seed in these gins gets mixed and will be inferior in quality. In the case of our selected strains we sell certain number of flowers every year and multiply the seed in the second generation on one acre and in the third generation on thirty acres under strict control on the Governmet farm, we distribute the seed in the fourth generation to seed growers in a block of 600 to 800 acres and in the fifth generation in a block of 5,000 acres. The produce of this is sold through the Sale Societies, ginned separately and the seeds stocked in these societies for general distribution in the sixth generation. Produce from the crop of this sixth generation is not taken back for seed purposes. This organisation of seed multiplication is to prevent deterioration by natural crossing and by accidental mixture. The Sale Societies open their depôts and distribute the general seed. The method has been appreciated by cultivators.

(*iv*) Pig and deer are the only wild animals which damage the crops to a great extent in the Southern Division (pigs in the western paddy tract and deer in the eastern dry cotton tract). I have dealt with fencing against pigs in my answer to the question 9.

(*c*) Organisation of hunting parties is also considered to be a remedy and is under contemplation at Dharwar.

QUESTION 12.—CULTIVATION.—(*i*) The iron plough has now come to be used instead of the wooden one, and does better preliminary tillage. Owing to want of good bullocks some cultivators have not yet taken to its use. Demonstration of motor tractor is attracting the attention of the cultivators and seems to have scope for improvement in the existing system of tillage. The disc harrow for sugarcane cultivation is also useful.

(*ii*) The system of growing ground-nut and cotton in rows has been successful in Haveri taluka. Maize with *tur* as a row-crop has succeeded in the Gokak canal tract in place of maize after maize. *Juar* after lucerne and ground-nut is better than *juar* after cotton. Considering from many points of view a three-year rotation wheat, *juar*, cotton or ground-nut, *juar*, cotton is better than two-year rotation *juar*-cotton.

QUESTION 14.—IMPLEMENTS.—(*b*) A network of demonstrations preferably through Taluka Development Associations and facilities for getting improved implements on hire are what are needed to hasten their adoption by the cultivators. The Taluka Development Associations should better keep them both for sale and on hire to start with. When the demand increases they may start special co-operative agricultural requisite societies for the purpose.

(*c*) The two manufacturers of iron ploughs, namely, Messrs. Kirloskar Brothers and Khan Bahadur Cooper, manufacture iron ploughs on a large scale. They have been doing their own propaganda to a certain extent in carrying out their sales. I suggest that they should better deal through the Taluka Development Associations where they exist. They will undertake to demonstrate their implements and act as their agents.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*a*) In the Malnad tract an average cultivator works on his field about two hundred days in a year, in Gadinad 240 days, and in Yerinad 150 days. The Malnad cultivator generally goes to forest work either for cutting or carting wood. In Gadinad and Yerinad the cultivators round cities and railway stations generally engage themselves with their bullocks in carting goods; but in the interior the slack season is much wasted.

(*b*) Spinning and weaving ought to form the general bye-industry in the country. Rural weaving classes seem to be the right aid to be given by the Government. I know a school is working at Ibrahimpur in the taluka of Navalgund, district Dharwar, a dry tract subject to famine where much of the spare time is wasted. Out of 9 students trained for the last four months, 7 have already purchased fly shuttle looms. Many of the villagers have promised to learn weaving and are very anxious that the school should be continued there until the demand is fully met. I give this only as an instance to show the possibilities of hand-weaving if a right sort of propaganda is done on it. Most of the cloth worn by the cultivators is coarse which they can prepare themselves. Organisation of the sale of the surplus produce, however, is a matter of much importance and should be arranged. The other possible bye-industry on a large scale is poultry breeding especially among the non-vegetarian cultivators. This seems to be a very hopeful bye-industry, but caste prejudices seem to come in the way. It needs encouragement, however, among the people who are willing to take to it.

Fruit growing needs irrigation facilities which do not generally exist in the dry tract. Hence this is not a possible bye-industry.

Sericulture, I feel, requires cool climate and has a limited scope in the Southern Division.

Pisciculture has also to meet caste prejudices.

Rope making is possible and is being done. It needs extension.

Basket making I feel, is a specialised subject and cannot be handled by the average cultivators.

(*d*) I think that the Government should give help in the form of technical advice in establishing these industries in rural areas and with long-term loans to co-operative societies if they are organised to establish such industries.

(*e*) Yes. The best method of encouraging industrial concerns in rural areas is to form co-operative societies by the producers of raw materials themselves.

(*f*) Yes. A more intensive study is needed, but before it is attempted the available information from the persons interested should be collected.

(*g*) Field embankment by the cultivators themselves at their spare time with small *taccavi* advances to meet their maintenance is likely to go a long way towards greater rural employment and ultimate greater production from the land.

(*b*) Propaganda and the organisation of local sanitary committee will induce the villagers to devote their spare time in improving the health condition of their environment.

QUESTION 18.—AGRICULTURAL LABOUR.—(*a*) A propaganda to induce labourers of fair means to go and settle in areas where the cultivable land remains uncultivated is likely to succeed if the occupancy of these lands is given free to them under certain conditions and if co-operative farming societies are organised.

(*b*) There is shortage of agricultural labour only at the time of harvest, as the harvests of various crops in a tract come together. Change of crops under the existing conditions of the rainfall is not generally possible. Suitable harvesting and threshing machines are in demand by the cultivators; but they have not yet been found out.

QUESTION 22.—CO-OPERATION.—(*b*) I have the following observations to make upon:—

(*i*) Credit societies—many members who take loans do not use them for the purpose for which they take. The progress of the movement from the point of agricultural development is therefore not in any way marked, though in some other directions it has done exceedingly well. The Managing Committee of the society, the Inspector of the Bank and the Government Auditor should be very particular in making thorough enquiries about this point and it should be an essential point in audit classification of the societies.

(*iii*) Hubli and Gadag Cotton Sale Societies have done well in the Southern Division. Distribution of good pure seed of selected types of cotton, grading *kapas* and auction sales which bring better prices to the cultivators are the main causes of their success.

The Agricultural Department works with these Sale Societies in multiplying good pure seed and an Agricultural officer does grading work in each of these societies.

(*iv*) There seems to be a large scope for fencing societies in the western and for bunding societies in the eastern tracts of my division. Fence and field embankments have appealed more than anything else to the cultivators. Eight fencing schemes with stone walls have already been executed and about 30 miles walls have already been built to protect about 11,000 acres. A few schemes are complete enclosures, while others have walls only along the hills. I give below the details of two schemes (one complete enclosure the cost of which is the highest of all and the other with wall along the hills the cost of which is the least).

No.	Name of the village.	Area protected.	Total length of the wall.	Dimensions of the wall.			Total cost of construction.	Increase in cropped area.	Approximate extra profit per year.
		Acres.	Miles.	Ft.	Ft.	Ft.	Rs.	Acres.	Rs.
1	Hulihond	351	3·37	4½	3	1½	7,103	236	4,335
2	Dhunbad Kurnakop.	2,482	3·29	4½	3	1½	4,765	100	5,875

These figures may interest the Royal Commission. The cost in both cases is very little when compared with benefits derived. In the case of linear walls along the hills which cost less, the adjoining villages will have to carry on the wall and in fact applications to that effect are coming forth.

Extension of co-operative fencing is not as rapid as it ought to be owing to the following reasons:—

(1) Cultivators of Malnad are poor and many of them are not in a position to pay one-eighth of the cost of fencing which they are required to collect before they can approach Government for *taccavi* loan. In most cases I have observed that cultivators borrow for this purpose.

(2) Some obstinate absentee landlords refuse to join the scheme thinking that they would be benefited if others carry on the work. There will be considerable delay in inducing these recalcitrant owners and taking their signatures for consent. A few good schemes are pending for the last two years for this very reason and the part of the money collected has been deposited in the Banks.

(*vi*) There seems to be scope for co-operative use of motor tractors, power cane-crushers and rice-hulling machines in the Southern Division and attempts are being made to start societies for the purpose.

(*viii*) Cattle breeding societies are making fair progress in Hirekerur taluka of the Dharwar district. This taluka borders on Mysore territory and the cultivators have appreciated the value of Amrit Mahal bulls. Castration of mongrels in villages where societies have been started and prompt veterinary aid need more attention.

(*c*) From my long personal experience in connection with formation of fencing societies I feel legislation to compel minority to join for the common benefit is badly needed. If 80 per cent. of the people consent, the other 20 per cent. should be compelled.

(*d*) I feel fencing societies, sale societies and cattle-breeding societies have in the main achieved their object.

QUESTION 23.—GENERAL EDUCATION.—(*a*) The existing system of general education has not in any way improved agricultural efficiency of the people; but on the contrary it has acted adversely on it. The educated man dislikes manual field work and does not think about the agricultural development of his own lands and far less about his village or tract. As a demonstrator and propagandist I am required to meet local educated people of the country who possess the lands and I have not received any appreciable response from them with a few honourable exceptions. They silently direct the argicultural demonstrator to their ryots and state that they do not know anything about the subject which we wish to interest them in. These educated landowners are however leaders of rural areas and the demonstrator is required to work through them in many cases. It is really a difficult task to do it. If the educated leading landowners possess fair agricultural knowledge and take interest in the subject the progress, I am sure, will be more rapid. I have a few suggestions to make:—

(1) Elementary school education in rural areas should have agricultural bias from the fifth standard and the schools should have their long usual vacations at the time of harvest instead of at any other time.

(2) Agriculture should be a compulsory subject in middle and high schools and text-books prescribed for various classes.

(3) Agriculture and rural economics should be an optional subject in all the Arts Colleges.

This will mean that majority of the educated men will be interested in agriculture and begin to think about its development. Many of the students who go to Agricultural College at present have very little grounding in the subject of agriculture and the knowledge and practice they get in three years is also very limited. Some students do come from the agricultural classes but they too have no touch with the subject in high schools.

The students that pass out from the Agricultural College are after all very limited in number and form a small minority among the educated men of the country.

(*b*) (*iii*) In the rural areas of the Southern Division many of the primary schools are only up to the third standard. Full primary schools are for a group of villages. The cultivators are not inclined to send their small children from villages to villages and it is mainly for this reason that the proportion of the boys who pass through the fourth class is smaller. The second reason is that cultivators depend upon their children for field work from the very tenth year of their age. A taste for education is being created however in rural areas and a right sort of education with agricultural bias is really what is needed.

QUESTION 24.—ATTRACTING CAPITAL.—(*a*) As far as I now observe, men of capital and enterprise do not generally possess the necessary interest and knowledge in agriculture. If they take to it without the requisite knowledge, they will have to depend entirely on the servants and I am afraid they are likely to fail. Agriculture requires strong technical personal supervision if it is to be conducted through servants. Our elders in rural areas did it but their sons with the present education have abandoned it. I know many families which were once engaged in agriculture have now leased out their lands. General education with agricultural bias discussed in question 23 will, I think, solve the situation.

(*b*) Absentee landownership and annual rental system instead of long term leases are the main factors tending to discourage land improvement. Some of the landlords have not even seen their lands and are letting them out through their clerks or some middle men.

QUESTION 25.—WELFARE OF RURAL POPULATION.—(*a*) Good drinking water-supply both for men and cattle is a need in many villages and deserves attention. There are many other items which need similar attention but where is the money? Poverty is dominant and it is mainly the result of ignorance.

Village school ought to be the centre for enlightenment in rural areas and it must be a right kind of school. This school should in fact be a reference to the villagers for the solution of almost all their difficulties in the form of advice.

(*b*) I am in favour of Government conducting economic surveys in typical villages through experts who should work with the local committees. The committees with these experts should consider and draft the method of enquiry suited to different tracts and subject it to the public criticism before any actual enquiry is undertaken.

(*c*) My intensive statistic study in two villages is still in progress but from my intimate knowledge of the people and their problems in the rural areas of the Southern Division I have the following observations to make:—

In the western paddy tract, protection against wild pig, co-operative rice-hulling machines, co-operative tank irrigation schemes and good drinking water-supply will improve the condition of ryots a good deal. In the eastern dry tract, field embankments, co-operative cotton ginning and oil pressing industries and weaving as a cottage industry will do the same.

To add to this free and compulsory education with agricultural bias in rural areas is likely to hasten the rural development. Organisation of funds for all these purposes should engage the attention of all the sympathetic leaders of the country.

Oral Evidence.

6598. *The Chairman:* Mr. Salimath, you are Deputy Director of Agriculture in the Southern Division, at Dharwar?—Yes.

6599. You have prepared for the Commission a very interesting note of the evidence which you wish to lay before us, and we are very much obliged to you. Would you like to proceed at once to question and answer, or have you anything in general to say?—I have no general statement to make.

6600. There are just one or two points that I should like to clear up. Your statement is very complete, and conveys your meaning with great clarity. Would you turn to page 371? What is your experience of the efficiency of Local Boards as bodies responsible for education?—I am sorry I have not got much touch with the Local Boards.

6601. Have you any views as to their efficiency as directing agents for education?—The members come from rural areas, and of course they have got some influence in the tract. They can influence the rural areas towards these bias schools.

6602. I see that on page 373, amongst the reasons for agricultural indebtedness, you give the uncertainties of the monsoon season first place as one of the reasons for agricultural indebtedness?—Yes.

6603. Would you turn to page 374? I see there that you link the damage by wild pigs in a particular district with the incidence of malaria in a very interesting way. I take it your view is that the night watching, which is necessary in an area where damage by wild pig is very prevalent, exposes the villagers to infection by malaria?—Yes, I hold that opinion; it makes them more susceptible.

6604. The effect of these two factors in the particular district has been to bring about a considerable measure of depopulation, has it not?—Yes.

6605. Then you give a very interesting example of the extent to which fencing is capable of mitigating this evil?—Yes.

6606. Do you think the desire to fence land is spreading; do you think the cultivators are paying more attention to the possibilities of protection by enclosure?—It is spreading very much.

6607. What has turned your mind towards the possibility of utilising prickly pear as manure?—It grows on a very large scale in almost all villages, just in the village sites. To convert it into manure it is cut and put into a pit; but it does not rot well, and we shall have to find out how to make it rot quickly and then apply it.

6608. It is very tough and does not rot very easily?—No.

6609. Have you ever come across any indigenous practice of this sort? Have you ever known cases where the villagers have done it?—I know in two instances the people attempted to turn cactus and prickly pear into manure.

6610. What happened?—They got an advantage to a certain extent; they had to rot it for two years, after burning it.

6611. Burning in order to remove the prickles, is that it?—Yes.

6612. Why is it necessary to remove the prickles in the case of manure? —Otherwise, the prickles will remain as they are, and in the fields they will inconvenience the cultivators.

6613. So that what they do is to singe it, just as they do before pulverising it for fodder in the fodder famine period?—Yes.

6614. The prickles were removed and the spineless leaves put into the pit and left there for two years?—Yes.

6615. Was any cowdung or other agent put in with it?—No.

6616. On page 377 you give figures as to the average periods of annual unemployment of the cultivators?—Yes.

6617. How did you arrive at those figures?—By taking each tract separately, and enquiring of the cultivators. Of course, I have done it twice in different areas, taking the days month by month and aggregating the whole during the year.

6618. How do you account for the extraordinary difference between district and district?—In the Malnad tract, generally they take two crops; that is why they work more than in the eastern dry tract, where of course they take only the *rabi* crop. Similarly, in the transition tract the working days are more.

6619. Do you say that the figures that you have given are accurate?—So far as I could make them, because I have actually worked them out.

6620. You think they are reasonably accurate?—Fairly reasonably so.

6621. Is co-operation making any headway in the district with which you are familiar?—In connection with fencing and in connection with cotton sale it is progressing in the Southern Division.

6622. Is it very difficult to organise villagers on a co-operative basis for the purpose of enclosing crop land and fencing?—We experience some difficulty. Especially, some of the absentee landlords are not willing to help and then the schemes take a very long time; of course, that is one of our difficulties.

6623. I suppose there is no objection other than the cost; that is the only reason why an individual stands out of these schemes; they do not want to pay?—It is not only the cost. Some of the absentee landlords do not come in, though the cost is fairly low. As I have shown in the second instance, the cost per acre has not exceeded Rs. 2, where one wall along the hills is built up. In that case, too, we had to wait for a very long time before we could complete the scheme.

6624. Is there any objection, other than the cost, put forward by particular landlords or cultivators? There is no other objection to fencing; is there?—Generally the cultivators are required to pay one-eighth of the capital required for fencing, according to the co-operative rules. I have invariably observed that they borrow for that purpose. That is also one of the difficulties.

6625. Do you think that, where the majority of owners are in favour of fencing, the scheme should be carried out in spite of the opposition of a small minority?—The majority of them are willing and anxious to extend it.

6626. But of course, if you have two owners who are anxious to carry out fencing, and between the holdings of those two owners there is someone who objects to fencing, that immensely increases the total cost of fencing the properties of the first two men, in that each would have to have a separate fence for his own property?—Yes.

6627. For that reason do you think that where the majority favour enclosure, a small objecting minority should be compelled to conform to the scheme?—I think so. I am emphatic on that.

6628. *The Raja of Parlakimedi:* You suggest on page 370 that agricultural schools should be encouraged. Do you mean that the medium of instruction should be the vernacular?—Yes, the vernacular.

6629. Have you got a sufficient number of books translated?—There is a dearth of books at present.

6630. How do you propose to meet the difficulty?—I think some of the people in the different Divisions will have to write books; that is the only remedy.

6631. What would you suggest as regards the financing of the translations?—If encouragement is given to some people, if prizes are given, I think people will be coming forward to write books in the vernacular.

6632. Do you mean that prizes should be given by the department?—By the department.

6633. I think you imply that management under the Local Boards has not been very successful. Do you not think that it may be handed over to these Development Associations?—I am of opinion that members coming from local areas have not yet taken enough interest in starting these agricultural bias schools. If Government gave some grant it would go a long way.

6634. *Sir Chunilal Mehta:* In answer to the Chairman you were talking about the objection of certain absentee landlords to coming into co-operative fencing schemes. Have you also found that some landlords are obstructive, that they think the scheme cannot be carried out without their assistance and they stand out. You notice that?—I have noticed it but to a very small extent.

6635. Would you advocate legislation to compel such people to come into the scheme?—Yes.

6636. That is the proposal which is before the Government now. Are you aware of any proposal being made by the Registrar of Co-operative Societies to Government on that matter?—Yes.

6637. Would you mind telling the Commission your experience of *tals*? Mr. Lowsley deals with *tals* on a big scale. Do you deal with *tals* of individual cultivators?—We deal with individual cultivators on a small scale not exceeding Rs. 5,000. We deal only with embankment schemes not costing more than Rs. 5,000.

6638. Have you carried out any such schemes?—We have in fact carried out 120 schemes during the past season.

6639. Have you any idea of what it costs?—We have divided our field embankments into three classes. In the first class we have the big *tals* where water comes from an area exceeding 400 acres, in the second class from 100 to 400, and in the third class ordinary field embankments where the slope is not heavy and the catchment area is within 100 acres. We have not systematised the work of estimating the extra profit for the fields we have bunded, but from my enquiries from the cultivators on the spot we have arrived at some figures which may be taken as fairly correct. In the first class of schemes we are getting 20 per cent. on the capital which we lay down; in the second 15 per cent., and in the third not more than 9.

6640. How are these schemes financed?—I think up till last year we took only schemes of individual cultivators who were willing to pay from their own pockets. Recently in Bijapur, Government advanced a fairly large amount of *taccavi* where we are working with the Collector.

6641. Have you got the figures of any of the schemes you have carried out?—I am sorry I have not brought them. If you want it I will supply figures for a few of the schemes in each of the classes I have mentioned.

6642. Would you mind supplying the actual figures?—I will do so.

6643. Is there a big scope for this class of work in the districts with which you are acquainted?—Enormous, especially in the eastern tract where the rainfall is less than 18 inches.

6644. Even there you think that these *tals* would lead to better outturn? —Certainly.

6645. On page 377 you talk of weaving as a possible spare time occupation?—Yes.

6646. These figures that you have collected are actual instances?—Actual instances.

6647. Do you find any disposition amongst cultivators to take to weaving? —In certain tracts, yes.

6648. Have you found any caste difficulties preventing cultivators taking to weaving?—Not so far as I have observed.

6649. Are there professional weavers by caste known as *Koshtis*. I think there are agricultural classes who have taken to weaving?—They have been weavers for a long time.

6650. What kind of cloth do they produce?—Ordinary village cloth: *dhoties, panchas,* and of course shirting.

6651. Coarse cloth which they use for themselves?—Yes, and *saris.*

6652. Is there any organisation for the marketing of these products?—Weavers take their own products to the nearest town and sell them there; there is no co-operative organisation.

6653. Where do they get their yarn from?—In the market.

6654. Do they use mill yarn or hand-spun yarn?—Mill yarn.

6655. Is there any organisation for the supply of mill yarn to them?—No.

6656. They get it from the moneylenders?—Yes.

6657. And the moneylender charges any price he likes and supplies any indifferent quality yarn?—To a certain extent he does.

6658. You think therefore there is scope for improvement in this industry?—I think so.

6659. *The Raja of Parlakimedi:* Do you think that the Taluka Development Agency would be a better agency than the District Boards to look after the agricultural bias schools?—I think so.

6660. You think that these grants should not directly go to the teachers of the bias schools but should go through the Taluka Development Bodies?—I am of opinion that they should.

6661. You suggest that prickly pear may be used as green manure?—It is not a green manure crop.

6662. Where can it be got from?—It can be got from the village site; it should be put into a pit, allowed to rot and then applied to the fields. It cannot be applied as green manure because it is grown on the village sites.

6663. You said that it was tried somewhere as green manure?—Not as green manure. It was cut, burnt, put into a pit, allowed to rot for two years and then applied to the fields.

6664. What is the particular crop for which this was used?—For *juar* in that particular year. We do not generally manure cotton; we manure *juar.*

6665. Did it give better results than cowdung manure?—No, it did not. It gave some manurial effect; I mean it was better than no manure, but no better than farmyard manure quantity for quantity. I have been wondering whether it would give better results if it were more thoroughly rotted and mixed with lime and ammonium sulphate. We have tried that this year.

6666. With reference to page 372, do you not think that these cultivators and landowners should be encouraged to take interest in these schools? You say: "As regards good fieldmen for such associations, I feel, selection of candidates and periodical training classes ought to remove our difficulty." Do you not think that landowners also might be encouraged to attend these periodical training classes?—I have not differentiated cultivators from landowners. Landowners who have done work in the fields will be better.

6667. The man who cultivates his land and is interested in it?—Yes.

6668. You would not mind including a landowner of that sort?—No.

6669. *Sir James MacKenna:* Who carried out those experiments with prickly pear to which you referred?—The Agricultural Overseer in Gadag.

6670. Has the Agricultural Department worked out the manurial value of this rotted prickly pear or is it just a shot in the dark?—In my division it has not been done.

6671. Do you not think that would be a good preliminary before you begin recommending it?—We are not recommending it. A cultivator out of his own curiosity did it. We have not done any propaganda.

6672. For how many years have you been the Deputy Director of Agriculture?—For the last four years.

6673. Do you come from the cultivating class yourself?—Yes.

6674. Was your father a farmer?—Yes.

6675. Did you work on the land as a young man?—I did.

6676. Where were you trained?—I was trained in the Poona Agricultural College.

6677. Have you any agricultural stations in your district?—There is one at Dharwar and another at Gokak.

6678. Do you live on one of those farms?—No, I am living in the city of Dharwar.

6679. Do you carry out any research work yourself?—No, not myself.

6680. Not as Deputy Director?—No.

6681. *Professor Gangulee:* On page 370 you say: "A separate vernacular agricultural training college is a need." Is it possible to eliminate English in an agricultural training college?—This would be of the type of vernacular college which existed formerly without English.

6682. Where?—In different linguistic divisions, for the training of teachers for ordinary schools.

6683. Under the head of Administration and Propaganda you make a number of suggestions. Have you yourself as Deputy Director tried to give effect to any of them?—I have.

6684. Would you definitely state a particular instance and tell us what was the result?—I have given effect to almost all these that are suggested. Perhaps you will kindly refer to a particular item.

6685. For instance, have you created sympathy with the Revenue Officers?—I have done so.

6686. Have you made arrangements for light refreshments at the time of demonstration?—Yes. It is the usual system; I am very particular about it.

6687. On page 374 you say there is a large scope for the construction of communal tanks. What do you mean by "communal tanks"?—Irrigation tanks.

6688. Run on a communal basis?—Yes, by groups of cultivators.

6689. Not one tank for the Mahommedans, one for the Hindus, and so on?—I do not mean that.

6690. *Mr. Calvert:* As regards fencing, I see the tariff on wire netting is 15 per cent. Is that an obstacle to the further progress of your fencers?—I think so.

6691. It is so high?—Yes.

6692. Do you think the abolition of this tariff on wire fencing might make your work easier?—I think so.

6693. Have you carried out economic enquiries in the villages?—Yes.

6694. Have you examined the question of mortgages?—Not yet.

6695. ***Mr. Kamat:*** **You say you are carrying on intensive statistical** study in two places in your district?—Yes.

6696. Your inquiry is not complete and you are not able to give any definite conclusions at this stage?—Yes.

6697. But from your intimate knowledge of the people can you give me an interim conclusion as to one or two things. Is the productivity of the land per acre going up in certain tracts, to your knowledge, owing to the new methods?—You mean with improved methods?

6698. With the help of the modern improvements which you adumbrate, have you reason to believe that the land is producing more per acre than it did before?—Certainly, it is in cases where they have taken to improvements.

6699. That is your impression?—Yes.

6700. After taking into consideration the price and the value of the produce, the margin of profit to the cultivator is also going up?—I think so.

6701. You have reason to believe that?—Yes.

6702. And the standard of living of the cultivators in the Southern Division is also rising?—Not as a whole.

6703. Only in those places where they have taken to your improvements?—Yes.

6704. You think it is necessary and desirable that the Deputy Directors of Agriculture should have, as a rule, knowledge of rural economics and should be interested in the welfare of the villages?—Certainly.

6705. They should not merely confine themselves to the propaganda of the mechanical agricultural improvements which the department wants them to spread?—I quite agree.

6706. Are most of the Deputy Directors adopting that view, that they must interest themselves in the profits and losses and economics of the villages?—I think they are doing so.

6707. Do they also take an interest in rural reconstruction in their capacity as Deputy Directors or do they think it is not part of their official duty?—I do not think they hold that view.

6708. They do not neglect that side of the question?—They do take a certain interest in the matter, but it is only a question of the volume of work they put in.

6709. They have no special interest in the problem yet?—To my knowledge some have done that work.

6710. Some do take an interest?—Yes.

6711. *Dewan Bahadur Malji:* You have very strong views as to economic surveys in villages?—Yes.

6712. You are in favour of carrying on these surveys with the assistance of official experts wherever possible?—Yes.

6713. You do not mind Government spending money on it?—No.

6714. *Sir Henry Lawrence:* In the Dharwar district what proportion of the villages is subjected to damage by pigs? Are the pigs in every district or in a few villages only?—In 7 talukas of the Dharwar and Belgaum districts.

6715. Seven out of 12?—Out of 20.

6716. Nearly one-third of the total number of villages are damaged by pigs?—Yes.

6717. The damage is serious?—Yes.

6718. In one-third of the whole area of that district?—Yes.

6719. Is it equally serious in Bijapur?—No.

6720. In Belgaum?—In two talukas out of 10 (8 talukas and 2 mahals).

6721. So that the damage by pigs is limited to these villages which are in the neighbourhood of reserve forests?—Certainly.

6722. In your figures here on page 378 you say that 2,400 acres have been protected by a wall of 3 miles?—Yes.

6723. That wall extends only up to a certain portion?—On one side of the hill only.

6724. Do you find that the wall is effective? Does not the pig climb up on the other side?—It is 75 per cent. effective. On the borders of fields the people will still have to watch their crops, because the adjoining villages have not yet taken to fencing. They have applied to carry the wall along the hills, and until they do it there will be pigs coming and the border people will have to watch it.

6725. You speak of the evil of absentee landlordism. Can you give us any idea of the proportion of the land held by absentee landlords?—I can-

not give you accurate figures. In the parts where I have worked in the dry areas I think it comes to nearly 20 to 25 per cent. That is my rough idea; I have no figures.

6726. Do you refer to all the three districts in your charge?—The dry tract of my division excepting Malanad and Gadinad. I am speaking of half the areas in my three districts.

6727. 20 to 25 per cent. in half the areas of three districts?—Yes.

6728. On page 374 you speak of tanks which now need repair and improvement?—Yes.

6729. Is any work now being done to repair or improve those tanks?—Not to my knowledge.

6730. Under whose charge are they?—It is the duty of the cultivators, as it is stated, but they have not done it in the past. Of course it was also the duty of the Revenue Authorities to see that the silt was removed, but it has not been done in the past and as a result various small village tanks have been silted up.

6731. Have you any scheme to suggest for the improvement of these tanks?—I had a consultation with the Irrigation Engineer of Dharwar and he is of opinion that the tanks had better be raised than silt be removed; but he advised that in some circumstances the silt might be removed. We have been trying to start co-operative societies for the removal of silt, with some grant from Government.

6732. Is there anything to prevent the cultivators removing the silt themselves?—It is costly; it is a communal tank and nobody does it.

6733. Is not the silt of some value if it is put on the land?—It is to a certain extent, but the cost of carting is prohibitive and most of the fields below the tank are paddy fields.

6734. Then these improvements must be carried out by Government agency; that is your proposal?—That is my proposal.

6735. How is it to be financed?—By subsidising co-operative societies.

6736. By grants from Government?—Yes, and by long-term loans.

6737. Is there any famine in these particular areas?—Not usually.

6738. So that the work cannot be done by grants from the Famine Insurance Fund?—I am afraid it cannot be; it is not a famine tract.

You want to subsidise these particular cultivators at the expense of the general taxpayer. Is that your proposal?

6739. *Dr. Hyder:* To the extent of 90 per cent. the general taxpayer is identical with cultivators. Is that so?—Certainly.

The Chairman: The proportion between the whole of the taxpayers and the cultivators of this particular district is, I suppose, another matter.

6740. *Sir Henry Lawrence:* On page 380, you mention that "our elders in rural areas did it but their sons with the present education have abandoned it (agriculture)". Is that your view?—Yes.

6741. Is that progress taking place on a large scale?—It is taking place on a large scale.

6742. In your particular community among Lingayats?—Yes.

6743. Do you propose to do anything to stop it?—General agricultural education will help matters.

6744. You trust to that?—Yes.

6745. No propaganda can be undertaken in your community to prevent this drift away from agriculture?—I have not much faith in that. General education will help better.

6746. *Sir Ganga Ram:* How many years have you been Deputy Director of Agriculture?—I have been Deputy Director for the last four years, and altogether I have been in the department for the last 16 years.

6747. During these 16 years what improvements have you carried out either with regard to yield or quality of the crops?—So far as the Southern Division of this Presidency is concerned we have been working on three problems especially. In cotton we have done very well; for example, the selected Kumpta cotton has covered an area of 5 lakhs of acres. That means an increase of at least Rs. 5 per acre in yield, and an increase in profit of at least Rs. 2 per acre. That is one of the items we have been working on.

6748. Has that been done by your advice? By the department; myself and the staff together.

6749. From demonstrations?—And from original research work on the farm.

6750. On cereals?—On cereals we have just been working on paddy and *juar*.

6751. Have you done anything on wheat?—No.

6752. Why not? Have you made any attempt to encourage the sowing of wheat in place of *rabi juar*?—There are particular tracts in which wheat grows and there are particular tracts in which *rabi juar* grows. We have tried *vice versâ* and we have mostly failed.

6753. Is it on account of the nature of the soil?—The nature of the soil especially.

6754. Cannot you find out some seed which will suit the nature of the soil?—With all that the difference in profit between *juar* and wheat is very small. There is no particular advantage to the cultivator in growing wheat.

6755. What do you mean by 'no advantage'?—In the net profit.

6756. Is wheat selling at the same price as *juar*?—The yield from *rabi juar* is greater; it is 600 lbs. per acre, while wheat gives about 400 lbs.

6757. On an irrigated area?—No, in the dry tract.

6758. Depending on the rainfall?—Depending on the rainfall.

6759. *Sir Thomas Middleton:* At page 370 of your note you suggest that the produce of school plots should be given to the students. Is not that done in many cases already?—That is done to a certain extent.

6760. I think you suggest that it should be given to them as an incentive to take up the work?—It is one of the incentives.

6761. But the practice is common already?—It is done in the schools to a certain extent.

6762. What staff have you got working under you as Deputy Director in your area?—Eleven District Agricultural Overseers are working under me.

6763. How many of them have come from a college?—Seven are agricultural graduates from the Agricultural College and four are non-graduates.

6764. Have those four non-graduates been to college at all?—They have worked on the farms a number of years.

6765. They have been promoted?—Yes.

6766. I think there is a slip at page 372. You do not call *cyperus rotundus, hariali*, do you?—No, I am sorry.

6767. You were referring to *cyperus* and not to *hariali*?—Yes.

6768. You say on page 373 that when a cultivator has enough land for one pair of bullocks he is usually progressive. What amount of land do you think a cultivator should have in order to employ one pair of bullocks, in your tract, on light land and on heavy land?—It is not a question of light and heavy soils. We have got three tracts. In the Malnad paddy tracts, about 4 acres of paddy and about 6 acres of inferior millet is the ordinary rule; 10 acres altogether. In the transition tract, that is, between the western paddy tract and the eastern dry tract, they cultivate 24 acres, and in the eastern tracts generally it is 40 acres, with one pair of bullocks.

6769. With one pair of bullocks, 40 acres?—Yes.

6770. They do not put all the 40 acres under cultivation every year; there must be a large amount of fallow?—They do not keep any fallow, except in famine, when, of course, the bullocks are not available.

6771. Do they keep 40 acres clean with one pair of bullocks?—The weeding is very very little in the eastern dry tract where they have very little rainfall.

6772. Do they cultivate as much as 40 acres properly with one pair of bullocks?—Yes; even more than that; I have observed generally from 40 to 70 acres with one pair of bullocks.

6773. *Sir Ganga Ram:* Do they only plough once?—Ploughing is not done at all in the eastern dry tract, in the Bijapur district and in Nargund, Navalgund, Gadag and Rok talukas of the Dharwar district. All that is done is harrowing. Some cultivators give two harrowings; some three; and some very good cultivators up to four.

6774. How broad is the harrow?—(*The witness indicated a breadth of about two feet.*)

6775. *Sir Thomas Middleton:* The land which they cultivate is not red soil land?—No. It is ordinary black cotton soil.

6776. What kind of harrow do you mean?—They use the ordinary country blade harrow.

6777. You use prickly pear as manure. Do any people in your district make use of it as fodder except in famine times?—No.

6778. There was an attempt made rather further east than your district by one prominent landowner to use it in ordinary years, but evidently his example has not been followed?—Not yet.

6779. As regards use of manures, at page 375 of your evidence you have said that you have observed an increased use of ammonium sulphate and of cake manure. What you mean is that you have seen an increased use of the mixture?—Yes, a mixture of ammonium sulphate and cake for sugarcane.

6780. Formerly it would have been cake only. It is not many years since sulphate of ammonia has come into use?—Yes.

6781. Before sulphate of ammonia came into use, cake was used?—Cake? Before that they were not using cake either; they were only using the ordinary farm manure for sugarcane.

6782. What are cultivators using bonemeal for?—For the paddy crop especially.

6783. In the tract where *sann*-hemp is used for manure, is it a light soil?—It is black soil with murum soil below.

6784. You have two varieties of cotton in your area, Dharwar and Kumpta. These two varieties are commonly grown in your area?—Yes, Kumpta and Dharwar-American.

6785. Which is used for the heavier soil and which for the lighter soil?—Kumpta is used in the heavier soil, and Dharwar-American in the lighter soil.

6786. Are cultivators growing more Kumpta and less Dharwar than formerly?—No, they are occupying much the same area.

6787. *Dr. Hyder:* On page 380, you speak of poverty as being due mainly to ignorance. Will you agree with me if I enumerate the following causes of poverty. It is not merely ignorance, but the first cause is that there are too many people. Would that be one of the causes?—I agree.

6788. Then the second is that cultivators work only a small number of days in the year. Is that a dominant cause of Indian poverty or poverty in your particular district?—Yes.

6789. The third cause is that there are no other subsidiary occupations open to the people?—Yes.

6790. The fourth cause is that which you have given, ignorance?—Yes.

6791. Would that sum up the main causes of the poverty of agriculturists in your district?—I agree.

6792. At page 373, you propose that agriculture should be made more remunerative by reducing the rental values of the land. Do you think that would be effective?—I think so.

6793. You would be doing it at the expense of another man, the landowner?—The owner of the land, in my opinion, should be a cultivator. A decrease in absentee landlordism, in my opinion, is the pressing need.

6794. But if the number of people remains the same, if they do not work a larger number of days, and they remain as ignorant as before, do you think the simple fact that they do not pay rent to somebody would increase their produce and *pro tanto* their prosperity?—I have laid stress on the point that the tenant holder cannot make both ends meet. In all the three tracts where I have been, the rental values have increased. That is the reason I have written that.

6795. *Sir Ganga Ram:* Do you guide the people in regard to the rotation of crops; as to what crops to grow after each other?—Certainly.

6796. Can you work out for me the best system of rotation for three classes of land, (*i*) canal-irrigated, (*ii*) well-irrigated and (*iii*) not irrigated, giving what crops you would grow. Please work out the rotation for a hundred acres for three years. If three years is not the proper rotation, you can take any period you like?—I can do that for my own tract.

6797. I do not want you to give it to me now, but you can send it to me later?—I can try.

(The witness withdrew.)

सत्यमेव जयते

Lt.-Col. H. M. H. MELHUISH, D.S.O., I.M.S., Director of Public Health to the Government of Bombay, Poona.

Replies to the Questionnaire.

QUESTION 25.—I would offer the following suggestions for improving hygiene in rural areas.

The principal difficulties with which we are confronted are the superstition, ignorance and apathy of the people, and lack of funds. To overcome the former we must have recourse to education.

Although propaganda in public health work has been taken up by various voluntary societies and private individuals of recent years, their work is confined principally to the towns—little has been done in the villages except by the officers of the Public Health Department. These are, however, so few in number and the area over which they work so large that they have insufficient time to devote to this work. The establishment of Health Associations in all districts and the augmentation of the public health service is, therefore, called for. By the means of health exhibitions, magic lantern demonstrations, cinema shows, public lectures, the exhibition of placards and posters, and the distribution of leaflets, much may be done to enlighten the people on public health matters.

While this form of instruction will be useful in propagating knowledge among the adult population, it is of even greater importance that the children should grow up with a thorough understanding of the laws of health. To this end hygiene should not only be taught in the schools, but should rank as one of the most important subjects in the curriculum. The teachers should also be selected with care, and should if possible be themselves trained by instructors having a practical knowledge of public health work, and capable of imparting to their pupils an interest in and enthusiasm for the subject.

Attention to the following points is necessary when dealing with the question of village sanitation:—

1. Registration of vital statistics.
2. Notification and control of epidemic diseases.
3. Conservancy.
4. Protection of drinking water-supplies.
5. Housing.
6. Disposal of the dead.

The registration of vital statistics is performed by the village officers. On the whole the numbers of births and deaths are recorded fairly accurately, but it would be helpful if these officers could be made to understand that this work is an important part of their duties requiring care and attention and not to be shirked on any pretext. The value of the death statistics is, however, much impaired by the indifference shown to entering the cause of death intelligently. Village officers cannot be expected to diagnose complicated diseases, but they should be able to distinguish the commoner diseases for which there are names in the vernaculars. In many cases, all deaths not due to actual violence are attributed to fever. A Manual of Vital Statistics (abridged edition) for the use of these officers was published in 1922 and it would be useful if it could be made a text-book for study for the Talatis' examination. In 1924, classes for the instruction of village officers and others were started in the Western Registration District. They are held at convenient centres in the talukas by the Inspectors of Sanitation and Vaccination and include instruction in the accurate registration of vital statistics, early notification of epidemic diseases, protection of water-supplies, etc. If they prove successful in the Western Registration District, they will be extended to other districts.

The notification and the control of epidemic and contagious diseases.—Small-pox, cholera, plague and influenza are the four notifiable diseases. On the outbreak of one of these the village officer is expected to send intimation immediately to the Assistant Director of Public Health and the *mamlatdar*, and to keep a separate register, and send extracts from it regularly to the *mamlatdar* who supplies daily returns of the disease to the Assistant Director of Public Health during the outbreak.

Receipt of early intimation is the secret of success in dealing with epidemics, and it is important that the village officers should understand this. On the whole they appear to do so, but in some instances great delay occurs in reporting the outbreak and there is still room for improvement in this respect.

The control of epidemics also rests with the village officers. The officers of the Public Health Department can only advise as to what steps should be taken. In some other Provinces, District Health Officers and staffs have been appointed, whose duty it is to deal with epidemic outbreaks. They are said to be working with success (in Madras for instance) and their adoption in this Presidency would be a notable advance in public health work—the question is under the consideration of Government.

In addition to dealing with epidemic outbreaks, the District Health Staffs would carry out and control vaccination, and attend to village sanitation, propaganda and all the other branches of the work.

Conservancy.—In most cases this is very faulty owing to the ignorance of the people regarding the danger they run by allowing excremental matter and refuse to lie about near their homes as well as to neglect on the part of the village officers to have the work properly carried out.

The indiscriminate scattering of night-soil broadcast is not only a danger to the health of the community but is wasteful of a good and cheap manure. If this night-soil is properly conserved and dumped in pits mixed with *kutchra* as in the Nasik system of trenching, which is employed in parts of the Presidency, a valuable manure is obtained, and the public health benefits at the same time. The storing of manure is another example of wasteful and unhygienic methods. If dumped on the ground surface it breeds flies and as it dries is blown about in all directions until the air becomes laden with it. Manure should be stored in pits, well away from houses and water supplies and protected from flies by covering the outside of the dump with dried manure in which flies will not breed.

Protection of water-supplies.—Water is usually obtained from wells, rivers or tanks. Whenever possible it should be obtained from wells which are easier to keep free from pollution. The village officers should see that they are not misused and are kept in repair as advised by the Health Department. Tanks are open to gross pollution of all kinds and should never be used for drinking purposes unless under close supervision. Rivers also are open to pollution and during cholera outbreaks are a dangerous source of supply. If no other sources are available, the village officers should see that separate areas are set aside for drinking water, washing, bathing and watering cattle. Where possible, new wells should be provided to prevent the use of tanks and rivers as sources of drinking water.

Government makes a grant annually for the improvement of village water-supplies but this is not allotted in consultation with the Public Health Department which might with advantage be done.

A few years ago, an attempt was made in this Presidency to teach the people how to purify their drinking water, with special reference to threatened outbreaks of cholera. "Instructors" were appointed two to each Registration District who toured the taluka headquarters and important villages, holding classes or demonstrations for village officers, school-masters and others. The method of purification with potash permanganate was shown. For financial reasons these classes were discontinued, but they undoubtedly served a useful purpose and it is hoped that in due course they may be resumed.

Housing.—This constitutes one of the most difficult problems of all. A house in healthy surroundings is the first essential for a healthy life. Instead we find in Indian villages, insanitary, ill-ventilated, vermin infested, and dust laden dwellings, hardly fit for human habitation. The practice of keeping cattle and other animals in the living rooms further complicates the problem and renders the house unhealthy. In by-gone days it was a common practice, I believe, to change the site of a village from time to time. This custom would unfortunately be too costly to revive, and even the rebuilding or reconstruction of individual houses seems to be beyond the means of most villagers. The removal of animals from inside the house and provision of separate stable accommodation outside should, however, be insisted upon. Although the existing villages present so difficult a problem, new construction work should be carried out on hygienic principles under the guidance of the Public Health and Consulting Surveyor's Departments.

To sum up.—The measures suggested are—

The appointment of District Health Staffs and District Health Associations.

The education of the village adults by "propaganda."

The training of the children in the schools by well selected teachers.

The tightening of control over the village officers in the matter of registration of vital statistics and reporting of epidemics and, by degrees, the enforcement of by-laws in connection with sanitation of the village areas pending the introduction of a comprehensive Public Health Act.

Oral Evidence.

6798. *The Chairman:* Lieutenant-Colonel Melhuish, you are Director of Public Health to the Government of Bombay?—Yes.

6799. You have put in some very interesting notes and there are one or two questions I should like to ask you on them. Would you care to make a statement of a general character before we proceed to question and answer?—I do not think so.

6800. On page 391 of your notes you say, "The establishment of Health Associations in all districts is called for." On what basis would you organise these associations?—I think it might be done on a co-operative basis.

6801. You must have some central idea about which to create your organisation, must you not?—Yes, the centre of the district.

6802. In the next paragraph you say, "It is of even greater importance that the children should grow up with a thorough understanding of the laws of health." Do you think the existing systems of education supply that knowledge?—Not altogether.

6803. Do you think more might be done in the direction of making hygiene an item in the curriculum?—I think it might be emphasised more as an important subject of teaching.

6804. You would not attempt too much, you would be content to make plain to the mind of the child one or two leading rules of health. Is that the position?—Yes.

6805. On page 392 you suggest the provision of pure drinking water to villages. What do you recommend as the practical method of providing pure drinking water?—The sources of supply are always very impure; it is a question really of some method of purifying the supplies which already exist.

6806. There are two ways of regarding the problem, are there not? One is to attempt to provide water from a non-infected source, and the other is to attempt chlorination or some other method of purification of water already infected?—Yes.

6807. Which would you adopt?—First I should endeavour to provide pure sources, if possible.

6808. What is the most ordinary channel of infection of village drinking water?—It is personal. The people infect it themselves.

6809. How?—By their habits.

6810. What habits do you refer to?—They draw water from the source with their own utensils which are not usually clean. Then they wash their clothes, etcetera, in the neighbourhood and stack all sorts of refuse, impurities from which get into the well either directly or through the soil.

6811. There is no appreciation of the risks run by that sort of thing?—Not much.

6812. Where villages are provided with an ordinary well, that is, a well other than a step well, what is the ordinary channel of infection?—In the first place, directly from above the well.

6813. Do you mean from stuff thrown into the well?—Introduced by the buckets and things they use.

6814. By the vessels they dip in?—Yes.

6815. Do they dip the vessels from which they drink, or do they dip a bucket into the well?—As a rule they dip the vessels they bring to the well, unless there is a bucket provided. The remedy is to provide a bucket.

6816. Is there any other source?—Percolation through the soil; they draw water from the well and empty it there. That water runs back to the well through the soil.

6817. Apart from these two channels of infection, are there any others? Would a well with a pump and a cover and cemented for a sufficient distance below the surface to prevent the return of drainage water into the well before it passed through a sufficient depth of soil to purify it, solve the problem of providing pure water?—It should do.

6818. If you had a village well which was not a percolation well in the usual sense, but an impermeable tube sunk in the soil a certain distance with perforations in the tube so that water could be admitted from higher or lower water-bearing strata as might be arranged, do you think that would help to ensure a hygienic water-supply?—Certainly.

6819. Have you ever known an instance of a tube well being used?—Yes, many borings are done.

6820. For drinking water purposes?—Yes, there is a great deal being done in North Gujarat.

6821. What I want to get from you, if I can, is some statistics in support of the theory that such a plan provides a pure water-supply. Can you provide them?—I can get them I think.

6822. Speaking generally, do they bear out very strongly this contention?—Yes. I should say certainly, provided, of course, they stick to that water-supply and there is no other which they can go to.

6823. Where a convenient well supply is provided in a district, where there are also accumulations of water in ponds, or bunds, or wherever it may be, is it the custom of the people to confine themselves as far as drinking water is concerned to the water from the well, or is the tendency to take water from the most convenient place regardless of whether it is protected or not?—They have fancies; whichever water they particularly fancy they are inclined to use; but I think on the whole they prefer a well with sweet water to a tank, if there is a well there.

6824. What are the principal parasitic diseases borne by water in this Presidency?—One of the worst we have is the guinea-worm. Then there are intestinal diseases like dysentery, diarrhœa, cholera, and a certain amount of enteric fever.

6825. Would you suppose that comparing the health statistics of the villages provided with a good water-supply with those of villages not so provided, there ought to be a marked improvement in the health of the public as regards the incidence of these particular diseases?—Yes, there should be.

6826. And that, generally speaking, is in fact the case, is it?—I cannot say definitely.

6827. If there is in fact a very marked improvement, there is a strong case, is there not, for making the utmost exertions to extend the provision of pure drinking water to as many villages as possible?—Certainly.

6828. And taking into consideration the great loss in efficiency of labour as the result of these diseases, there will be a strong case on economic grounds alone for spending large sums on the provision of a pure drinking water-supply?—Certainly.

6829. At page 391, talking about classes for instruction of village officers and others, you say this is in the experimental stage. What is the trend of experience as regards those experiments? Are they promising?—The Assistant Director who has done this reports that the registration does show signs of improvement. There are not quite so many diseases returned as "fever" as there used to be; but it has only been going on for a short time.

6830. These classes were instituted purely to increase the accuracy of the returns?—They were also being extended to instruct them in simple matters of sanitation.

6831. May I take it that your department is watching very closely the result of these experiments?—Yes.

6832. How long do you think they will have to be maintained before definite conclusions are arrived at?—That is a matter of three or four years.

6833. On page 392, you are talking of the indiscriminate scattering of night-soil broadcast. To what extent is the sun a satisfactory destroyer of parasites of all sorts conveyed through the agency of night-soil?—It is quite effective if the night-soil is exposed to the direct rays of the sun, but then that is not necessarily the case.

6834. What is, as a rule, the practice; to cover it with earth or leave it in the sun?—It is exposed.

6835. Where it is exposed, do you think that the sun is a sufficient disinfectant?—It is very effective.

6836. It occurs to me that the danger to public health of this practice of relieving nature in the open fields has been a little over-emphasised; that where it is not the practice to cover with soil the sun is a sufficient germicide and destroyer of parasites?—The breeding of flies is the principal risk in the scattering of night-soil. Flies breed in it. The sun does not have much effect in that way.

6837. Is it really the case that the practice of going out into the open fields to relieve nature has an important bearing on the breeding of flies, not the deposit of large quantities of night-soil but the practice I refer to?—It is scattered all round the village, on the borders of the village, and certainly it leads to the breeding of flies.

6838. Do you mean that the eggs of the fly are laid in this matter?—Yes.

6839. In the full glare of the sun?—Yes.

6840. Then, on the same point, you say, "If this night-soil is properly conserved and dumped in pits mixed with *kutchra* as in the Nasik system of trenching, which is employed in parts of the Presidency, a valuable manure is obtained." The changes there are changes due to fermentation, are they not?—Yes.

6841. To what extent is fermentation a satisfactory destroyer of disease germs and parasites?—The night-soil is left there for a long period; heat is generated which destroys all infection in the night-soil.

6842. On the technical side it has been shown definitely that night-soil so treated does not carry infection?—That is so.

6843. That is perfectly definite?—It has been shown in a laboratory.

6844. I do not see how else you could discover the point, do you?—Simply by field work.

6845. *The Chairman:* I want to deal with one point on page 393. You say, "The removal of animals from inside the house and provision of separate stable accommodation outside, however, should be insisted upon." Is it a fact that the practice of keeping domestic animals inside the house leads to ill-health?—Yes.

6846. Does it cause any particular disease?—It simply introduces dirt into the house.

6847. Do you suggest legislation for it?—Not at the present time.

6848. *Sir Thomas Middleton:* Have you had much hook-worm disease in the Bombay Presidency?—So far as we know, we have none.

6849. *Professor Gangulee:* You had some public health organisations in the form of Village Sanitary Committees. Are they still in existence?—Yes; Village Sanitary Committees are still in existence.

6850. What about the Sanitary Boards?—There is only one Board left.

6851. These Sanitary Committees are under the control of local bodies?—Yes; they are under local bodies.

6852. Have you any supervision over them?—Only advisory.

6853. Could you tell us how they function?—On the whole, not too successfully. Some of them work all right, they carry out certain improvements, but they are not very well off, so they cannot do much.

6854. After the passing of the Village Panchayet Act, would you transfer these things into their hands?—Yes.

6855. Is that satisfactory?—There again, I think there is still some delay in getting the thing working. In fact, the Act is now being reconsidered.

6856. *Mr. Calvert:* Have the activities of your department been restricted at all by financial stringency?—Yes.

6857. You have had to drop several lines of activity?—Yes. Before the war there were various activities going on which have had to be discontinued.

6858. Is bad health in any way due to under-feeding?—It may be so; under-feeding would certainly affect their health in that way by a reduction of vitality.

6859. Would you say that milk was a necessary item of diet for adults?—For adults, no; it is for infants.

6860. *Mr. Kamat:* You refer to the establishment of Health Associations in the districts. You have some examples in urban areas, I think, of Health Associations?—Yes.

6861. To your knowledge, are they functioning well?—They have only been going two or three years.

6862. Are they purely non-official agencies or do they get a subsidy from Government?—Two of them get subsidies.

6863. Do you think that such Health Associations should be extended to all towns?—Yes.

6864. Do you think they should be subsidised by Government?—I would advise that, to give them a start.

6865. For purposes of sanitation in village areas do you advocate the passing of a comprehensive Health Act?—Not at present. I said "pending" in my note.

6866. That means the present provisions, either in the Local Boards Act or otherwise, are not sufficient, in your opinion?—Not for the future.

6867. Supposing a Public Health Act of a very comprehensive nature were passed, what machinery would be necessary for carrying its provisions into effect? Would it be through your department or the Local Boards or village panchayets? How would it be done in village areas?—Through the Local Boards, I presume.

6868. Or in villages through the village panchayets?—Yes.

6869. To your knowledge, do the village panchayets function well?—They vary; some do and some do not. I think they are reluctant to take much action.

6870. They do not look to village sanitation?—Not in all cases.

6871. Neither have the Sanitary Committees succeeded so far?—They are not so successful as they might be.

6872. Is it due to lack of funds or lack of public spirit?—I think it is due to both.

6873. It is also due to lack of public spirit?—Lack of interest.

6874. *Dewan Bahadur Malji:* Cattle sheds in villages were originally separate from residential houses and you advocate the continuance of that practice?—From a sanitary point of view, yes.

6875. The reason why animals have now to be tethered in the house is principally congestion in village sites?—Yes.

6876. Do you think any co-operative effort in the line of buildings on approved patterns will solve the question effectively?—I think it would go a long way towards doing so.

6877. Would you like to have some lessons on hygeine in general readers in the schools?—They already have them.

6878. Recently we have introduced a Village Panchayet Act. Wherever Sanitary Committees and Sanitary Boards formerly existed, and the people are unwilling to have village panchayets in their area, is it true that they

are now without village panchayets or Sanitary Committees in their villages or towns?—In many villages there is nothing.

6879. Do you approve of that idea?—No.

6880. Take the example of the town of Amod in the Broach district. Formerly it was a municipal town. The Municipality has gone and the Sanitary Board has gone and there is no village panchayet. I take it that you will be surprised to hear the town remains without any sanitary arrangements?—There are many like that.

6881. Is there no remedy for it?—Education, I think, is the only remedy.

6882. Why are not Sanitary Boards set up when people will not have village panchayets?—They will have to be re-established, I suppose.

(The witness withdrew.)

Mr. E. J. BRUEN, Livestock Expert, Government of Bombay.

Note on Cattle-breeding.

Necessity for cattle in the Bombay Presidency.

Cattle are especially essential to India for the following reasons:—

(*i*) *As draught animals.*

Bullocks have been used in India for generations for supplying the necessary draught for road and field use. It is doubtful if any other draught power will ever be used extensively enough in India to do away with the bullock. The fragmentation of holdings makes it practically impossible for any mechanical power to be used generally and horse power would be a further burden on this country since most of the cultivation is on the one crop system. Moreover it would take generations to teach the people to handle any other than bullock power in cultivation.

(*ii*) *As a milk producer.*

India more than any other country in the world requires milk. It is not only essential as a necesasry part of the daily diet of infants and adults alike, but it is used extensively in cooking. The Hindu being a vegetarian will not use any other form of fat in his cooking except butter fat.

(*iii*) *As manure producers.*

It will take years to introduce the use of artificial manure on an extensive scale into agriculture on an extensive scale. It is, moreover, very doubtful whether it will ever become popular owing to the Indian cultivator being so poor. The cultivator's cattle, if they give no other return, do produce a certain amount of manure, which helps to keep up the fertility of his soil.

It will therefore be seen that cattle are, have been and always will be essential to the country.

Method of producing and breeding in the past.

Cattle-breeding in the past in India was undoubtedly carried on by a professional breeder, who raised his cattle by migrating from place to place in search of food and water for his cattle. His year usually commenced from *Diwali*. He left his home after *Diwali*, with his cows headed by a selected bull in search of good grazing and water, travelling through dense jungles and forests. Cattle being of little value, sick, weak and lamed animals were left behind to die or be devoured by wild animals. In this way disease was stamped out and had little effect. He bred unconsciously by selection or the survival of the fittest. As one bull headed the herd, there was little chance of cows being crossed by any other than the bull intended for the purpose. In his wanderings his cattle got different types of grasses. The variety made up a food that was balanced and beneficial to the cattle which were at the same time raised at little or no expense. He returned to his home after *Diwali* to dispose of his male stock, which were taken up by professional rearers to train them and sell them eventually to the cultivator. Absence of roads, of bridging over rivers and of railways, seemed that each breed or type was kept pure. The population of the country being scattered in small villages, towns or hamlets and the sale of the produce of the cow being local, it was to be had in abundance and cheap.

Position to-day.

The professional cattle-breeder is fast dying out, the only professionals now remaining are the Rabari or Barwad of North Gujarat and the Dhangar of Ahmednagar district. But as cattle-raising is now generally confined to

villages, the cattle are kept more or less constantly in one place; the treatment given is nevertheless practically the same as under nomad conditions, *i.e.*, the cattle are not fed and dry cows are expected to thrive on the grass available (which is very meagre for 6 months of the year). In the grazing fields, moreover, as many adults entire males are found as females and the cattle are continually mixed. When disease appears, therefore, it takes a toll of 30 or 40 per cent. and those that do recover, are usually unfit for further use as breeding animals. The net result is under-feeding, promiscuous in-and-in-breeding, crossing and the constant dread of diseases. Naturally under such conditions a deterioration has set in, which will be difficult to check.

Price of cattle and cow products compared.

It is difficult to strike a comparison of the cattle and cow products of to-day with those of even some 25 years ago, as the prices of both livestock and dairy products even to-day fluctuate considerably, and the only authentic records of the past are the Gazetteers of the different districts published about 1880. At this time cows of certain breeds could be purchased for anything from Rs. 10 to Rs. 60, bullocks from Rs. 40 to Rs. 200 the pair, milk from 16 to 20 lbs. per rupee and ghee at the rate of 4 lbs. per rupee. To-day the prices are just about double in all cases. In cities milk is now sold at from 6 to 8 lbs. per rupee and ghee ½ to 1 lb. per rupee.

Obstacles to improvement.

In India, unlike any other country, there are many obstacles to the improvement of cattle, which cannot be easily got over. They are:—

(1) Religious prejudice to the slaughter or killing of animals infected with disease. This means the spread of disease, which cannot be stamped out but must take its course. Then, too, there is the objection to the isolation of undesirable entire bulls from a herd, religious principles stating a bull was put into this world for a purpose and this purpose must not in any way be restricted.

(2) The castration of undesirable bulls. This is also objected to on religious grounds. The cultivator also holds the opinion that bulls castrated early become effeminate, the neck not developing, and in their opinion the powers of endurance and the working qualities are reduced considerably by early castration.

(3) The starvation of female stock from time of birth. No attention whatsoever being paid to the female with a consequence that even the male gets a set back *in embryo*. If a cow has a female calf, the cow is milked or another male calf is given to the cow, her own female calf only receiving sufficient to keep her alive. This naturally gives the breed a set back. The idea is still prevalent in India that the sire counts for very little, they firmly believe that the impression stamped on the mother's mind whilst being served has the power of producing good or bad progeny. Therefore little or no attention is paid to the bull used except by the professional breeder, who does attach a certain amount of importance to the bull. The frequent recurrence of famine also plays havoc with the cattle of the country. The farmer in no circumstances lays in a stock of fodder. In some cases he is afraid to do so, owing to enemies setting fire to such stores. In the majority of cases it is due to the fact that the cultivator or breeder does not care and does not know better.

The fragmentation of holdings plays a great part in cattle-breeding and the possibility of improvement. The holdings are too small to support even one pair of bullocks the year round, the cultivator buying a cheap pair of bullocks to do his work and then selling them when finished with. The demand therefore at present for good working cattle is limited. To eradicate these beliefs, to deviate from the opinions he holds, will take years.

Necessity and the dearness of cattle have made a certain section of the Presidency take more interest in their cattle and now breeding of cattle, which was unknown at one time, is flourishing.

The buffalo as an agent in deterioration.

It is evident from old religious teaching and writings that the buffalo is only of recent introduction as a milk producer as only the cow is mentioned and is more or less worshipped on account of her usefulness to humanity in general. The buffalo now, however, although of recent introduction, has superseded the cow as a milk producer. This is due to the fact that the buffalo produces large quantities of fat of a higher melting point, which is so useful for cooking purposes. Owing to the buffalo being the recognised milk producer, no attention is now paid to the cow and her female stock. In the buffalo it is the reverse, the female stock are given attention and the male stock die as being of no use as a draught animal. This neglect of the female stock due to the competition of the buffalo has been a direct cause of deterioration of the country cow. The set back the cow has had in this respect, will take years to improve and the buffalo is likely to get a bigger hold each year.

Feeding.

The cow and her progeny although held in reverence by the people receive little or no attention except when actually useful as in the case of the bullock during the several farming seasons. The buffalo, which is producing milk for 8 months of the year, gets good food and attention. In Gujarat in the poorest of cultivators' families will be found an earthenware cooking pot in which the she-buffalo's food is being prepared.

Attention is being concentrated on the female buffalo, which naturally must improve, the cow which is getting more and more useless other than for production of bullocks and manure, is receiving less attention each year. It might here be noted that the nature, build and colour of the buffalo makes it impossible to ever improve it sufficiently to compete with the cow as a draught producer.

Types of cattle in the Presidency and their necessity.

In the Bombay Presidency we have a breed of cattle suited in each case to the soil and climatic conditions of its natural home. We have breeds suited to sandy dry soils with little or no rainfall where the larger portion of transport is conducted on camels, *i.e.*, Sindh. In Gujarat we have a large upstanding breed, which is admirably suited to the deep rutted roads of Gujarat. In the hilly wet tracts of the Ghats we have a breed, which can withstand, and thrive under, such wet and rough under-foot conditions. In the Central Deccan we have a small fast hardy breed, which thrives on the poor pastures, is able to get over the land quickly in short ploughing and sowing seasons and is suited to fast draught. It is doubtful if any other one of these breeds would suit, or thrive under, the conditions that the indigenous animal of the tract lives and works under. It is therefore essential that this very large number of breeds should be fostered and cared for.

What has been and is being done for cattle-breeding in the Bombay Presidency.

From available records it is seen that the Government of Bombay have been trying to improve or to do something towards the improvement of the cattle ever since 1881. The first step taken after extensive inquiries was to place bulls in each district through the agency of the District Local Board. The method adopted was the same that had been in vogue for generations in India, *i.e.*, dedicating a certain number of bulls to a particular deity. These bulls were branded with the deity sign and let loose. The system was originally introduced by the Brahmins, the eldest son of a Brahmin considering it

his duty to purchase and dedicate bull to his god on the 11th or 13th day after the death of his father. These bulls were the property of no one in particular, every Hindu resident feeding the bull in some form or other. This being the practice at the time, Government through the Local Boards tried the same methods. This method failed for several reasons, the chief being that the bulls became a nuisance and had to be destroyed. In Nasik district Government had to come to the assistance of certain localities to destroy these bulls, which were known as 'Pol, Walli and Pen bulls'. Later on the District Local Boards made further attempts by purchasing the most likely bulls available and keeping these at stud like a horse stallion. This also failed, the bull either getting too fat or getting so fierce that no one could get near him. The failure of both these systems was but natural and to be expected. However it is sufficient to show that as far back as 1881 one of the chief reasons for the deteriorations lies evidently in the scarcity of good bulls. Government through the agency of the Civil Veterinary Department and the Agricultural Department made many extensive inquiries into the subject from the experience then gained. The European method of giving out premium bulls to known persons was introduced by the Civil Veterinary Department in 1907. Two areas—one in North Gujarat (Ahmedabad district) and the second in Sholapur district were taken in hand and bulls on a premium system were given out. Under this system a bull was purchased in consultation with the prospective premium holder, Government paying half cost and the permium holder the other half. Government then paid a premium of Rs. 4 per mensem as feeding charges and at the end of 3 years the bull became the property of the premium bull holder (Rules in detail appended).

During this period Government found it difficult to purchase good bulls. It was decided to start farms for each breed and produce good stud bulls. At the same time a system of holding small village shows was introduced. The introduction of the premium system and the holding of shows had a certain amount of good effect. The Government in 1918 considered the question of cattle-breeding to be sufficiently important to start a new section of the Agricultural Department. A special Deputy Director of Agriculture for Animal Breeding was appointed with the necessary district and office staff. The district work in hand and the Northcote Cattle Farm, Chharodi (District Ahmedabad) was handed over to him by the Civil Veterinary Department. Up to this period the chief aim was the improvement of the draught qualities of the breeds taken in hand. The work in hand was continued and investigations were set on foot as to the form further development should take.

सत्यमेव जयते

Results of inquiries.

It was ascertained after inquiry that the greater number of the cattle in the Presidency, including the buffalo, were uneconomical animals. The production of cattle was purely a mechanical increase of, if anything, a more degenerate and more uneconomical animal with each generation. The chief defects which make the animal uneconomical being:—

(*i*) The very small amount of milk produced by the cows; in some cases hardly sufficient for the maintenance of the calf.

(*ii*) The late maturing of all breeds in the Presidency; the normal age at which an animal either calves for the first time or becomes useful as a draught animal being between 4 years and 6 years of age.

(*iii*) All breeds in the Presidency are shy breeders, *i.e.*, they calve once in 18 months or 2 years.

In consequence of these defects in the breeds of the Presidency, the cattle-breeding or rearing industry is gradually dying out as it is now no longer possible to raise cattle for practically nothing as in the past. Consequently

cattle now have to tend for themselves, no attention being paid whatsoever to them. A cattle owner or breeder owning a cow gets his cow served and hopes for the best.

The aims of the Agricultural Department are based on the improving of the very essential qualities enumerated above, *i.e.*, (*i*) to breed milk and more milk into each breed, (*ii*) to breed early maturing qualities into each breed so as to get them to become useful at half the present age, and (*iii*) to breed regularly of calving into the stock of bulls which it puts out, it being a recognised fact that these qualities can be imparted by a pure bred bull possessing such qualities. With this end in view the policy of the one existing farm was changed. (Government Resolution appended.)

Northcote Cattle Farm, Chharodi.

The Northcote Cattle Farm was originally started as a Preservation Society in the famine of 1899. At this time some 589 head of cattle were purchased at an average cost of Rs. 49 per head. The society depended for its finance on public charities. In the year 1907 it was handed over to Government as the funds of the society could not meet the necessary charges.

The Kankrej breed from the commencement was raised on the open ranching system. The farm having an area of 2,300 acres of land, the cattle were grazed all day. Until the year 1919, when the farm was handed over to the Agricultural Department, the cows were not milked as the only aim in view at the time was improvement by selection of draught qualities only. Breeding for draught only meant the neglect of the milk qualities with a consequence that, after a few generations, the cows hardly gave enough milk to nourish their young. The cattle not being handled, it was a difficult matter to tie the animals for milking. However in 1921, 49 of the best cows were taken in hand and the annual lactation yield for the 1st year was 480 lbs. The work has been continued and the present year the yield of milk has reached 1,330 lbs. per animal, the calf at the same time being suckled by the dam. Each year by selection the low yielders, irregular calvers, late maturing animals and those not conforming to type were cast and sold.

By this means the yields have increased, more regular calvers are being bred, heifers are calving much earlier and the bullocks are coming into use at a much earlier age. A comparative statement of the improvement since 1921 is appended.

Bankapur Farm.

The next breed to bo taken in hand was the Amrit Mahal, a breed used in the Dharwar, Belgaum and Bijapur districts. Up to this time the Dharwar district was considered to be a non-breeding district, *i.e.*, the cultivator purchased his necessary draught cattle which were available in large number in Mysore State at a fairly reasonable figure.

The Bankapur Farm for this breed was started in the year 1920-21 by purchasing 22 cows and 2 breeding bulls, this number was again added to in the year 1921-22 by 25 cows and 1 breeding bull.

The Amrit Mahal is a purely draught type of animal but it is hoped that in time the breed will give a small quantity of milk over and above that required by the calf, the aims and objects of this farm being the same, *i.e.*, to produce an animal that will become useful at a much earlier period and will produce more progeny in its life-time or calve more regularly.

Red Karachi or Sindhi breed of cattle.

In the year 1918 a farm known as the Willingdon Cattle Farm was established for this breed by public donations with an assurance from Government to carry on the farm. The farm was located first at Mirpurkhas, then at

Landhi and eventually on the site, which it is now occupying, at Phihai, Malir, Karachi. The Sindhi being more or less purely bred for milk, it has been considered of little value as a draught animal. The objects of this farm are to improve the breed in the same way, special attention being paid to milk.

Other breeds.

Leaflets of all the important breeds giving description, usefulness, etc., are appended.

Other agencies for producing bulls.

1. By the utilisation of *pinjrapoles* and *gowrakshaks*.
2. By encouraging the starting of co-operative cattle-breeding societies.
3. By encouraging the keeping and breeding of good cattle by big landlords.

1. *Pinjrapoles and gowrakshaks.*

In nearly every town in the Presidency of any size where the Gujarathi Hindu or the Jain has made a home will be found a *pinjrapole* or *gowrakshak*. These institutes are maintained by charity and by a cess levied on themselves by the Hindu and Jain. In some instances their incomes are large and in others small according to the trade of the town.

The object of these institutes is to preserve the lower animal life where good, bad, maimed and blind cattle are to be found. They are usually well equipped with good buildings with ample accommodation. Having been started years ago, they hold good sites and in some cases good and ample grazing land.

During years of scarcity and famine good specimens of all breeds filter into these institutes, being purchased to prevent them from being slaughter-

At present little or no material benefit is derived by the country from these institutes. In these institutes there are, therefore, possibilities. They have the necessary buildings and in some cases the necessary good stock, which are fed and cared for fairly well.

Endeavours are now being made to get such institutes to co-operate with Government by setting aside good cows of a particular breed, a bull being supplied by Government and Government also paying the pay of a trained graduate to manage the institute. Two such *gowshalas* are already working and the results so far have been fairly satisfactory. As such institutes exist in nearly every district, it would help considerably if they could be made to see the great benefit the country would derive, if they made their institutes not only asylums for the useless but set aside even a part to produce good bulls.

2. *Co-operative cattle-breeding societies.*

This also is a fairly good agency for a supply of good bulls. The great drawbacks to the societies is that they are usually formed and run by the more enlightened of a village, a class of persons that has had little or nothing to do with cattle, the result being that although the breed is kept pure and improved on in this respect, it will be many years before they can produce bulls possessing the desired qualities. The societies are not wealthy concerns and they run their farms on as economical lines as possible with the result that what good is gained by mating the best is lost in the produce not being fed sufficiently to maintain or carry on the improvement. These societies however, are useful in that they can and do supply improved bullocks.

In the Dharwar district since the year 1922, 18 co-operative cattle-breeding societies have been started. This area at one time did not breed. Through the agency of propaganda by the Co-operative Department and the Agricultural Department and through the increase of price interest has been

aroused. In addition numbers of villages have formed bull clubs and are now keeping for the benefit of the village, bull of known qualities produced on Government farms, the demand now being greater than the supply.

Taluka Development Agricultural Associations are now taking a keen interest in the cattle of their respective talukas and this agency has helped considerably in enlightening the people regarding the better treatment of cattle and the use of pedigree bulls.

3. *Private persons.*

Government have given lands on concession terms to private persons for cattle-breeding. Lands are given on the express understanding that a certain number of good cows will be maintained headed by a bull supplied by Government. The results from these are, however, not very encouraging owing to poor management and still poorer feeding. These attempts are, however, only a drop in the ocean and supply only a very small percentage of the bulls necessary.

Starting of farms, material available and time required for results.

In India in the past and to-day a pedigree animal was and is an unknown quantity. The cattle are on the whole poor. In certain restricted areas a few animals will be found conforming to a particular type, having the same colour, outward conformation, size and shape of horns. Nothing further in regard to their breeding is, however, known. From these few animals have been selected the best and located on a farm. It is only with rigid selection for years that one can ever hope to get anything like a pure herd together, taking into consideration that the Indian cow calves for the first time in 5 or 6 years. Instances are appearing each year where one cow served by the same bull in three consecutive years has produced three calves totally different in colour and conformation. More farms are needed and more *gowshalas* to co-operate with Government before any work on a large scale can be reached.

It must here be clearly understood that at present the public at large do not appreciate "pedigree bulls" and therefore good bulls do not command the price they should do. Pedigree bull production is a costly business as only a small percentage of those grown and reared are really of value. Therefore in India pedigree bull breeding cannot pay and will not for years be a commercial proposition. In European countries a pedigree breeder may produce 10 bulls, on 9 of which he loses money but the 10th brings in such a price that his business flourishes.

In India to-day the value of a bull is calculated on his carrying a few lucky marks and conforming to a particular type. He is known as 'Jatwala' or an 'Assal.'

Bulls of this description not being pure bred throw in different progeny with the net result that there is no advance made. The percentage of selected breeding animals from such a herd in a year is about 10 p.c. It will therefore be seen that to get the right animal or herd together will take years and cost money. Each year makes it more and more difficult to procure the necessary cattle with which to start a farm.

Effects in the district.

In establishing a farm the cattle have been bought from the breeder himself. He knows his cattle. Consequently he knows that you cannot for a few years produce any better than he himself has produced, as he has kept the best and sold you what he does not want. Despite all this in the past

6 years considerable interest has been aroused. The reports of the very many inquiries made considered certain areas breeding areas and others non-breeding areas. Among the latter were included Dharwar and Sholapur districts. To-day these two districts are doing as much breeding as any others.

Disease.

In the Bombay Presidency fatal cattle disease is practically always in existence. To improve successfully the cattle, legislation for the isolation of infected villages is absolutely necessary. The more general use of inoculation and vaccination must also be introduced.

Cattle Breeding Management of the Chharodi Cattle Farm in North Gujarat.

GOVERNMENT OF BOMBAY, REVENUE DEPARTMENT, ORDER NO. 198.

Bombay Castle, 21st January 1920.

Letter from the Director of Agriculture, No. 263, dated 8th January 1920:—

"1. I have the honour to approach you with regard to the future of the Chharodi Farm in North Gujarat, recently taken over from the Civil Veterinary Department and placed under the direct charge of the Deputy Director of Animal Breeding. After a very careful survey of the situation there, Mr. Bruen has approached me with certain proposals some of which I venture to lay before you for sanction. In this connection I have myself visited the farm, and have been closely into the matter with Mr. Bruen.

"2. The object of the farm, it may be recalled, was laid down in 1907, the views of Messrs. Morgan and Mollison being accepted by Government (Government Resolution No. 9823, dated October 7th, 1907, Revenue Department) and was as follows:—

(*a*) to maintain a herd of pure North Gujarat cattle;

(*b*) to improve the breeds of North Gujarat cattle, by breeding with bulls of as near an ideal type as possible;

(*c*) to issue, as premium animals, bulls produced on the farm where they are required in the districts, subject to special premium bull rules.

"The experience of the last few years shows that there are two distinct types of North Gujarat cattle, both of which are found in the Chharodi herd, namely, the 'Kankrej' and the 'Wadiyal'. These seem to have been usually considered as one by most of the authorities on the subject, but they are really very distinct; of these the 'Kankrej' is the more valuable and profitable animal, being faster at work and (as has been proved at the Surat Farm), a very good milch animal. The 'Wadiyal' is a coarser and bulkier animal, slower and apparently chiefly suitable for heavy slow draught.

"We have apparently fairly satisfactory herds of these two types of animals, and after casting (at a good price, however) about eighty to ninety animals out of a herd of six hundred and fifty, Mr. Bruen thinks that we shall have the basis of first class herds of these two breeds. The only addition we shall want from outside will be the obtaining of two first class 'Wadiyal' bulls from the neighbourhood of Radhanpur, at an estimated cost of Rs. 800. The herd will itself be able to produce 'Kankrej' bulls for its own use, better than any that can be obtained from outside.

" 3. The farm at Chharodi contains about 2,700 acres, but it has never been surveyed. It is at present one huge paddock, with a single boundary fence. There are practically no interior fences and the result is that the herd cannot really be split up into portions and as the bulls must roam with the herd, it is difficult, if not impossible, to maintain two pure breeds. In order to make this possible and at the same time to prevent certain parts of the farm being over-grazed and the herbage spoilt, it is essential, I think, that the farm should be divided up by fencing into a number of blocks of about 400 acres each. This will entail a careful survey of the property and then the planning of fences to secure the object aimed at Mr. Bruen estimates that wire fences to achieve the end in view will cost Rs. 18,000 and I have to request you to move Government to sanction the expenditure of this amount for the purpose.

" 4. Mr. Bruen is of opinion and I agree with him, that with a standard herd like that at Chharodi, where the young stock are already of great value and will continually tend to increase in value, the stock should be, partly at any rate stall-fed. This means a considerable expenditure, estimated at Rs. 5,000 for masonry troughs, chains and other necessaries for this purpose. Hitherto there has been no stall-feeding except for the very young stock. I have to request you to ask Government to sanction this expenditure.

" 5. It is also necessary that we should have a much better water arrangement than at present. At present the cattle drink from tanks which are filled with rain water and then remain stagnant. I propose the erection of a small engine and pump on our well with overhead tanks and water connections to each of the cattle yards. This arrangement would be of great use also in case of fire and so far as I can learn there has been a small fire almost every year. As we have often over twenty lakhs of pounds of fodder stored, this is of very great importance. Such water arrangement as is needed is estimated to cost Rs. 6,000 and I have to ask you to move Government to sanction this amount for expenditure during the coming financial year.

" 6. It is also necessary to keep a very much larger amount of fodder on the farm in the form of silage. At present there is one silo only and the number needs to be very much increased. I venture to propose that Rs. 10,000 be granted in the coming year for increasing the provision for making and keeping silage.

" 7. The staff of the Chharodi Farm at present consists of :

(1) A Manager on Rs. 150 per month with a personal allowance of Rs. 30 to the present Manager, Mr. Nagarsheth.

(2) A Salutri—clerk—on Rs. 40 per month.

(3) A Fieldman on Rs. 30—2—40 per month.

As I propose now that at least 200 acres should be placed under cultivation in the coming year and as the system which is to be followed in the future will mean very much more careful records than in the past, I venture to propose that the following staff should be sanctioned for the future :—

1. Manager on Rs. 150—10—250 per month.

2. An Assistant Manager, on the cadre of 4th grade Agricultural Graduate Fieldmen, *i.e.*, Rs. 60 during one year's probation and then on Rs. 75—5—100.

3. A Salutri—clerk—on Rs. 40—2—60.

4. A Fieldman on Rs. 30—2—40.

This involves only one new post, namely that of Assistant Manager. The others simply involve continuation of the present arrangements on slight alteration of rates of pay.

"8. The definite proposals which I venture to submit to Government are that:—

(a) The following special grants should be included in the budget for 1920-21 for the Chharodi Farm:—

	Rs.
1. Purchase of two 'Wadiyal' bulls	800
2. Troughs, etc., for stall-feeding animals . . .	5,000
3. Fencing for dividing the farm	18,000
4. Pump and tanks for water-supply	6,000
5. New silos	10,000
TOTAL	39,800

(b) The following posts should be sanctioned as the staff of the Chharodi Farm in place of those at present existing:—

1. A Manager on Rs. 150—10—250 per month.
2. An Assistant Manager on the cadre of 4th grade Agricultural Graduate Fieldmen on the usual pay.
3. A Salutri—clerk—on Rs. 40—2—60.
4. A Fieldman on Rs. 30—2—40.

"9. I make these proposals with confidence as from present indication the Chharodi Farm is likely, in the near future, not only to be a very valuable institution from the point of view of maintaining the cattle of the country but also to be a very paying proposition.

ORDER.—The proposals made by the Director of Agriculture are sanctioned with effect from 1st April 1920.

2. The Accountant General should be requested to make the requisite provision in the second edition of the budget."

Old Premium Bull Rules—Conditions.

1. Half the initial cost of a premium bull to be paid by the agent or on behalf of subscribers resident in the village concerned.

2. Rs. 4 per mensem to be paid by Government to the agent for maintenance charges.

3. The bull to be the property of the agent after three years if he has subscribed half the initial cost himself, if the cost has been raised by subscription, the bull to be sold after three years and the proceeds utilised in paying towards the cost of another premium bull.

4. The bull to be properly cared for by the agent and to be allowed to graze with his cattle. The agent to be held responsible for the bull's condition.

5. The services of the bull to be made available free of charge to cows belonging to residents of the village only. The bull not to be allowed to cover more than one cow a day. In case of more than one cow being brought on one day, the best cow to be selected for the services of the bull.

6. A register of cows covered to be kept by the village officer from information supplied to him by the agent.

7. Premium bulls are not to be worked.

8. Neglect of above rules to involve forfeiture of the bull with no compensation.

Revised Premium Bull Rules and Regulations.

1. The premium bull will be issued in each case in the name of one approved person to be known as the agent who will be solely responsible to Government

for the care and management of the bull which must be maintained in good breeding condition.

2. The agent may be a private individual or the representative of a group of persons such as the inhabitants of a village or the members of a co-operative society.

3. In selecting its agents Government will take into account—

(1) the quality and number of the breeding cows available, with a view to the bull being used to the best advantage,

(2) the suitability of the locality—in particular as regards (*a*) grazing and water facilities, (*b*) fodder supply and (*c*) climate,

(3) the enthusiasm of the people as evidenced by their preparedness to

(*a*) store fodder whether as hay, *kadbi* or silage.

(*b*) to eliminate from the village all entire males either by castration or removal.

4. The agent will be required to sign a stamped agreement embodying the rules and regulations governing the terms of issue of premium bulls.

5. The agent will make the services of the bull available for all the cows approved by the body he represents.

6. The Livestock Expert to Government will represent Government in dealing with agents under these regulations and his decisions will be final.

7. Premium bulls will remain the property of Government and payment of the hire charge mentioned under rule 11 will give no title of ownership of the bull to the agent or the body he represents.

8. The bull will normally be issued for a period of three years and at the end of that period Government will replace the bull free of charge—but Government reserve the right to take back the bull at any time it sees fit to do so without compensation.

9. The replaced bull will be at the absolute disposal of Government.

10. Government will also replace the bull if the agent or the body he represents finds it unsatisfactory.

11. The hire charge for the bull will be one-half or one-quarter of the market value of the bull.

12. Government will contribute a maintenance premium of Rs. 10 and Rs. 5 per mensem on the following conditions:—

(*a*) If the hire charge is one-half of the value of the bull, Rs. 10.

(*b*) If the hire charge is one-quarter of the value of the bull, Rs. 5.

(*c*) Provided Rs. 5 are spent on feeding concentrates for the bull.

13. Payment of the premium will be made monthly provided the post card referred to in rule 15 is received. Otherwise the agent will forfeit the premium.

14. The agent will maintain a register in which will be entered all services.

15. Post cards will be provided by the Department of Agriculture and the agent will be responsible for despatching one post card each month to the Agricultural Officer in charge of the Circle in which will be noted all services during the month.

16. The bull will be regularly inspected by a representative of the Bombay Department of Agriculture; the agent will be present at these inspections and will produce the register.

17. Government are prepared to promote cattle-breeding in those villages already possessing breeding bulls, by providing a premium bull free of cost in place of each such bull which may be surrendered to Government. If the surrendered bull has been dedicated to God, Government will hand it over to a suitable *pinjrapole*.

Northcote Cattle Farm, Chharodi.

Statement showing the marked progress in yielding capacity of the Kankrej herd within the period of five years.

Serial No.	Year.	Number of animals milked.	Number of animals yielding 1,500 lbs. and above during the year.	Annual average yield for animal milked.	Remarks
				Lbs. ozs.	
1	1921-22	100	6	438 11	
2	1922-23	69	4	637 11	Milking operations were begun in December 1920.
3	1923-24	67	13	827 7	
4	1924-25	109	16	932 11	
5	1925-26	93	32	1,330 14	

Northcote Cattle Farm, Chharodi.

The animals were calving at the age of 6 and 7 years in the time of the Civil Veterinary Department and this was always a problem with them. The following remark appears in the annual report of the Civil Veterinary Department for 1916-17 :—

"66. The cows at Chharodi mature very late for some reason and quite a small number produce calves before 6 years of age, 160 cows over 6 years of age produced 75 calves whilst only 16 cows calved out of 74 between 4 and 6 years. The question is being considered from all its aspects with a view to effect some improvement".

During the year 1925-26, 33 animals calved for the first time on this farm and the average age at which these animals dropped calves works out at 4 years and 9 months. Out of these there were only two that calved at an age over six years and only six that calved at an age between five and six years. One animal calved at as early an age as 3 years and 7 months and another one at 3 years and 8 months.

The total number of births during a particular year has also considerably increased of late and the last two years' can be taken as the record years in the history of the farm in this respect.

A statement showing the number of births.

Year.	Number of cows.	Births.		Remarks.
		Male.	Female.	
1920-21	256	65	60	
1921-22	212	65	66	
1922-23	153	53	63	
1923-24	194	40	52	
1924-25	204	68	59	
1925-26	195	85	81	

Willingdon Cattle Farm, Phihai, (Sind).

Statement showing the marked progress in yielding capacity of the Sindhi herd within the period of four years.

Serial No.	Year.	Number of cows.	Number of cows yielding under 3500 lbs.	Number of cows yielding over				Remarks.
				3,500 lbs.	4,000 lbs.	5,000 lbs.	6,000 lbs.	
1	2	3	4	5	6	7	8	9
1	1922-23	38	4	...	2	...	...	
2	1923-24	35	13	5	7	7	1	Columns 4 to 8 show number of animals completing a lactation in the year.
3	1924-25	39	20	5	5	5	...	
4	1925-26	33	18	5	8	9	3	

Oral Evidence.

6883. *The Chairman :* Mr. Bruen, you are the Livestock Expert to the Government of Bombay?—Yes.

6884. You have put in a most interesting and useful note on cattle-breeding in this Presidency for which my colleagues and I are very greatly obliged to you. Do you wish to make any statement of a general character at this stage in amplification of your note?—No; I should prefer to be asked questions on it.

6885. Do you agree that the improvement of the quality and condition of cattle in the Presidency would be one of the most substantial contributions to a better system of agriculture?—I am sure of it.

6886. Do you think that the present organisation of your own department, the Agricultural Department and the Veterinary Department, and the co-ordination between them is such as to offer the best hope of that improvement in the breeding of cattle?—No.

6887. Would you like to make constructive suggestions to us as to what improvements could be made?—Yes. I think to get the best use out of my department and the Veterinary Department they should be under one control; whether they are under the control of the Director of Agriculture or the Minister of Agriculture is really immaterial.

6888. You think that there should be some over-riding authority over both departments?—Yes, for the simple reason that at the present time the Veterinary Department is under a Minister whose portfolio is totally different from that of the Minister of Agriculture, and that means there can be hardly any co-ordination at all. We are working together and whenever I want the help of the Veterinary Department they are always willing to give it, but there are times when their help is needed in a greater measure than they can provide at present. Owing to their system of having the Veterinary Assistants under the District Local Boards, it is very difficult for them to transfer a man from one particular District Local Board to another in an emergency. If the two departments are placed under one Minister that difficulty can be obviated very easily, I think.

6889. As regards the wider question of the co-ordination of the Heads of these departments, do you think that you are in sufficiently close touch with the Director of Agriculture?—I am. I am directly under the Director of Agriculture and I think my work is really in every sense just as important as that of the Veterinary Department. Since both these branches are equally allied to agriculture, it is my opinion that the direct control should be in the hands of the Director of Agriculture, because they are so interlaced with one another that the one cannot do without the other. If you take it in that light the Director of Agriculture is the right person to direct both departments, because you cannot expect a man with purely veterinary training to control the Agricultural Department. I think in every Province in India the Director of Agriculture is now a specialist officer. Under these conditions the Director of Agriculture has just as much knowledge of animal breeding as he has of veterinary science, and if he can control animal breeding efficiently he should be able to control the veterinary work efficiently.

6890. As regards the organisation of the Veterinary Service, have you a good deal of experience of the Veterinary Service in this Presidency?—No, I am afraid, I have not.

6891. I should have thought indirectly you would have?—I deal direct with the Superintendent of the Veterinary Department, but what his organisation actually is I do not know.

6892. Nor have you any experience, then, of the working of that organisation?—Except that I happen to know that the Veterinary Assistants in the districts are under the District Local Boards, and so there is dual control,

the Veterinary Superintendent controlling the men from one end and the Local Boards from the other.

6893. Is it your view that the high incidence of contagious disease amongst cattle in the Presidency is a serious bar to cattle improvement?—Yes, very serious.

6894. Would you develop that a little?—Yes. Really there are two main factors in the deterioration of cattle in this Presidency, famine and disease. After the cattle of a particular village or group of villages have passed through an outbreak of rinderpest, the 30 or 40 per cent. that may survive the attack are hopeless as breeding animals. That is my experience not only in the districts but on a Military farm also. When I was Manager of one of the Military dairy farms I had a herd of 1,700 cattle. We brought many animals through rinderpest and after we had got them through they were hopeless as breeding animals. There must be some form of legislation to prevent the spread of disease in India.

6895. What do you say about the Indian States in relation to such an Act?—I believe myself that in the Provinces we are all trying to do our best, but your question leads me to a matter which might arise later on another point; namely, the best is not got out of us owing to the fact that we really do not know what our neighbouring Provinces are doing in this particular line; and this equally applies to the diseases of cattle.

6896. In your day-to-day work you feel that the lack of co-ordination and co-relation of work between the different Provinces is a serious hindrance?—Yes. It means it is costing the different Provinces a lot more money than it really ought to.

6897. Reverting to my original question of the bearing of the high incidence of disease on the improvement of breeds, do you think it is true that a good many persons, relatively well-off, would be prepared to take an interest, and an active part, in the improvement of breeds if they were not deterred from doing so by the fact that they feel it is little use spending money on the improvement of cattle unless there is some security for the lives of the animals so improved?—I have not come across cases of that description.

6898. You do not think that is an important consideration?—I should not care to say. It has never been put to me at all in that way in my work in the districts since I have been here.

6899. Before leaving the question of the inter-relation of these departments, would you agree that hereditary and congenital characteristics are often important in relation to immunity or susceptibility to disease?—Yes, and that is one of the reasons why, in this Presidency, I am very much against the crossing of our indigenous breeds of cattle.

6900. You are against crossing?—Yes, with outside breeds of European or American cattle, because my contention is that at the present time one of the few qualities our Indian cattle possess, if not their only quality, is their immunity against disease, and by bringing in anything from outside we are going to lose the only quality we possess at the present time.

6901. Have you followed the history of the half-breds in the Military farms?—I spent six years on a Military farm myself.

6902. It is a fact, I take it, that the first cross is an efficient animal so far as its yield of milk is concerned?—Yes.

6903. The best available in India?—The best available to-day, yes.

6904. What about the next cross?—It is hopeless.

6905. And the next cross again?—I do not think they have ever got to it.

6906. Do you think the half-bred farm makes any contribution towards the improvement of cattle in India?—No; in my opinion it is a hindrance, because the Military dairy farms have for the past 15 to 20 years been selling half-bred bull calves, or even heifers, into the districts. The cultivators, and even our city people, have heard that these animals give enormous quantities of milk, so they have purchased them and treated them in exactly the same way

as the ordinary village cattle. The result has been that when disease comes along the first animal to pick it up is the half-bred.

6907. That is why there are no third crosses?—I do not know that it is due to that; I think it is due to the fact they are so hopeless it is impossible to rear them.

6908. Regarded purely as milk-producing machines, could you give any indication of the comparative value of selected indigenous cows and the half-breds to which you have referred?—Unfortunately the crossing of our Indian cattle with European and other breeds was started many years ago, and the improvement of our indigenous cattle has only recently been taken in hand, so that to-day half-bred cattle and country cattle cannot fairly be compared. On my farm I have the son and daughter of an animal which gave in her lactation period 10,000 lbs. in 293 days. If as much work had been done on Indian cattle in the last 25 years as has been done on the half-bred, I believe the former would now be in the same position as the latter.

6909. Not quite, because an important contribution towards the improvement of the cattle of the country would have been made?—Yes. I am only referring to milk yield. Had the Military dairy farms tried to improve the native cattle, they would have made a contribution towards the improvement of the cattle of the country, instead of the reverse.

6910. Is there general agreement with your views that the second cross back to the indigenous animal is a failure?—I think this question was fairly well thrashed out at the last Board meeting I attended, and there everyone agreed they were useless. I think that opinion is almost universal.

6911. Do you know if any recognised expert traverses that view?—I think the Military dairy farm people, who have done it themselves, now admit they have failed.

6912. They have not failed, because they were not attempting to improve the breeds; their only concern was with the milk yield?—Yes.

6913. On this matter of breeding bulls, you have provided the Commission with copies of the old and the existing rules. Do you wish to suggest any change in the practice or the rules?—No, beyond mentioning a small change I am having to make at the present time. We are giving a premium bull to a particular person and not to a village or a society or anything like that. We hold one man responsible. In our old rules, after three years the bull became the property of that man, and that was an encouragement to him to take the bull. After we had worked according to the old rules for some time, I found that out of 100 bulls we put out in the Presidency we only got good results from 35, which is natural when you are working with the cattle we have in India; there is nothing very pure about them yet. In order, therefore, not to lose a good bull I might have put in a village, I altered that rule so that the bull, instead of becoming the property of the man, remains the property of Government the whole time. Government replaces that bull free of charge whenever required. That scheme costs the village no more and costs the Government no more; it is the person who actually takes the bull who feels the loss. Owing to this arrangement it became a little difficult to put out bulls in some areas, so that I have now rescinded the clause in question.

6914. How many premium bulls are there in the Presidency at this moment?—At this moment I have in the Presidency 168 premium bulls.

6915. One hundred and sixty-eight premium bulls at stud at this moment?—Yes.

6916. Has it been brought to your notice that the cultivators complain they have to pay more than the recognised fee when they take a cow to a premium bull?—It has never been brought to my notice at all.

6917. You know this country far better than I do. Would you be at all surprised if there were instances where a little bit more than the recognised fee is charged?—There is no fee at all; none whatsoever.

6918. I am thinking of cases where bulls are at stud for a fee. For premium bulls there is no fee at all?—No.

6919. Have you known cases of charges being made for premium bulls?—Yes, but they are absolutely voluntary from the person who has taken a cow to the bull. In one village in the Dharwar district, we happened to put out a really excellent bull. The bull was intended for the use of the village only, and people from the surrounding villages, whenever they came to have their cows served by this particular bull, gave a sort of donation to the village for the use of the bull, either in the form of 2 lbs. of *ghi* or 5 lbs. of concentrated food to be fed to the bull itself. It was for the bull; there was no fee.

6920. I am founding myself on what the Commission was told the other day by a group of villagers whom we examined. I was wrong, I suppose, when I was told of that, in thinking they referred to premium bulls. Probably it was a bull belonging to some one which he let out at a recognised fee. Is there any extortion on the part of persons in charge of these premium bulls?—None whatsoever.

6921. You have given the Commission a very interesting note* on the question of fodder and grazing. I do not know whether you wish to amplify that at all, or whether you think your note covers every point you wish to put forward?—As far as I know at present it covers everything. If there is anything wanting, I may be able to answer any questions that are put to me.

6922. On the question of the facilities for grazing in forests or grass-cutting in forests, do you wish to say anything more than you have said?—As far as cattle-breeding goes, I may assure you that the closing of forests and the so-called restrictions on grazing lands, in my opinion, have very, very little effect on the deterioration of the cattle, for there is ample fodder in our Presidency during the monsoons, both in the form of grass and in the form of the *juar* that is grown in the Presidency that, if properly conserved and used, would last the scarce months through quite easily. But unfortunately we have not yet got to the stage where we can show the people that this is possible. We are doing it now.

6923. You refer to non-fodder-famine years?—Yes, I am referring at the present moment to the usual year, the normal year.

6924. What about periods of fodder famine?—We are getting over that difficulty in the Bombay Presidency very rapidly. We have got a Famine Fodder Fund, which is operating very successfully in, I think at the present time, about five or six of our talukas and districts where famine occurs fairly frequently, by storing the local fodder grown.

6925. You say you are getting on rapidly. Do you look forward to the day when a fodder famine will no longer be a menace?—I hope so.

6926. I am sure you hope so, but do you think so?—I think so. As I say, we have ample fodder, if we can only get the people to conserve it. In our worst tract, in the Ahmednagar and Sholapur districts, in a good year there is as much fodder grown as will last those districts for two or three years, which is about our limit of famine years in succession.

6927. How about the practice of stall-feeding in this Presidency?—All bullocks and all cows that are useful, that are giving milk, are stall-fed, but I am sorry to say that it is a very, very small percentage of the cattle of the Presidency. Especially is that so with regard to the cow.

6928. Is stall-feeding more prevalent in some districts than in others?—Yes. In Gujarat stall-feeding is resorted to considerably, and similarly in the Dharwar district.

6929. How do you account for that?—It is simply due to the fact that the cattle of Gujarat give a fairly substantial return to the owner. The buffaloes are known milkers; they produce fairly substantial quantities of milk; they are economic animal and are fed. In the remainder of the Presidency the

* *Vide* Government of Bombay, Revenue Department, Resolution No. 3252, dated the 30th June, 1925.

animal is not economic and the people cannot afford to feed it; it is let loose in the morning and returns in the evening, finding what it can.

6930. In the matter of dairying, do you think that a dairy carried out according to the European ideas of hygiene and so on is an economic proposition in this Presidency at this moment?—It is, and it would be more so if there were better control and legislation over the milk that is sold in the country at large. I might give you an instance. We have a company that supplies milk to Bombay from a place about 2 hours' run out of Bombay itself. That institute has a depôt in Bombay to which it sends its milk, and it is pasteurised and cooled. The remainder of the milk in Bombay is produced from buffaloes that are stall-fed in the city itself. There is the producer of milk, that is, the owner of the buffalo, who passes his milk on to a wholesale or retail vendor, who, as a matter of fact, has no recognised residence in Bombay at all. The Municipal authorities inspect the milk produced by this company, it may be twice or three or four times a week; but though the milk produced by this man who has no residence may be tested, the next day when they go to look for him, he is not to be found. Therefore, the competition is unfair, and we cannot possibly compete with the people in Bombay in supplying milk.

6931. Are you broadly familiar with the conditions in Great Britain?—Fairly familiar.

6932. If all the statutes and rules which in England control the sale of milk, its quality and cleanliness, were to be removed, and milk which was dirty were offered to the East End population at half the present price, side by side with milk which was clean at its present price, do you suppose they would take the clean milk?—I do not see why they should not. The trouble in India is that the Hindu population will buy adulterated milk, but they will not adulterate it themselves. If you go to any one of our market places in India where milk is sold you will find the man has a vessel of pure milk; alongside it he has a vessel of water, and he will sell you whatever grade of milk you want. You cannot teach these people to buy two ounces of pure milk, take it home, and add clean water to it, that is not permissible, apparently, in the Hindu religion; whereas they will buy adulterated milk in the city here.

That is what I really meant by my question.

6933. Clean milk, and sound rules of hygiene in its distribution, are things which are really imposed on the general public by the more progressive elements in the community, and if left to themselves, the humble members of the community will not worry about these things?—I think myself that if the adulterated and dirty milk were removed and clean milk were supplied at the same price, people would accept it.

6934. At the same price?—It can be done at the same price; I am producing milk cheaper at this little place outside Bombay than they can do in Bombay at any time.

6935. Do you mean to say that you can produce first class milk under first class conditions, and sell it as cheap as the milk is being sold to the working class population in Bombay to-day?—As cheap as good milk is sold, yes. The person selling milk in Bombay will tell you, "Here is pure milk; you can have it at six annas or eight annas a seer; I will add one glass of water to it, and you can have it at 4 annas a seer." If they took it at the pure price from us our dairies would pay and pay well.

6936. How much of the pure milk is bought, as compared with the deliberately watered milk?—I think that depends on the size of the family.

6937. It is really an important point. After all, if there is no demand for pure milk, your case for the production of pure milk as an economic proposition goes by the board, does it not?—The production of pure milk does not depend only on the production of the milk itself. There are other factors working with it that would go to show that it is essential in this country.

6938. What would they be?—First and foremost, these people that produce milk in a city bring their cattle down into the city. They milk them for

9 months or 12 months, or even up to 18 months. When they have finished the animal is done, and it goes to the slaughter-house. To prevent this great drain on the country, it is essential that we should produce milk in the district. By producing milk in the district we are going to save the cattle of the country, and at the same time produce clean milk.

6939. How do you suggest a start should be made?—By encouraging and subsidising the starting of dairy farms in the district.

6940. By subsidising?—Yes. Every other commodity in India that has to be produced and cannot stand on its own legs is subsidised, and I cannot see why dairies should not be subsidised as well.

6941. Have you anything to say about the manufacture of milk or dairy products? Could that be made an industry of this country?—Yes, it could be made a very flourishing and paying industry. Unfortunately it has got into the hands of a class of persons whom it is very difficult to eradicate to-day; it will take us years. India had at one time a very large export trade in butter, but it has lost that owing to the quality of the butter exported. Australia has captured the Ceylon market, to which we used to send quite a lot of butter; and similarly with Japan, and the Straits Settlements. Owing to the quality of the butter we produce in India to-day, we have lost that trade.

6942. That is not due to conditions in India?—Not at all. Good pure butter can be made in India as in any other part of the world, and I believe more cheaply. We produce butter in Gujarat during the greater part of the year for something like 11 to 12 annas a lb. It simply means that the material is there and it is only the methods of manufacture that have helped us to lose this trade that we had.

6943. Is there any Municipal system of health control in a great city like Bombay? Is milk which is exposed for sale tested at all?—There is control, but I am sorry to say that it is a control on paper; it does not function very well.

6944. It works on paper, but not on the milk?—Not on the product.

6945. Are tests taken of the milk exposed for sale?—Yes, they are, but, as I tried to explain to you to-day, the only man who suffers is the man who runs a scientific dairy. We are being prosecuted, whereas the man who adulterates is not. His name is taken, his milk is analysed, but to-morrow if a summons goes for him he is not to be found. He was under the name of "Ali Bux" yesterday, but to-morrow he will call himself by another name, and you can do nothing.

6946. Is the distribution made from door to door?—Yes, it is from door to door. In some cases there are shops that sell the milk and sell many other commodities at the same time.

6947. Would you suggest the registration of itinerant vendors?—Yes.

6948. Might that make an important contribution towards the improvement of the general position, which would act generally on dairying?—Yes, it would help us in improving our cattle in the country to-day. That is the point I wish to lay most stress on. It is not so much that there is shortage of milk, but there is a very big drain on our districts for cattle to produce milk for these large cities. The drain is really big, and I think that legislation of any description is going to help very little, unless it is to encourage and give the man producing milk in the mofussil a chance of competing with the local man.

6949. What do you say about the production of a dual purpose animal, a milking and working animal, as against the opposite line of advance?—The time is coming, I am afraid, when we shall have to pay very serious attention to producing a dual purpose animal, for the simple reason, as I pointed out in the note that I presented to you, that we have in the buffalo an animal which is probably one of the greatest hindrances to the improvement of cattle in this country. The female buffalo calf is attended to from the day it is born till the day it calves, and ever afterwards, and naturally, with that attention it has improved. Whereas, the female calf of the cow, from the

day is born till the day it dies, receives no attention whatsoever. From a milk-producing point of view, there is very little attention, and less attention every year, being paid to the cow, and the time must come when the same position will be reached as was reached with our shorthorn cattle at Home, when they went on breeding them till they bred the milk out of them. It is going to be exactly the same. If very extensive steps are not taken to remedy this, I fear in time the cattle of this country will be in a very sad way.

6950. You think things are going from bad to worse?—Yes. The buffalo is spreading. As they get their milk from the buffalo, they pay less attention to the cow. In certain parts of India they produce milk from cows, but they cannot sell it. Unless we take very serious measures, I am afraid the time will come when the cow population of this Presidency will be in a very sad way.

6951. *Sir Henry Lawrence:* Do you consider there is a sufficiency of plough bullocks in this Presidency?—There is a sufficiency of bullocks in the Bombay Presidency, but they are not produced in the Bombay Presidency.

6952. Where does the Presidency derive its supply from?—I tried to work out the figures for the Commission, but I have really had very little time in which to do it. I will give you the facts, though I cannot give you the figures. We have in the Presidency, as most of the members of the Commission have seen, about nine different breeds of cattle; they are all exhibited at the Agricultural Show. Over and above this, we have three breeds of cattle that are used extensively in several of our districts. These are the Malvi, the Nimari from the Central Provinces and the Amrit Mahal from Mysore State. All those animals that are in the Presidency to-day are not bred here at all. Every Malvi bullock that is seen in the Presidency has come from Central India Agencies or from the Central Provinces or from Rajputana. I tried hard to work out some sort of figures, but I believe myself that almost a quarter, if not a third, of the bullocks of the Bombay Presidency come from outside.

6953. What is, approximately, the cattle population of the Presidency? Have you got the figures?—The cattle population of the Bombay Presidency is 9·9 millions.

6954. Of that, what proportion do you regard as uneconomic or useless animals?—In my opinion, 75 per cent.

6955. *The Chairman:* Seventy-five per cent. are useful or useless?—Useless.

6956. *Dr. Hyder:* Is that due to their number?—Due to their quality.

6957. *Sir Thomas Middleton:* You mean uneconomic?—Uneconomic. Excuse me; I may be leading you astray. When I say uneconomic, I do not mean that 75 per cent. of the 9·9 million or 10 million cattle that we have in the Presidency are uneconomic. What I meant to say was that 75 per cent. of the cow population of the Bombay Presidency is uneconomic.

6958. *Sir Henry Lawrence:* Out of the 10 million would about half be cows?—No.

6959. What proportion?—Our cow population in the Bombay Presidency is just a little over 1¼ millions.

6960. That is all females?—All females; cows, heifers, and so on, and our bullock population is about 3¼ millions. We are importing about a third of our cattle. We have got 1¼ million cows to produce 3¼ million bullocks. As you know, the Indian cow calves for the first time in the vicinity of 6 years of age, and it calves till it is about 14 years of age, making a total of about 8 years; they calve, as a rule, once in 18 months or two years. In their lifetime, they produce from 4 to 5 calves, of which 50 per cent. may be taken as males and 50 per cent. females. If you take 25 per cent. of these as casualties, you will find that we are producing only about two-thirds of our requirements in the Presidency. We have only got to material for the production of two-thirds of the bullock power that is necessary in the Presidency.

6961. One and a half million cows produce how many bullocks in a year?—They produce once in every 18 months or 2 years. They produce half that number; that is half of 1½ millions.

6962. They produce about 600,000 a year?—Yes, roughly.

6963. That would be their total progeny in a year?—Yes; 25 per cent. of those die before they reach maturity.

6964. What would you estimate as the annual requirements of the Presidency in bullocks?—I am afraid I have not been able to work out that figure. I really do not know what the annual requirements are. I have here worked out that in 1920 the requirements of bullocks in the Bombay Presidency were 3,695,852.

6965. Thirty-six lakhs were required for the cultivation of all the cultivated area in the Bombay Presidency?—Yes.

6966. What life do you give to a working bullock?—We might take it that the working bullock matures in India at the age of 4½ or 5 years; his total period of efficient working will not be beyond 12 years of age, that is to say, 7 years' work.

6967. If you divide that figure of 36 lakhs by 7, your annual requirements are 500,000?—Yes, I take it that would be correct.

6968. That figure of 7 years allows for deaths and other casualties?—No, I am not allowing for casualties.

6969. Making that allowance would you put it at 5 years?—It is hard to estimate in working years like that. Probably, it would be about 5 years, allowing for casualties.

6970. In that case, you require about 7 lakhs of bullocks per annum?—Yes.

6971. The local cows produce nearly that quantity; that is your estimate?—Yes.

6972. You have at stud about 160 premium bulls?—Yes.

6973. Are there other bulls possessed by District Local Boards put out to stud?—No, all stud bulls are put out by my department.

6974. The total number of bulls that Government, in any shape or form, produces for the improvement of the stock is your 160?—That is the number actually in use to-day. They are shifted after every three years from a particular village.

6975. Do you look forward to any fixed time within which you may be able to make any appreciable improvement in the cattle population?—No, I am afraid I cannot estimate any figure like that, because the conditions vary so, and one never knows. If we had good years every year we might be able to give you an estimate; but with famines and diseases cropping up it is really impossible to give any figure at all.

6976. Your operations with regard to premium bulls will have to be multiplied manifold before you can really do much good to the total cattle population?—Quite so.

6977. You would not like to give us any figures?—No, I cannot give you any figures. I may tell you that this is a very expensive proposition; when I am abe to prove to my Government that this is a sound proposition I may get more assistance and more funds for this purpose.

6978. But you are satisfied that your 160 bulls are doing good service?—I am quite satisfied that at the present time they are doing very good service. It is a very difficult thing to gauge the result in rupees. A calf may be born to a cow owned by a man who may be in straitened circumstances; he may sell the cow and the calf and they go out of that district altogether; but we are at the present moment in the Bombay Presidency getting Rs. 20 or Rs. 30 more for a calf produced from one of my premium bulls than is paid for the ordinary cattle in the district.

6979. You regard yourself as at the very beginning of a very important improvement for the benefit of the ryot?—Yes, I think it is really very important.

6980. Do you wish to concentrate on one purpose or the other or do you think it better to produce a good serviceable dual purpose animal?—It all depends where we are working; we are trying to breed more milk into our draught breeds indigenous to a particular tract. In Gujarat we have bred milk into an animal which a few years ago was a purely draught animal. Unless we can produce an animal that will give more milk, that will calve more regularly and will mature at half the age, at the present time it must be uneconomical, and no man is going to keep an animal that is uneconomical. It is our duty at the present moment to produce an animal which will not be a burden on the cultivator; when we have reached that stage, the cattle problem of this Province will not be difficult. Until that is done, it is going to be a very serious uphill climb.

6981. How long have you been in the service of the Government of Bombay?—Since, 1919, but I have been breeding cattle in the Bombay Presidency since 1914.

6982. Have you got out any pamphlet or bulletin to suggest to Local Bodies the proper principles of animal-breeding?—We have issued certain information in the way of leaflets, but not on a very extensive scale. At the present time, although I have spent six years in the Bombay Government, I feel that there is a good deal more to learn on this particular question than I have been able to pick up in these six years, and I think it would be rather dangerous for me to go round to any particular person and tell him to do so and so in his particular locality, because I have really not had sufficient experience, and I do not believe there are many people in India who could or would attempt to give you a definite view on this particular point.

6983. Have you any Indian staff working with you?—I have myself three men for the whole of the Bombay Presidency.

6984. Three officers, of what standard?—Three men who are drawing at the present time about Rs. 115 a month.

6985. Are they from the Agricultural College or the Veterinary College?—I have two from the Agricultural College and one from the Veterinary College; that is my district staff. Then I have my farm Managers as well; I have three farms and I have Managers in them.

6986. So that to make any real impression on District Local Boards and get them interested, you require some more men to do propaganda work?—Yes, a good deal; I hope the time will come when the Bombay Government will consider this seriously and give me a bigger staff.

6987. Have you yet made any proposals to the Bombay Government?—Yes, we are making proposals very frequently during the year. I got a letter in only to-day with reference to starting another farm and gradually I suppose we shall be able to get what we think is required.

6988. So far the importance of your work has not been recognised in your opinion?—Yes, in my opinion it has not been recognised.

6989. *Sir Ganga Ram:* What price has the cultivator to pay for a pair of bullocks ready for the plough from your institution?—I do not sell bullocks.

6990. What does it cost you?—I do not produce bullocks.

6991. *Sir Thomas Middleton:* Where are your headquarters?—Poona.

6992. Have you visited all parts of the Presidency?—Yes.

6993. Would you care to name three or four districts where the cattle are distinctly above the average for the Presidency, and similarly three or four where they are distinctly below the average?—Yes. We have excellent cattle in Sind, in Gujarat and in Dharwar, and very fair cattle in Satara. The districts which have very poor cattle are Poona, Nasik, Khandesh, Bijapur and Sholapur, and our worst cattle are in Konkan, Karwar and Ratnagiri.

6994. Are there obvious reasons for these differences?—In the Dharwar district the people breed and look after a very fine type of cattle. In Gujarat the buffalo is what it is to-day because the people there have been able to regulate breeding owing to the fencing that exists there.

6995. You told us that the cattle in Dharwar and the buffaloes in Gujarat were very fine, and therefore the people were taking care of them?—Yes.

6996. I put it to a previous witness this morning that the cattle had been taken care of, and that therefore they were valuable?—Quite right.

6997. Which comes first, the care or the value?—The point is the cattle are valuable because they have been taken care of and they have been able to regulate their breeding, with the result that they have the good cattle which they care for to-day.

6998. I attributed quality in the case of Gujarat cattle to the enclosures you have just mentioned?—Our cattle in Gujarat are at present produced by the Rabari, who goes from place to place. Enclosure has little or no effect on him, but he knows the value of a bull and he selects a bull which he keeps, and no other male stock are allowed anywhere near his cattle.

6999. You have shown in your memorandum that the Rabaris did their work well in the past?—Yes.

7000. But I gather from your memorandum that their practices are deteriorating?—Yes.

7001. And that they are not now so efficient?—No, owing to the fact that the trade is also deteriorating and their movements are restricted.

7002. From your memorandum I gather that in the period which I can recollect (30 to 35 years) the cow, as distinct from the bullock, in Gujarat has suffered badly in competition with the buffalo? That was beginning when I first knew the country?—Yes, that is so.

7003. Reference has been made to second crosses. What exactly do you mean by a second cross?—We have found the second cross is nothing like the first cross. It deteriorates in stature, physique and milk yield. A first cross is where we put an Ayrshire bull, say, on a country cow. The Ayrshire bull put on the calf of that first cross gives the second cross.

7004. Often called the three parts bred?—Practically.

7005. Is it the influence of the second cross itself which is detrimental, or the fact that you have an animal much more nearly resembling the breed from which the bull comes, and entirely unsuited constitutionally to the climate and conditions of this country? What is it that makes the animal so useless?—I think the lot of different things are brought to bear on it. For one thing, the second cross is physically unfit to thrive in this country. It is not because it resembles the Ayrshire more, because pure Ayrshires brought out here have thrived to a certain extent; there are cattle brought in by almost every ship that brings horses to Bombay and Madras, and those cattle thrive.

7006. Crossing tends to find out weaknesses?—Yes.

7007. I was interested to hear you say that in your opinion ample supplies of fodder were available in the Presidency. I should have thought that at any rate in the Deccan and some other districts of the Presidency there could not be ample supplies?—It is my opinion that though there may be one or two talukas (and I could name you one or two) where there is not enough, yet they are not the Presidency, and in the Presidency as a whole there is grass in abundance in the monsoon period. If people would only conserve it and make hay and silage of it there would be ample for one, two or even three years.

7008. Your point is that the grass exists in the reserves in the forests?—Yes, and in the grass lands adjoining our villages.

7009. We are well aware that there is a vast amount of grass grown in the forests, but the evidence we had the other day was that there were only 500,000 tons in the reserve accumulated by the Forest Department?—Yes, but it is not that grass I allude to at all; it is the grass in the locality. For instance, here in Poona we have hills all round. In Khandesh we have the Satpuras with miles and miles of grass land. The Forest Department has given the people every right and facility to get grass from the forests

at 4 annas a cart, and they have only to go 16 or 17 miles to get it; and if they wanted to conserve it they could.

7010. They have to cut it for themselves?—Yes.

7011. Are they able to undertake that work in addition to the cultivation they have to carry on?—That is the great drawback, that both these functions come at the same time; but I think it could be overcome. Silage-making, for instance, is done at a time of the year when there is no other work possible, when the monsoon is on. The crops are growing and the people are idle; they could set to work to make silage.

7012. The difficulty about silage is the heavy cost of carting it any distance?—You cannot expect people to cart green fodder 30 or 40 miles, but people should certainly be able to cart green fodder 2 miles to make silage; and where we have no grass we have an ample supply of *juari*. In Dharwar there is very little grass, but there is sufficient *juari* to justify Government opening a shredding and baling plant and purchasing fodder to keep as a reserve against famine for other districts.

7013. With regard to the number of calves in this Presidency, you have here 2,700,000 cows. These cows calve on an average once in 18 months, but, assuming they calve at two-year intervals, the number of calves born would be about 1,350,000?—Yes. My figures show that we have 1,062,000.

7014. *The Chairman:* The first calf is at 6 years old?—Yes, and our improved stock in India calve at 4½ or 5 years. I should not care to say when the ordinary village cow calves.

7015. What proportion of the females shown in that list would be under 6, and what over?—It would be very difficult to say. You would have to take it as about 50 per cent.

7016. *Sir Thomas Middleton:* The figure given here refers to cows 5 years old and upwards?—I think you cannot possibly base it on that figure. I have seen census reports. A man will call a bullock working in the fields a bull because it is entire. You may have a heifer 6 years old, and because it looks like a cow it is put down as a cow; but if it has not calved it is not a cow but a heifer.

7017. This figure of 2,700,000 given in the Bombay memorandum; what number do you think it represents of cows?—I should not care to say, but I do not think it represents all cows. It most probably includes buffaloes. My figure is 1,062,000, or about half of what you have mentioned. The buffalo population is about another million, which makes it correct.

7018. I did not know that the figure in the memorandum included buffaloes?—Yes; I am fairly sure my figure is correct.

7019. You talk of butter selling in Gujarat at 11*d.* a pound. That includes buffalo butter?—It is practically only buffalo butter.

7020. *Dr. Hyder:* Your purpose here in this Presidency is to evolve a dual purpose breed; is that not so?—Not exactly. We are trying to evolve a dual purpose animal, in that we are trying to get our present draught breeds to give more milk than they do.

7021. I find from your note that the buffalo is in close competition with the cow so far as milk is concerned?—It is in competition with the improvement of our cows; that is the point.

7022. How do you get over the buffalo difficulty when you are face to face with the problem of a dual purpose breed?—The point is that all we are trying to do is to produce an animal which will be more economical for the cultivator to keep in good condition. If we do that, and he knows the progeny from that cow will give him more milk to support his family, and will at the same time give him a good draught animal, he will breed that and leave the buffalo alone. The buffalo has no place whatsoever in the home of a cultivator. He cannot afford to feed two mouths to produce two animals which are required for two different purposes.

7023. Do you think the cattle population of this Presidency is beyond its fodder resources?—No. My opinion is the fodder resources of the Presidency are ample, but the cattle in the districts are so poor (as I have said, 75 per cent. of the cattle of the Presidency are probably uneconomic) that a man will not stir or spend 4 annas to bring a cartload of grass to feed them, because he knows they are of no use to him. If they can find sufficient food to keep themselves alive, let them; if it is not to be had they do not get it, and when they get so lean they can hardly walk and they are taken by the butchers.

7024. Are these hills round Poona to which you refer under the control of the Forest Department?—Yes.

7025. Whether they are covered with trees or not? The majority of them are bare.—We have three or four different sorts of grass land. We have grass land under the Forest Department; we have revenue waste land under the Revenue Department, and there are other lands which produce very little else but grass under the Forest Department.

7026. You said the dairy industry in Gujarat was not a success?—The organised dairy industry in Gujarat is not a success, but the dairy trade as it is, is a very profitable thing to Gujarat.

7027. I imagine the products of that industry are milk and butter?—Yes, and a certain amount of *ghi*.

7028. The home demand in this Presidency is chiefly in the form of butter or *ghi*?—The demand for *ghi* is greater than for butter.

7029. Do you think if the dairy industry in Gujarat devoted itself to *ghi* rather than butter it would find a profitable market?—No; a man makes most money when he sells his produce as near to milk as possible. If he can get a fair price for it as milk it is more profitable to him to sell it as milk. Next comes cream. The cultivator can make more money on cream than on butter, and so it goes on until you get to *ghi*, which is the least paying of any one of the four steps in the milk trade.

7030. The rise in the price of *ghi* has not been so great as the rise in the price of milk?—For the quality of *ghi* the villager would turn out from his butter he would not get the price he should do; he realises a better price if he sells it as butter.

7031. You mentioned some figures with regard to the annual requirements in the way of bullock-power: I think you said 31 lakhs. How many acres do you allow to a pair of bullocks?—We have taken the Presidency as a whole. These figures I am giving you are from the Report of the Cattle Committee that was appointed by the Government of Bombay four years ago. I have not had time to get out anything more recent.

7032. *The Chairman:* What year was that?—It was published in 1923. That is not the little note I have given you; I wrote that the other day.

7033. *Dr. Hyder:* Are these figures from the Report of the Cattle Committee figures which result from an enumeration of the cattle, or are they based on the total area cropped divided by the acreage you would allow to a pair of bullocks?—As a matter of fact, for our purpose I have taken here as an average throughout the Presidency about 15 acres per pair of bullocks.

7034. You know the total area cropped, and by dividing it by 15 you get at your bullock requirements?—Yes. If we take as an average that one pair of bullocks will plough and cultivate 15 acres of land, taking the Presidency as a whole we would require 36,95,852 bullocks; not pairs, but bullocks. That was in 1919-20.

7035. With regard to subsidised milk, you know that India is an agricultural country?—Yes.

7036. Therefore to require State-aid for the production of milk is peculiar?—The point is that the dairy and cattle-breeding industries have been

neglected for so many years that the improvement of crops has outstripped them considerably, and the cow and the buffalo to-day cannot compete with other agricultural pursuits. They cannot compete with cotton, for instance. Yet it is absolutely essential to this country that we should have milk and that we should have cattle, and therefore it is now up to Government to give the State-aid it gave to cotton and iron and other things and bring this on a level with other schemes.

7037. Land produces many things. It can produce cotton, wheat, sugarcane, grass, cows, milk. The fact that so much of the land is devoted to these other crops which are more profitable shows that the dairy industry is not profitable?—Yes.

7038. You would require to support it by means of a subsidy from Government?—Yes, until it becomes equal to and can compete with the other crops of this country.

7039. *Sir Chunilal Mehta:* You said there was ample grass of fodder of other kinds available for the cattle population of this Presidency?—Yes.

7040. The grass requires cutting at a particular time?—Yes.

7041. Is that possible?—I think so.

7042. Take the Khandesh forest, which has the largest amount of grass. How do you expect the cultivator to cut at a time when his crops also require attention?—I expect there is a little difficulty in that, but he could make silage.

7043. So far there is no indication that silage will be popular?—I should not care to say that. We have not spread ourselves sufficiently over the Presidency to say it is not popular or that the people will not take to it.

7044. The Agricultural Department has been advocating silage for the last few years?—Ever since I have been with the department, yes.

7045. Yet people are not taking to it?—That is so.

7046. There must be some reason?—It is like everything new that is brought into the country and forced on the people like that. They will have to study it for a season or two before they will take to it. That happens whenever you introduced anything new into the country. I think the time we have devoted to it has not really been enough.

7047. Have you found out the reasons why people do not take to silage? Is there any particular difficulty?—We are demonstrating it now, and the people say the cattle will not eat it and do not like the smell. If we got at the people for a succession of years and showed them that the cattle did eat it and that it was useful they would use it. In Nasik the Department of Agriculture built a silo tower which was taken over by a private person in the Nasik district, and to-day he makes and sells silage in the same way that other people make hay and sell it. If it succeeds there, why should not it do so elsewhere?

7048. Do you consider the Navapur grass would make good silage?—I think so.

7049. Has not there been a complaint that that grass is unfit for cattle unless it is cut at a particular time?—That is true, and it applies to practically all the grasses in the Bombay Presidency. Our grasses are cut too late. Moreover, especially in Navapur, where the forests are heavy, in an 80-lb. bale of grass you will most probably find 10 lbs. of leaves and sticks. The people are prejudiced. We have found in Khandesh that the grass there, cut at the time of year when it is usually cut, is of very little use to us during our famines.

7050. In good years there is a surplus of *kadbi* in those areas where *juari* is largely grown?—Yes.

7051. You say the cultivator should take this and make it available in subsequent years?—Yes.

7052. Why is not that being done?—Because the poor man does not know any better. He gets his fodder and stores it for a little while, and then some broker comes along and produces Rs. 100 and offers to buy his grass and he sells it.

7053. Is that the only difficulty, or have you found that the cultivators are afraid to stack it because of the risk of fire?—That is quite true. In North Gujarat we have tried to get the people to stack *juari* fodder, and they are afraid, because they think people may set fire to their *juari* owing to the damage their cattle have done to the crops while they were growing. That is an established thing in Gujarat.

7054. And there is some truth in it?—There is.

7055. Attempts have been made in the past to get the people to go in for communal storage of *kadbi*?—I do not know about the rest of the Presidency, but that is so in the Dharwar district.

7056. Yet the whole thing has come to nothing?—I think it will take a little time.

7057. You still hope it will be possible?—I have every hope.

7058. From what you say I gather the buffalo is really destroying the cow; that is what it amounts to?—Yes.

7059. The population of this Presidency has a preference for buffalo milk? —Yes.

7060. And for *ghi* made from it?—Yes.

7061. Do you think measures should be taken to get over this difficulty?— Not to stop the buffalo, but to pay more money for and spend more attention on improving the cow to make it as useful as the buffalo. I still maintain the buffalo is essential for our dairy, *ghi* and butter trade, but that is from a commercial point of view only. I say the buffalo has no place with the cultivator.

7062. *The Raja of Parlakimedi:* In this district, do you mean?—In every district.

7063. *Sir Ganga Ram:* Do you not use buffaloes for ploughing?—To a certain extent, in the rice tracts; but we have a breed of cow we have proved to be better than the buffalo in every respect for wet cultivation and ploughing, our Dangi.

7064. *Sir Chunilal Mehta:* Is the Dangi bullock now being used in Konkan?—Yes.

7065. Is it displacing the buffalo?—No. It has been in competition with the buffalo all through. Why the buffalo has a hold there is because you can buy a male animal for Rs. 15, whereas the cow would cost Rs. 75 to Rs. 80. The poorer class of rice cultivator still keeps and uses the buffalo bull.

7066. What steps do you desire either Government or the people to take to meet this competition of the buffalo?—By improving and breeding and caring for the cows more than they do at the present time.

7067. Have you any hope of altering the taste of the people for buffalo milk?—I think the time will come, but as I have already mentioned the buffalo will always be there for the milk-supply of towns and larger villages, though circumstances will make the cultivator utilise the milk of his cow, as indeed he does to-day. If a cultivator has a cow which gives 4 to 6 lbs. of milk over and above what her calf requires he consumes it; he does not go to the bazaar and buy buffalo milk.

7068. You consider a time will come when the buffalo will only supply the milk requirements of cities?—And the *ghi* requirements of the country. What I want to impress on the Commission is that our cattle in India at the present time do not give any milk at all. The cow is used at present to produce a male animal. For a cow to produce a male animal a man has to keep it for six years, and in the sixth year it may produce a female calf which will be no use to him, so he will have to go on for two years more.

It may be nine years before it produces a bullock, and it will be five or seven years at least before that bullock is useful. Therefore he keeps one animal 14 years to produce a bullock, and during that time gets nothing back from that cow at all. I say the cow must give milk, so as to become an economic proposition.

7069. I quite agree; the whole object is to make the cow an economic proposition?—Yes.

7070. How do you propose to do that?—By improvements in our breeding methods, by producing premium bulls from our Government farms and other institutions where we hope to get help.

7071. What subsidy do you require from Government for this purpose?—It all depends upon the amount of work which is going to be undertaken by an individual; but I think the subsidy should cover his losses for at least three years.

7072. Whose losses?—The losses of the person who has undertaken to produce the cattle or start the dairy or whatever it may be.

7073. Then your plan of campaign would be to multiply the number of premium bulls as much as ever you can?—Yes.

7074. You have got 168 now?—Yes.

7075. Are you limited by finance in putting out more bulls?—My finance is limited.

7076. Are you limited by the difficulty of getting bulls?—I am limited by finance and I am limited by the difficulty in getting bulls.

7077. So that if you had all the finance you wanted?—At the present moment I could not buy the bulls.

7078. You could not use that money?—No.

7079. Therefore your present plan is to increase the number of breeding bulls?—Yes.

7080. And that you are doing not only by breeding them on Government farms, but by making arrangements with private institutions like *gorakshans* and *pinjrapoles* to breed on scientific lines under your supervision?—Yes.

7081. To breed bulls which you undertake to buy and put out in the country?—Yes.

7082. That would be your plan of meeting this difficulty?—Yes.

7083. What more assistance do you require from Government?—The point is that if all these institutions started and worked as we wanted them to work, and if we filled the deficiency by starting farms where no such institution existed, and produced the bulls, that is all that is really wanted at the present time as far as bull production is concerned. We want institutions and places where we can produce the required pedigree bull to improve the cattle of the country.

7084. You suggested that subsidies might be given to dairies. What is your idea with regard to that?—The point is that to start a dairy in India at all, it must be started with at least 20 or 30 buffaloes or cows as the case may be. To purchase 20 or 30 animals in the first year of starting a concern is a very difficult matter; in those 30 animals you may buy 15 animals that have paid their way, and you may buy 15 animals that have not paid their way. For that reason it takes a man at least three or four years to get a herd together of sufficient size to be self-supporting. During that period in my opinion he must be subsidised, because he cannot possibly do it otherwise.

7085. What co-ordination have you now with the Military dairy farms?—None whatever.

7086. What would you suggest?—The Military dairy farms are working in our midst in our Province, and my contention is that they should not only produce milk for the Military but they should be producing an animal that is useful for our district, and it should be one of the best media

for the production of first class animals. I think this Commission should lay a great deal of stress on that particular point, because while these people are here no doubt to produce milk for their troops, at the same time they should be assisting the districts in which they are located. Here, as I tried to point out to you, they use half-bred animals, and instead of being a source of help to the Bombay Government, they are a nuisance to us, sending out into the villages half-bred animals which are really dangerous to our cattle.

7087. Are you in frequent touch with the Expert of the Imperial Institute?—Very frequent.

7088. I suppose the Military farms would be beyond the scope of his authority?—Yes.

7089. You said there was not enough co-ordination with the other Provinces?—Yes.

7090. In what way do you suggest there should be co-ordination?—I think it would really be met by having a sort of committee that would function in each Province; that would not be isolated or placed in Simla or Pusa with an office, but it would function in each Province; that is, it would do useful work in each of the Provinces. It would be in a position to make recommendations. We will take for instance the United Provinces. We have a very fine type of animal which I believe would meet their requirements in a particular locality, and I recommend that they get these animals and breed them in their Province, or get the Bombay Presidency to produce bulls for them. By doing that they would save the Bombay Presidency at the present moment the starting of three farms for producing Malvi cattle which we are using extensively in the Panch Mahals, in parts of Khandesh and parts of Lower Gujarat. If we had some sort of co-operation with an original farm where these cattle come from, we could breed our cattle in the Provinces where they are now using the Malvi, at a great deal less cost than the establishment of a farm would entail.

7091. Have not your meetings with the Board of Agriculture been of any assistance to you?—None at all. If it is going to have meetings which are anything like the meetings of the Board of Agriculture, I think I would rather do without it; we want a more virile body of people who will move round the country and advise and be useful to each Province in turn. If it is going to be isolated so that you have to write letters and receive answers to letters, I would rather do without it.

7092. Have you noticed in any part of the Presidency the cow used for any purpose except for milking and breeding?—In the Mysore State they actually use them in the plough, and the cow is used as a beast of burden for carrying produce by a certain class of trader.

7093. Do you think the tendency to use the cow for the plough is on the increase?—I should not care to say.

7094. It is only just beginning, is it?—No, I think it is an old established practice in Mysore State, but I should not like to say the practice is increasing.

7095. Has that been tried in the Punjab?—I could not tell you. That is an instance of how this committee I have suggested would be of immense help to us.

7096. You have a bull at Manjri, have you not? Is Manjri in your charge?—No.

7097. You have nothing to do with Manjri?—No.

7098. *The Chairman:* In answer to a question put to you by one of my colleagues a short time ago you spoke of the possibility of the issue of some manual of instruction. I think you ought to know that Dr. Mann, in answer to a question put to him by Sir Henry Lawrence which ran, "Have you issued any manual on cattle-breeding to indicate to cattle-owners the proper principles for the improvement of their cattle?", said: "I have

a bulletin of that kind which has just been drawn up by Mr. Bruen in my office; we have not issued one, but it is ready for issue?"—I was asked if I had issued any and I said 'No.' It is ready for issue; it is in the press; it is in the College to-day, but only to-day.

7099. I thought you would wish to know that?—I was asked if I had done anything up to the present, and I have not. It is only going out now.

7100. *The Raja of Parlakimedi:* Have you any buffalo-breeding stations at all in the Bombay Presidency?—We have, at our College of Agriculture; they are doing a little buffalo-breeding, and we have one place in Sind at Sukkur.

7101. Is it by selection, or what?—At the present time by selection and breeding from pedigrees.

7102. Is it entirely to improve the milking strain?—Entirely to improve the milk production.

7103. The percentage of butter in buffalo milk is greater than in cow's milk, is it not?—Yes.

7104. And India is a very large butter-eating country?—Yes.

7105. Would you not encourage buffalo-breeding stations?—As I have said before, as a commercial proposition buffalo keeping may be encouraged, but that is not our business. Our business at the present moment is to improve the agriculture of the country by improving the cattle. My contention is that for the cultivator we must produce an economical animal. The cultivator cannot afford to feed a buffalo and a cow for two different purposes, so that we must give him an animal which, though its milk will be a little poorer in fat, will give him a little extra milk which will help him to keep his family as they should be kept. I do not for a moment say we ought to condemn the buffalo and slaughter it.

7106. In the Bombay Presidency is not the buffalo used for rice cultivation?—Yes, but to a very small extent. We have a breed called Dangi which is infinitely better than the buffalo.

7107. They are not even used for draught purposes?—Very little in the Bombay Presidency, except in the Konkan.

7108. Are the stall-fed animals as healthy as animals allowed to graze in proper grazing grounds?—It is very difficult for me to answer that question. Cattle brought up on good pastures do infinitely better than cattle that are stall-fed; but I am afraid there are no good pastures in India.

7109. What would you substitute to make up for the deficiency in stall-fed animals? Exercise is essential, is it not?—Yes.

7110. And a stall-fed animal must suffer from want of exercise?—No, it gets its exercise. An animal when it is outgrazing gets a certain amount of food, but it does not get sufficient food in India not to be stall-fed. By stall-feeding I do not mean that the animal is tied by the neck to its trough for 24 hours in the day, but I say stall-feeding is essential to supplement the poor grazing in this country.

7111. What is the best fodder for milk-giving cattle in this Presidency?—A green fodder such as *juari*.

7112. Lucerne?—I am afraid that is one of the things we lack in our Presidency. We have no institute in which we could experiment to find out which of these fodders is the best, but judging from yields it most probably is the best. The Indian, as you know, has a prejudice against feeding lucerne, because he thinks it has a bad effect on his animals; he thinks it makes a milk animal go dry, and it is very difficult to introduce it in this country.

7113. If that is so, it is peculiar to the Bombay Presidency; it is not so in other parts of India?—I am only talking of Bombay.

7114. Have you any statistics as to cattle fed on cotton seed and ground-nut cake?—No.

7115. Are they equally good?—As far as we know. We can tell you from the analysis which is better, but the analysis is apt to be misleading.

In our Presidency we have not up to the present carried out any extensive feeding experiments, and whether our cattle digest the one as easily as the other I am not in a position to say at present.

7116. *Sir James MacKenna:* You have given some answers to the Chairman and to other Members on the question of organisation. I understand you consider that Agricultural, Veterinary and Cattle-breeding should all be under the same Minister. Under whom do you work as Cattle-breeding Expert?—I work under the Director of Agriculture.

7117. Do you think cattle-breeding should be under the Agricultural or the Veterinary Department?—Under the Agricultural Department, certainly.

7118. That is your firm conviction?—Absolutely.

7119. Is any training in the principles of cattle-breeding and dairying given at the Poona Agricultural College?—Yes.

7120. Who gives it?—The Professor of Agriculture and his staff.

7121. Have you anything to do with that?—Nothing.

7122. That seems to suggest a certain lack of co-ordination, does it not?—It means that I am fully occupied in the district and I have not got the time to devote to the College.

7123. On the general question of training in cattle-breeding and dairy work, do you think that subject should be taken up centrally by the Government of India, or should it be left to each Province to develop on its own lines?—I am of the opinion that each Province can do its own work quite well, but that there should be some way of co-ordinating one Province with another so that each Province can help its next-door neighbour. I think I have answered that question already twice.

7124. Yes, you have. So that you are not in favour of the centralisation of training in the principles of cattle-breeding and dairying under the Central Government?—I might tell you that one of my opinions as to agricultural education in India is that the people do not get sufficient practical training.

7125. But that hardly answers my question?—And I am very much in favour of any institution that gives more practical training than our Agricultural Colleges give at the present time. Our college here is an Agricultural College; dairy training is only a side line. I think that an institute that furthers the teaching of dairy farming as is done in Bangalore should be encouraged.

7126. My point is that the essential principles of cattle-breeding are of general application?—Yes.

7127. And it might be economical of money and men to have it centralised instead of having each Province playing with it, which is all they are really doing now?—At the present time, since the Provinces are not equipped with as good institutions as that possessed by the Government of India, it may be we ought to take advantage of the Government of India institutions; but if our Province were equally equipped and we were staffed as well, I do not see any reason why we should not do the teaching here.

7128. You made some rather severe criticisms of the Board of Agriculture; did you attend the meeting of the Board of Agriculture at Pusa last December?—I did not.

7129. The subject of cattle-breeding was discussed then?—Yes. I did not criticise the Board of Agriculture.

7130. Then I must have misunderstood you?—I was speaking of the action taken with regard to cattle-breeding: that the Board of Agriculture being the body that it is, not only the Provincial Governments but the Central Government have taken very little notice of what that body said or did.

7131. One of the recommendations of that Board was that an All-India Cattle Committee should be appointed; do you approve of that recommenda-

tion?—I have made mention of that twice already to-day; I advocate it very much.

7132. I am putting it definitely in the terms in which it was passed by the Board; do you approve of that?—I do, yes.

7133. We have had rather a central organisation put before us. I think the officer who brought the idea before us called it a central organisation for research or an advisory council. I suppose if such a central agricultural advisory agency came into being, the All-India Cattle Committee which you suggest might work under it as a Cattle Sub-Committee?—Yes, to co-ordinate the work in one Province with that in another and to advise; as an advisory body I would welcome it.

7134. That is exactly the idea, you would have provincial representation on the Cattle Committee?—Yes, I agree, as I say again, on the condition that it is a functioning body, that it moves and meets and does some work in each Province.

7135. Do you think enough research work has been done on animal nutrition questions?—No.

7136. You said something about the Military dairy farms, and the general impression that might be drawn from your evidence is that you look with considerable disfavour on them?—I do.

7137. But I put it to you that at the time these farms were initiated the main problem was the immediate supply of suitable milk for the troops?—Yes, I agree with that.

7138. Do you not agree that in those circumstances the line they took for increasing that milk-supply by the introduction of foreign breeds of cattle was the only line that was possible?—Probably at that particular time the only thing they could do was to cross with cattle from Europe or America. That is probably the quickest way of getting milk, but it is not the quickest way of improving the cattle of the country.

7139. No, but that was not their problem?—No. I may mention that the Military have a farm at Ferozepore; all their cattle at that particular farm are indigenous Montgomery cattle, and most probably that farm pays them better than the farms on which they have half-bred cattle. If they had done that in these other Provinces with the indigenous cattle you can imagine the amount of good they would have done to the country to-day.

7140. That is the line along which you would recommend them to develop?—Yes.

7141. You think they ought to abandon the cross-breds, or at least, not sell the cross-breds?—They should keep them to themselves and not pass them around the country indiscriminately. They usually sell an animal which is no use to them; it comes into our districts and most probably is useful for about 3 months; after that it harbours disease which as soon as it gets run down, it spreads to all the other cattle we have in the vicinity.

7142. *Professor Gangulee:* Do I understand that you do not take any part in the teaching of animal husbandry in the Agricultural College?—I do not.

7143. You leave that entirely in the hands of the Professor of Agriculture?—The Professor of Agriculture and his staff.

7144. Has he had any training in this matter?—Yes, he is a man trained in England.

7145. Do you carry on any research on livestock breeding or on fodder and animal nutrition?—Yes, I do a certain amount on my farms; I am experimenting on different things in my farms to-day, but it is only very, very rough research, if you can call it research. We are trying to find out what we can; I have no laboratory, I have no institution under me where I can do research work.

7146. And you do not publish the results of your findings?—Yes, they are published.

7147. Of your own research?—As I tell you, I have no research.

7148. Experiments?—Only certain experiments which I have published; they have been published in the Journals at Pusa and they have been published in our Presidency. One was published from Chharodi Farm where we tried an experiment with grass and the quantity of food required to be fed to an animal which was being fed grass only; that has been published and any other work I have done in that way has been published.

7149. Are you in touch with the work of the Imperial Institute of Animal Husbandry in Bangalore?—I am in touch with the Imperial Dairy Expert, but I have had no occasion to deal with their Animal Husbandry Section; but our Grass Committee of which I am a member are trying to do a little work with them.

7150. Have you had occasion to visit Bangalore?—I was Imperial Dairy Expert myself for 9 months.

7151. So that you know that the Bangalore Institute originated from the suggestions made by the Board of Agriculture?—Yes.

7152. So the Board of Agriculture, after all, has done some work?—Yes; all I said was that there are a lot of things discussed at the Board of Agriculture which it takes years to get into the Provinces at all. What we want is a more mobile body, a body that will know something about each Province and be able to make recommendations which a Province will accept.

7153. Are there any big landowners and cultivators in the Presidency who have taken up cattle-breeding?—Not to my knowledge; there are just one or two cases where we have given land to private people to do work, but it has not been very successful up to the present.

7154. Are there many co-operative cattle-breeding stations here?—Yes, in Dharwar we have co-operative breeding stations, all started since the Government cattle-breeding station was started. All over the Presidency we have 18 such societies.

7155. Did the initiative informing those societies come from you or from the local people?—I should not like to say; I should say it came from the Co-operative Department; they formed the society of which you will find five representatives on the grounds in the Show.

7156. Do you as Livestock Expert of the Presidency offer assistance to these co-operative societies?—I do.

7157. Do they come to you?—Yes, every time.

7158. Do you inspect their breeding stock?—I do.

7159. In the event of the outbreak of an epidemic, do you obtain any assistance from the Central Veterinary Research Service?—Every time.

7160. You are in communication with them every time when there is an outbreak here?—I never attempt to go out of my sphere of work with regard to veterinary science; whenever I feel I should get the assistance of the Veterinary Department I get it at once.

7161. Have you got an adequate supply of the necessary sera for inoculation?—I have nothing to do with that; if I want my cattle inoculated I tell the Superintendent of the Veterinary Department. Where he obtains his serum has nothing to do with me.

7162. Do you keep any herd register?—I do.

7163. In keeping a herd register you must grade the stock?—Yes, for breeding.

7164. Do you follow any system?—I do.

7165. What is the basis of your selection? Do you look for milking quality, or what?—No, it all depends what I am breeding for. As I told the Commission before, I am trying to breed a certain amount of milk into all my breeds. Every year or twice a year I go over my herd very thoroughly; I look to the standard points of the particular breed, and I have regard to the milking

qualities of the animals combined with other points. Each animal is registered, each animal's milk is weighed, each animal is measured and weighed.

7166. Do you consider that cattle-breeding is a paying proposition?—No.

7167. That is one of the reasons I suppose why the professional cattle breeder is fast dying out?—Yes.

7168. And yet the price of cattle is going up?—Yes.

7169. And the fodder supply in the country is quite adequate?—Yes.

7170. Yet it is not a paying proposition?—No; I will explain that to you if you wish.

7171. I should like you to clear up that point?—In Ahmednagar district we have a breeder who breeds the black and white animal which you have seen at the Show. He leaves his home and goes from place to place through the different forests right away down to Surat and back again. He lands back at his home just before *Diwali* when he sells his stock. In the old days it did not cost that man a pice to rear his cattle; to-day in this particular locality there are only a very few of these breeders left, and now the cattle have to be supported on purchased fodder; it costs an anna a day to feed these animals. You can imagine what it is going to cost in four years, and in that locality the animal sells at probably about two-thirds of what it has cost to rear it. It could not possibly be a paying proposition.

7172. *Dr. Hyder:* But if it costs more to feed the animal, the breeder sells at higher price?—He does not.

7173. And the price of milk has gone up?—He gets a bigger price for the dual purpose animal.

7174. Prices are about double what they were?—So is the price of everything else.

7175. Why should he go out of the business?—Because now his business does not pay him. I tried to explain; in the old days it did not cost him a pice except for the food of his man or men who went round with the cattle, and the money for that was obtained by taking 1 or 2 ozs. of milk from each animal, making it into *ghi*, and selling it at the next village they went through, or exchanging it for wheat or *bajri* or whatever it might be. Now these people have to pay for all this food, and no matter at what figure you estimate the cost of keeping an animal for a year, it is not a paying proposition. When I say in this note of mine that it is not a paying proposition, I have laid stress on the point that it is not a paying proposition for a man to produce a bull that is fit to use as a breeding bull. Pedigree bull production does not pay and will not pay for years, for the simple reason that out of all the male animals that are born to-day, even on the most advanced farms, you will find there will be about 25 or 30 per cent. of them that cannot be used as premium bulls owing to the degree of impurity in the animals we have.

7176. *Professor Gangulee:* Leave out of consideration this nomadic cattle breeder. Why has not this business attracted the attention of the big landowners of the country, if there is any prospect of success in it. I mean there is such a big need. And you say that cattle-breeding societies are increasing, and that cultivators are beginning to realise that in order to improve their stock cattle-breeding must be encouraged. In view of all these considerations I do not quite understand why you have not been able to attract private enterprise to this business?—Because it is not paying.

7177. What are the results achieved by the co-operative breeding societies?—They are not paying, and especially during the first four years. After the first four years, when they commence selling their bull calves, they become self-supporting, but it will take them many years to become millionaires from cattle-breeding.

7178. *Mr. Calvert:* I think we have settled now that cattle-breeding does not pay; but you still, I think, hold the opinion that dairying is a paying proposition?—Yes, under the circumstances I have mentioned, where the demand is fairly steady it does pay. The Military dairy farms are paying to-day.

7179. If this dairying is a paying proposition, why is it your capitalists have not taken to it?—The point in this connection is that the capitalist here puts his capital into a dairy farm, but it is actually run by his servants, and the return after the servants have done with it is so very small that the people have not come forward at all. I doubt whether private enterprise could take up dairying as a business for many years to come.

7180. Do you not think the fact the capitalist does not take to dairying is proof positive it is not a paying proposition?—No, because what they fear is disease breaking out and their capital being wiped out along with their cattle, or a severe famine occurring, when they would have to purchase fodder at exorbitant rates. We have not yet actually proved right up to the hilt that dairy farming under present conditions is a paying proposition.

7181. You mentioned liability to disease?—Yes.

7182. As long as there is that liability to disease, do you think it is sound to encourage small cultivators to go in for high-priced animals?—Yes, because disease in India is actually spread by animals which are ill-fed and not taken care of at all. You will find here that, in our Province especially, the animals that are wiped out first are those which are not good animals at all. With a good animal the cultivator knows very well that if he does not give it the necessary attention he is likely to suffer. A man who keeps a more expensive animal than the ordinary village bullock takes a bigger risk, but he is repaid by getting very much more efficient work from a good animal than he would from the ordinary village animal.

7183. *The Chairman:* Is it really your view that resistance against, say, rinderpest or septicæmia is sensibly greater in the case of well-fed animals than in the case of poor animals?—I feel certain of it. If a wave of disease passes over a locality it is the poor animals that go first; they have not the power to resist it. The well-fed animals may be immune or may only get a slight attack from which they recover.

7184. Have you much foot-and-mouth disease?—We have it nearly always, but it has no effect on our cattle at all. You may have to tie them up for two or three days, but that is the end of it. There are no deaths from foot-and-mouth disease in India.

7185. *Mr. Calvert:* With regard to the system of common grazing in India, when you turn cattle out for common grazing would not your good milk-yielder suffer in comparison, with a barren cow or poor yielder?—That is a question put to me very often. Someone says to me: "Will a particular type of animal thrive in a particular place?" If I say it will thrive, I do not mean it will thrive if kept in the same way as the ordinary village cattle which are kept purely as manure producers. It requires more care.

7186. Has one result of this common grazing system been the survival of the fittest, the fittest being the disease and famine resister?—I have put it the other way; in my note I have said that in olden days the improvement of the cattle was due to the survival of the fittest, owing to the cattle passing through large forests and similar areas where the lame and the maimed and the unfit fell behind and were devoured; but to-day the common grazing area is a positive danger to the cattle of a village; each one has an equal chance of getting such grass as there is to be had.

7187. As long as you have the common grazing system, with equal treatment of all animals, your good milker will suffer?—Yes, certainly.

7188. Have you any experience of milk recording by private cultivators in India, apart from official farms?—Yes.

7189. Do you think it is a thing you can introduce as a means of calling attention to a good yield?—We hope in time to introduce it successfully wherever any milking at all is being done. I am doing it in two places in the Bombay Presidency to-day.

7190. If by milk-recording societies we bring home to the cultivator the fact that his cow is uneconomic, what will be the effect? Will he turn to

the buffalo, or try to improve the cow?—We have also to show him the cow is not only a milk-producing proposition, but a proposition for producing draught. We must take the two together.

7191. England is doing very well with a single-purpose animal?—Yes, but the single-purpose animal there is a dairy animal which produces large quantities of milk and has been bred for the last 150 to 200 years.

7192. Our co-operative records show that one of the biggest single reasons for borrowing is to replace cattle?—Yes.

7193. If you are going to introduce a higher priced animal, without reducing its liability to disease, the tendency will be to borrow more?—The point is that like everything else, when this improvement of cattle is first started the cattle must be a little more expensive, but eventually, when they are produced in larger numbers, they will come down to the usual price. It has happened in our Dharwar district already. When three or four years ago we purchased cattle from the Mysore State you could not buy a good pair of bullocks in Dharwar under Rs. 600 to Rs. 800; now they have come down to Rs. 400, simply from the fact that people have taken an interest in it and are doing their own work which somebody used to do for them before.

7194. Were you at the Pusa Conference last December?—No.

7195. At that Conference they had an auction of their spare cattle, and those animals produced very high prices when purchased by ordinary cultivators?—Yes.

7196. It seemed very dangerous to allow such high-priced animals to go to cultivators without their having got over this liability to disease?—It is like everything else; you must take the risk if you want something good. A man has got to have his milk or do without it.

7197. You spoke of the drain of good milch cattle to cities?—Yes.

7198. Do you think that is an appreciable proportion of your total cattle?—Yes, of buffaloes; I was not talking of cows.

7199. Is anything being done here for sheep or goat breeding?—Yes.

7200. Is satisfactory progress being made?—We started three years ago with sheep and have now two centres.

7201. Did you meet with any special difficulties?—One of the experiments I conducted was on a Government farm, and the other on the farm of a fairly large landowner. His attempts have been very successful, and were exhibited at the Poona Show. I obtained cross-bred merinos from Hissar and crossed them with the country sheep, and now I have reached the third generation and hope this year to get sufficiently good results to put into the country to be a striking enough example to the people to carry on.

7202. Have you had any complaints about spotting?—I have had complaints of a number of black animals through crossing two whites, but not of spotting.

7203. *Mr. Kamat:* The state of things in Gujarat is better than elsewhere in the Presidency?—Yes.

7204. Is it receiving any subsidy from Government?—No.

7205. Why are things better there than in the Deccan and elsewhere?—Because, as I have pointed out already, the people in Gujarat pay more attention to their cattle, both buffaloes and cows. They are very particular as to what bull serves their buffalo or cow. In the village grazing areas in Gujarat most probably all the animals will be she-buffaloes or cows; but if you go to the grazing areas of the Deccan you will find as many, if not more entire bulls than there are cows or buffaloes. The consequent deterioration has been so rapid that the animals do not produce enough milk to pay.

7206. It is not the famine conditions of the Deccan, or some such cause, but ignorance of the economics of dairying?—Yes, that *plus* famine conditions and disease.

7207. If you spread a knowledge of the economics of dairying in the Deccan, do you think there would be a chance for the dairy business here?—Yes, with animals imported from Gujarat, but not with the local animals.

7208. In that case, no subsidy from Government would be necessary?—Yes, it would be absolutely necessary. In Gujarat dairying is a paying proposition because it is a cottage industry; it is only a subsidiary industry to the cultivator which his wife carries on, and every pice he gets is profit.

7209. But with effort it could be made a cottage industry in the Deccan as well?—Quite easily.

7210. You said we had lost the butter trade. Would it not be possible to revive it in places like Bombay?—The trade is there, but before and during the War we used to supply large quantities of butter to Ceylon, Java, the various countries of the Malay Peninsula and Burma. Within the last two years Australia, on account of the superior quality of her produce, has cut us out of all that trade.

7211. You said the cow was being neglected in competition with the buffalo. Do you think that, even with all the improvements possible in the breed of cows, the cow could become as profitable as the buffalo in this part of the country?—Yes. I have laid stress on that point before. I say the buffalo as a commercial proposition in a commercial dairy is one thing, and deserves every consideration, but I am not dealing with that question at present; what we are dealing with is the cultivator, and I say for the cultivator the only proposition is to have an animal which will give him a certain amount of milk which he can sell or consume and which will pay for the food of the cow, instead of having to keep a buffalo to supply his milk and a cow to supply his bullock power. That is where I say the dual purpose animal is essential. In a commercial dairy the dual purpose animal is crowded out altogether.

7212. The cultivator values the calf the cow gives him as a draught animal?—Yes.

7213. But he finds himself helpless, so far as the cow as an economic animal is concerned, to maintain her for three or four years until the bullock is mature?—Yes. He has to feed her during such time as she is carrying the calf, and then her and the calf until such time as she calves again or the bullock gives him a return in bullock-power, or, if the progeny is female, until such time as the female progeny produces milk or another calf.

7214. He knows the value of the thing, but with all your improvements can you get over the difficulties for him?—We are striving to produce an animal which will be economic, which will calve earlier and calve regularly, and which will give in addition a great deal of milk to support itself and its calf during the period before the calf becomes useful. Even if it only gives him 2 or 3 lbs. of milk, at 2 pice a pound that gives him sufficient to keep those animals in good condition.

7215. That you are going to evolve?—We hope to.

7216. *Dewan Bahadur Malji:* In Gujarat has not the Rabari's business been chiefly taken over by the Sindis coming in with their herds of cattle?—Not taken over. There is competition between them.

7217. How is it that the Rabaris are giving way?—The Sindi who comes into the Bombay Presidency is not a breeder; he is another leech on the animal breeder. He is a broker who purchases animals from people when they are hard up for cash, and who brings them along in large herds and sells them. He is not a breeder, but a *dalal* or agent for selling cattle.

7218. Do you not think the Sindi manages to realise better prices than the Rabari?—He is doing better, because he comes with a mature animal, whereas the Rabari rears the animals.

7219. How does the Sindi breed compare with the Gujarat breed?—What the Sindi brings with him is not the Sindi breed; it is the Malvi and the cross Malvi that he brings down from Rajputana as draught animals.

7220. Am I right in thinking the Sindi breed does not compare favourably with the Gujarat breed?—It does not, as a draught animal.

7221. Can these Sindi herds of cattle resist disease as well as the Gujarat breed?—I do not know.

7222. You told us the butter business had failed in Gujarat?—No, not failed; I said we have lost a certain amount of the export trade we used to do.

7223. What were the chief drawbacks there?—The quality of the butter manufactured.

7224. Did you issue any instructions in those days?—I was not there.

7225. *Sir Ganga Ram:* In the cattle business, cattle lifting pays better than cattle-breeding?—That is so!

7226. Is this Presidency free from that?—Absolutely; we have nothing like it, except in Sind. Our people are honest here.

7227. *Sir Chunilal Mehta:* When giving Sir Henry Lawrence certain figures as to the number of cattle in this Presidency, the imports of cattle and so on, you had not all the figures before you. I have here the last Government Resolution on the subject; perhaps you would like to put that in?—Yes. (*The document was handed in: Government of Bombay, Revenue Department Resolution No. 3252, dated the 30th June, 1925.*)

7228. *The Chairman:* Are you prepared to tell the Commission what you estimate as the cost of maintaining a pair of working bullocks for an average month in the year?—I am afraid it means giving you 12 different sets of figures for different parts of the Presidency, and I could not very well do it.

7229. Are there bulls at stud at the Agricultural Department's farm, apart from the premium bulls?—Yes. Whenever we have facilities for offering our bulls to the public we certainly do so.

7230. At what price?—Free. To the city people and others making a living out of it and to rich merchants there is a certain charge, but I do not know of any instance where a cultivator has been charged anything. It is not under my control.

7231. I am only interested in the difference in practice between the Agricultural Department and your own in that matter. If it is true the Agricultural Department charges a small fee, do you know why it does so?—I really could not say, unless I was told where it was. As I say, I do not see any reason why a wealthy merchant in Poona who keeps a cow should not pay for the service of a bull.

7232. As to the different melting points of butter made from buffaloes' milk and butter made from cows' milk, can you tell us what the difference is?—The average of the results of four experiments subsequently conducted on the melting point of butter is as follows:—

Cow's butter 39·87° c.; buffalo's butter—38·25°c.

7233. Is it really important?—It is a point raised by the people themselves. They say buffalo butter is a great deal more useful for cooking purposes than cow butter. The housewives will tell you that.

7234. Is there any demand for Indian cattle abroad?—There was a very big demand at one time.

7235. If you could really improve your breeds here, do you think that demand might give rise to a very important business?—A very important business. It would help our breeders considerably and change the aspect of cattle-breeding in this country.

(The witness withdrew.)

The Commission then adjourned till 2 p.m. on Monday, the 1st November, 1926, at Bombay.

Monday, November 1, 1926.

BOMBAY.

PRESENT:

The MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.

Rai Bahadur Sir GANGA RAM, KT., C.I.E., M.V.O.

Sir JAMES MACKENNA, KT., C.I.E., I.C.S.

Mr. H. CALVERT, C.I.E., I.C.S.

Professor N. GANGULEE.

Dr. L. K. HYDER.

Mr. B. S. KAMAT.

The Hon'ble Sir CHUNILAL V. MEHTA. } (*Co-opted Members.*)
Dewan Bahadur A. U. MALJI.

Mr. J. A. MADAN, I.C.S. } (*Joint Secretaries.*)
Mr. F. W. H. SMITH.

Mr. W. J. JENKINS, M.A., B.Sc., I.A.S., Officiating Secretary of the Indian Central Cotton Committee, Bombay.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—(*a*) The present organisation of research work in the Bombay Presidency, judged by results, is proving satisfactory.

I have only one or two suggestions to make which, in my opinion, might be carried out with advantage.

(1) More facilities and more funds should be provided for *district research, i.e.*, research into *local problems* by *investigators* on the spot.

For instance, the Tapti valley area in East and West Khandesh is a large and important wheat growing tract. In this tract, much could be done by the introduction of new varieties, by botanical selection, by improved agricultural methods, etc., to increase considerably the profits of the wheat grower. But such work to be effective and to make an appeal to the Tapti cultivator cannot be done at Poona, or even at Jalgaon or Dhulia. At an expenditure of about Rs. 1,500, a small wheat research station could be started *in the Tapti area* and the problems of the local wheat crop studied and investigated.

Such instances could be multiplied in Khandesh and, doubtless, in all other Divisions of the Presidency.

I am therefore in favour of the formation of a *Provincial Research Committee* at Poona, under the chairmanship of the Director of Agriculture. This Committee would administer a *special permanent Research Fund* and, problems such as I have indicated above, should be submitted to this Committee by the district officers with an estimate of the money and staff required to deal with them. This Research Committee would have the advantage of knowing what research schemes were contemplated all over the Presidency and, if the problem seemed a sufficiently important one, would allot the men and the means of undertaking the investigation.

The central expert at Poona would act as an adviser to Deputy Directors in laying out and controlling such local research schemes, in addition to carrying on his own general research work at a central research laboratory or station.

(2) The central research experts should take steps to get in *closer touch with district problems and district workers.* At present, there is a large staff of specialised officers, centred at Poona, who are responsible to a great extent for special types of agricultural investigations.

The visits of these officers to the various districts of the Presidency are *not nearly so frequent* as they ought to be and with the exception of such occasions as a meeting of the Provincial Board of Agriculture, the district officers have little or no opportunity of discussing their problems with these central workers.

This difficulty is being overcome by the formation of Research Committees, *viz.*, the Khandesh Cotton Breeding Committee, and such a system should be greatly extended and developed.

In addition, central research experts should undertake the training of selected district officers who are intended to undertake the investigation of special problems in their district.

The ideal organisation of research work is, in my opinion, the present system of co-operation in cotton research between the Indian Central Cotton Committee and Provincial Governments. The Provincial Governments submit *definite schemes* of research into some *important* problem on cotton cultivation. These schemes are considered by the Agricultural Research Sub-Committee and, if deemed of sufficient importance, are recommended to the Central Committee who, by means of grants-in-aid, provides for the conduct of the research for a definite period of time. Annual progress reports on the scheme are considered by the Agricultural Research Sub-Committee and by the Central Cotton Committee who can control the work of the investigators. Cotton research is thus being adequately provided for and its continuation is not liable to checks or restrictions imposed by the fluctuations of annual provincial budget grants. I would advocate all research work in a Province being organised on similar lines with a *Provincial Research Committee* acting in the same way as the Central Cotton Committee does with regard to cotton research; with a Special Research Fund of a permanent nature in place of the funds of the Cotton Committee and with central research workers and senior district officers taking the place of Provincial Governments as in the present cotton research organisation.

The Provincial Research Committee of a Province should contain representatives of the Agricultural Department—both central and district workers—of other departments of Government dealing with rural development and a non-official member appointed from each of the Divisional Boards of the Presidency. The Director of Agriculture should be *ex-officio* Chairman of the Provincial Research Committee.

(*b*) In my Annual Administration Report of the North Central Division (Nasik and Khandesh) 1924-25, I mentioned several promising subjects of research and investigation in that Division. Certain of these have been taken up but, others through lack of staff and funds, still remain uninvestigated:—

(*a*) *The wheat crop of the Tapti valley.*—Proposals for this work had been submitted before I left charge of the Division.

(*b*) *Ground-nut harvesting in Khandesh.*—The immense increase in the ground-nut area in Khandesh—from 4,119 acres in 1912-13 to 1,40,190 acres in 1924-25 combined with the increasing scarcity and expense of field labour, has raised the problem of ground-nut harvesting by mechanical means to a *very high importance.* Experiments with different types of implements, *viz.*, potato diggers, converted ploughs, etc., were tried on Jalgaon farm but were all unsatisfactory. This problem requires immediate

investigation by agricultural, engineering and mechanical experts.

(c) *Fruit cultivation, including the drying and preservation of fruit.*—In Khandesh, the cultivation of fruit is growing rapidly and interest is already being shown by advanced cultivators in the manufacture and disposal for fruit products. Fruit growing in Khandesh has its own special problems which require investigation if the industry is to develop. No other type of agricultural research would attract so much *non-official interest and help* in Khandesh as investigations of this nature. A beginning has been made by the establishment of a small nursery in West Khandesh through the assistance of Rao Saheb Gulabchand Shet, a local fruit-grower and a member of the Divisional Board of Agriculture.

(d) *Sheep-breeding for wool production.*—In Khandesh, the chief income from sheep farming is derived from folding. The *immense* improvement in the wool which selective breeding could accomplish in a *very short period of time* is quite uninvestigated, an important and valuable line of research for the livestock experts.

(e) *The improvement of inferior millets.*—The inferior millets form the main staple of food for a large proportion of the inhabitants of the hilly tracts of Khandesh. Their yield is low and could be greatly improved by selection and cultivation of high yielding strains.

(f) *Power cultivation in Khandesh.*—Tractor farming is attracting much interest in the more prosperous parts of the Division and the possibilities of co-operative power farming are awaiting investigation. The large importing firms will not conduct the necessary trials required to establish the economic utility of tractoring in India and results obtained in other countries are useless. Efforts to obtain complete information on the financial side of tractor and power farming as well as the cultural aspect of the problem, are badly needed.

These few instances by no means exhaust the list of problems which are being inadequately conducted or completely held over in Khandesh on account of insufficient resources or organisation. The importance, as well as the diversity of the instances quoted above, may indicate however the urgency of increased development of research especially in the districts.

Another point which is worthy of mention is the necessity of encouraging —and if necessary, subsidising—non-official gentlemen who have facilities and are desirous of conducting small schemes of research work on their own farms, under the guidance and direction of officers of the Agricultural Department. I have come across many such progressive cultivators in Nasik and Khandesh districts and I believe that with a little encouragement and help from Government, there is a wide field here for extending our knowledge of agricultural improvements at small expense and in a practical and effective manner. The results of research work actually obtained in the district are much more likely to be adopted by the cultivators of that district than improvements worked out elsewhere and imported for introduction.

QUESTION 2.—AGRICULTURAL EDUCATION.—My experience of agricultural education in my late district of Nasik and Khandesh was confined to—

(a) Dhulia Vernacular Agricultural School, Dhulia, West Khandesh.

(b) Agricultural bias classes at different centres in the Division.

Dhulia Vernacular Agricultural School was opened in January 1923 and students who were sons or relatives of cultivators in the Division and who had passed the 4th Vernacular Standard, were admitted to a two years' course. The students are now accommodated free in buildings on Dhulia Government Farm and their board is defrayed from funds, collected by a

local committee of non-official gentlemen. The number of students is fixed at 30, 15 being first year and 15 second year scholars. The training is largely practical, full advantage being taken of the facilities offered by the farm.

Agricultural bias classes have been started at about six centres in the Division with the object of giving an agricultural outlook to primary rural education.

(*i*) The supply of teachers and institutions in the Division would appear to be sufficient although there was a demand for another agricultural school for Nasik district and for agricultural bias classes at other villages. It is doubtful however whether these demands form a *real reflection* of the cultivators' requirements. It was always *difficult to get the full complement* of boys for the Dhulia School and required much preliminary propaganda on the part of the Headmaster and my district staff.

(*ii*) No, I am not prepared to say that there was an urgent need for the extension of teaching facilities in any part of the district. If there was, it was not sufficiently voiced to come to the attention of my district officers or my Divisional Board.

(*iii*) Yes, I consider it advisable that teachers in rural areas should be drawn from the agricultural classes, as they would be much more fitted to gauge the educational requirements of their pupils. I am strongly in favour of agricultural bias classes which in my opinion, are doing good work, the results of which will only be fully realised later on. Such classes must have teachers from the agricultural community and these *must be practical men* with a working knowledge of the agriculture of the district.

(*iv*) In my experience, it was always possible to bring the complement of students at Dhulia School up to full strength but it was necessary to do much propaganda and the Headmaster had to tour the villages personally in order to obtain the requisite number of suitable boys. The cultivators do not appear on the whole to appreciate the advantages of an agricultural training for their sons and many of them must feel that it is not possible to spare a boy from the work of the home fields for so long a period as two years. There were one or two cases of boys leaving the school during the course and not returning. This was generally due to his services being required at home.

(*v*) At the commencement of Dhulia School, it was laid down that the course should be *solely* for the sons and relatives of cultivators and the object of the training would be to *fit them for the better farming of their family lands*. However, several applications from former students were received for fieldmen's posts in the Agricultural Department and I believe that the hope of obtaining service of this nature was a *big incentive* for many of the students in undertaking the training. I see no objection to this being the case as I consider that the supply of properly trained fieldmen is regrettably scanty and must be considerably increased in the interests of agricultural work in the Division. It is not possible to find a source of *trained local men* from the agricultural classes except from the former students of an institution such as this.

(*vi*) In the institutions, mentioned at the commencement of my replies to this section, *all pupils* were drawn from the agricultural classes.

(*vii*) I have always endeavoured to make the existing courses of study in the agricultural schools under my control *as practical as possible* and have made modifications in the courses of training from time to time with this object in view. No other type of training is of any *real value* to students attending agricultural schools.

(*viii*) Nature study, if applied to practical agricultural problems of the district is valuable; if not, it is a waste of time. Many teachers, I have found, are too apt to wander off into theory, without emphasising to their students the practical application which, in most cases, lies behind it.

School plots are useful if well supervised and made an object of interest to the pupils. The best school plots in my district were organised at Bhusaval High School, East Khandesh, by a teacher interested in agriculture. The

boys worked on the plots *after school hours* and were allowed to dispose of the produce of their own plots as they wished. Most of the school plots in my district were much too small and were badly laid out and managed.

A school farm is *essential* to a real agricultural school. At Dhulia, the Government Farm, with the exception of the cotton breeder's area, is managed by the Headmaster of the school who is also the Farm Superintendent. By this means, the students are enabled to get complete training in all farm operations *which they do themselves* under the guidance of the staff of both the school and the farm.

(*ix*), (*x*) and (*xi*) I have no replies to offer on these points, as all the boys attending institutions under my control, were from the cultivating classes and returned to their villages on the completion of their training.

(*xii*) and (*xiii*) With reference to adult education in rural tracts, I would like to point out that, in my opinion, the greatest deficiency in the present system of agricultural education is that there are *few if any facilities provided in the districts for the training of men of the muccadam (fieldman) type in specialised forms of agriculture* from the practice of which such men could make a good living. I refer to such subjects as well-making, working of boring machines, tractor driving, fruit cultivation, repairing of implements, *gul* manufacture, care of cattle, poultry farming, etc,; and more generally, the cultivation of certain major crops, *e.g.*, wheat, cotton, sugarcane, etc. I believe that a greater demand exists for such a type of man—after he has received practical training—on the larger estates and bigger farms of Khandesh than for the agricultural graduate. It should not be impossible for the Agricultural Department to utilise the staff and resources of district farms and experimental stations for the organisation of *short and purely practical courses* for cultivators and men of the "Kamgar" class who are either specially interested in such subjects or are desirous of adopting one of them as a profession. Such short "farmers' courses" have proved very popular and useful in other countries, *e.g.*, Denmark, and all that would be necessary for the institution of such courses would be the provision of accommodation for men at certain selected centres and the organisation of suitable staff for instructional purposes.

I would also suggest that students at Poona Agricultural College who take general farming or farm economics as their special subject should be obliged to spend a definite period of time on a Government farm in the district before being allowed to appear for their final examination.

During my period of work as Deputy Director of Agriculture, Nasik, and Khandesh, I endeavoured, at the suggestion of Sir Chunilal Mehta, then Hon'ble Minister for Agriculture, to organise an annual course in farm management at Jalgaon farm, East Khandesh for graduates of Poona Agricultural College. The idea of the course was to fit men for such posts as farm and estate managers and it was anticipated that there would be a demand for such trained men from the big landowners in Khandesh and elsewhere. Accommodation for four graduates was erected on the farm and the proposed course was well advertised. Very few applications were received and most of these were from applicants who were *not* graduates of Poona Agricultural College. One or two from these were selected for the course but failed to report at the farm. In short, the proposed course proved unattractive to the type of man for whom it was arranged and whom it was intended to benefit. There are probably many reasons for this but, in my opinion, the chief ones are:—

(1) The desire for immediate employment after leaving college and the unwillingness of graduates to spend further time in study or practice before entering employment.

(2) The length of the proposed course and the unattractive condition of residence—without allowances—at Jalgaon farm.

(3) The doubt as to whether attendance and completion of the course would be of any very material assistance in getting better employment afterwards.

It is not easy to put forward methods of overcoming these objections to such a course but I suggest the following:—

(*a*) Such a course should not be confined to graduates of Poona Agricultural College but should be advertised as available for any applicant in India who is approved by the Deputy Director of Agriculture, North Central Division.

(*b*) The length of the course should be shortened to six months—say from May to October—which will cover the cotton growing season.

(*c*) Government should be approached to grant a subsistence allowance to men from Bombay Presidency who undertake the course and arrangements should be made to enable the students to live entirely at the farm.

(*d*) The authorities at Poona Agricultural College should be approached to give more publicity to the course among final year students and in addition employers of skilled agricultural labour in Khandesh may be requested either to send their present managers, estate agents, etc., to the course or to insist on future employees having taken this course of training. A register of possible employers should be maintained at the farm and every effort made to bring students of the course in touch with such big landowners as may desire trained men.

If new conditions are approved, these should be widely advertised not only in the Bombay Presidency but also in the Central Provinces and in the Nizam's Dominions.

QUESTION. 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) The measures which have proved most successful in influencing and improving the agricultural practice of cultivators are:—

(1) *Well-organised, continuous and intensive demonstration and propaganda work conducted in the districts, especially in co-operation with non-officials and non-official local bodies.*

Note.—Actual field demonstration on the cultivators' *own* land conducted by well-trained practical demonstrators is the *only really effective method.*

The areas for a demonstration campaign should be *small* and *carefully selected* and only *one or two* improvements, specially chosen with reference to the *main* requirements of the area, should be demonstrated at a time.

The distribution of vernacular literature on agricultural improvement, unless in conjunction with field demonstration is of *practically no value.*

Similarly village lectures, magic lantern shows, the use of the cinema, etc., are generally *very ineffective agents in agricultural propaganda.* The chief value of such measures is to attract cultivators to attend field demonstrations.

The *value of non-official help in* agricultural propaganda *cannot be over-estimated.* In Khandesh, Bombay Presidency, this help has crystallised in the shape of Taluka Development Associations, which bodies have been of great value in the past and, if suitably financed, will do much more important work in the future. When I was Deputy Director in the North Central Division, Bombay Presidency, I got much help from these Development Associations and co-operated with them to the fullest extent. I should like to see an active Taluka Development Association in every taluka.

More use should be made of *ex-students of agricultural colleges and schools* in district propaganda. A good cultivator who knows improved methods of agriculture and *applies them with success on his own lands,* is the finest type of demonstrator.

Successful district demonstration and propaganda work *can only be achieved* with the *co-operation of all departments of Government,* especially the Revenue Department. In Khandesh much success was due to this co-operation.

I am not particularly enthusiastic over small *district agricultural shows* as agents in propaganda.

A great deal of progress in agricultural improvement could be made if more use were made of co-*operative credit societies* to organise field demonstrations for their members. The more co-operation there is between the Agricultural and the Co-operative Departments, the more rapidly will agricultural improvement spread and the cultivators be benefited.

All this work, mentioned above, can be of very little avail without:—

(2) *The organisation of sources of supply and maintenance*, in the case of *improved materials, and, of supervision and direction, in the case of improved methods.*

Note.—Propaganda *must be followed and supplemented by organisation of:*—

Supply and maintenance	Materials.
Supervision and direction	Methods.

In the first instance, this organisation must necessarily be *official* or, at least, semi-official. As the improvement demonstrated catches on and spreads, it should become solely *non-official, e.g.*, introduction of iron ploughs.

Firstly supply was organised by the Agricultural Department from the Government farms and implement depôts. Secondly, this work was taken up by non-credit co-operative societies, credit co-operative societies, Co-operative Banks and Taluka Development Associations. Now, in Khandesh at least, the bulk of supply is direct from manufacturers' agents to the cultivators.

The introduction of artificial manures, especially in irrigated tracts, is following the same sequence.

The Agricultural Department should eventually *cease all supply* and should be the guardian of the interests of the cultivators in their relations with suppliers.

In this work, there is *an immense field* for *co-operative enterprise.*

Manufacturers and suppliers are *not* assisting, as they ought to do, in this aspect of agricultural development.

The important fact is, that, *in order to introduce agricultural improvements on a wide scale*, the cultivator must not only be convinced of their economic advantage but also *must be provided with local facilities for adopting such improvements and continuing them in his own practice.*

In the case of the introduction of improved *methods*, it is necessary that propaganda should be followed up by the organisation of *direction and help* to cultivators who wish to adopt the improvement.

The Agricultural Department must take a bigger share of this work and continue it longer than in the case of the introduction of improved *material.* Finally, this supervision should be done *co-operatively* or by taluka organisations until the necessity for such guidance disappears and the improved method becomes regular practice.

(*b*) A field demonstration, to be effective, must be:—

(*a*) Well organised.

(*b*) Efficiently conducted.

(*c*) Completely followed up.

At present, in my opinion, the organisation of field demonstrations is *capable of considerable improvement.*

The essentials are that the demonstration should be *sufficiently advertised* beforehand; that efforts should be made to have, at least, one *preliminary discussion* on the subject of the demonstration in the village sometime before it is actually commenced; that the programme of demonstrations should be formed only after *full consideration of local requirements* and, if possible, *in consultation with local cultivators* and all demonstrations should be *followed up to their logical termination.*

To do all this successfully, a better organisation than is in existence at present is necessary. I am of the opinion that, just as there exists in nearly every village, a revenue *patel* and a police *patel*, so, especially in the larger villages, *an agricultural or "shetki" patel* should be appointed whose duty it would be to assist officers of Government and non-officials interested in agriculture in *organising and advertising field demonstrations, etc.* If such men could not be obtained on an honorary basis, some small remuneration might be granted to them by Government. In addition, these "Shetki" *patels* could be given two or three iron ploughs, a chaff-cutter, *petari*, etc., and any such improved implements suitable to their village conditions. These implements would be available for demonstrations whenever an overseer or fieldman of the Agricultural Department or local association visited the village and they could also be hired out to the cultivators and a small commission on the hire receipts allowed to the agricultural *patel*. I believe that a system of this nature would be the cheapest and most efficient means of bringing agricultural propaganda to the notice of the *large masses of the agricultural population* and would result in the development of a very much wider and diffused interest in improved farming methods.

In addition, the appointment of "Shetki" *patels* would have considerable value in emphasising to the villagers the importance of better agriculture in the eyes of Government.

Field demonstrations must be well-conducted and the technique should be as perfect as possible.

At present a large bulk of field demonstrations in the districts are conducted entirely by men of the "fieldman" type, *i.e.*, men drawn from the cultivating classes with little or no training in improved agricultural methods. Their work is supervised by "agricultural overseers," generally graduates of Poona Agricultural College.

This supervision, on account of shortage of staff, cannot be thoroughly effective and, as every worker in the district knows, the efficiency of the fieldmen appointed by Government and by non-official associations for work among the cultivators is, in more cases than not, extremely low.

In Khandesh, I endeavoured to meet this difficulty by organising a *class for fieldmen* on the Government farm, Jalgaon. This class did not extend beyond a fortnight but it was attended by practically every fieldman in the Division, both in Government and in non-official employment and proved a very valuable training. If field demonstrations are only to be conducted by men of the agricultural overseer type, progress will be extremely slow as these officers are expensive and cannot be multiplied to meet all requirements. Many minor improvements can easily be demonstrated by men of the "fieldman" type, if such men are given a good preliminary training and examined as to their suitability and efficiency before appointment.

The lack of trained fieldmen is one of the greatest hindrances to the wider extension of non-official organisations for agricultural improvement.

Every Department of Agriculture should *now* be organising and training a large body of these men, who can go out into the villages and demonstrate *with their own hands and in an efficient and practical manner*, the agricultural improvements most suited to the areas in which they have to work.

Finally, field demonstrations, to be thoroughly effective, *must be closely followed up.* For instance, suppose it has been arranged to hold a field demonstration in a village, to illustrate the advantage of using castor cake as a manure for cotton.

In my opinion, the following programme should be followed:—

(1) The agricultural overseer should visit the village about the end of May—two to three weeks before sowing time—and should explain the purpose of the demonstration to the cultivators and endeavour to arouse their interest in the work. This could easily be done by an informal talk in the village "kacheri" in the evening. At the same time, he should select the field for the demon-

stration and mark out the plots, control plots, etc., and give full instructions to his fieldman.

(2) The actual sowing of the seed and manure should be done by the fieldman and the differences between the treated and untreated plots clearly explained to the cultivators who should be called to attend the work at this time. They should also be given details about the cost of the manure used.

(3) During the growing season, *at least* one demonstration should be held by the fieldman on the plots under treatment and, at such a time, any differences between the manured and unmanured plots should be discussed with the villagers and comparisons made.

(4) A final demonstration should be arranged about the time of the first or second picking. The agricultural overseer should be present and the result of the demonstration should be discussed and the cultivators shown *by actual weighments on the spot*, how the manuring had proved advantageous and profitable. This would be followed up, in the evening, by another informal talk in the village when opinions would be invited and the whole course of the demonstration reviewed. At this time, the names of cultivators, desiring to make their own tests with the manure next season, should be taken and the organisation of a future supply of castor cake to the village should be considered.

If a system of work on these lines were adopted and put into general practice, I feel certain that field demonstrations would make a very much wider appeal to the cultivators and would prove of much greater value in the improvement of local agricultural practice.

I consider that the accurate recording of field demonstrations—as opposed to field experiments—is of little or no value and is a waste of valuable time and energy. The purpose of such demonstration work is not to provide material for annual reports or association leaflets but to *educate the cultivator, through the agency of his own eyesight*, on the value of introducing agricultural improvements in his farming practice.

In conclusion, I would like to state my belief that the amounts of money spent on research work and on propaganda work are quite disproportionate having regard to the relative importance of these two necessities in agricultural progress. Research work is of *no value whatever to the agricultural masses of India unless the results obtained from it are brought to the notice of the cultivators and are incorporated in their general agricultural practice.*

It has been my experience however that whereas money for research is generally comparatively easy to obtain, the provision of funds for propaganda among the cultivators is almost ludicrously inadequate.

I commented on this fact in my Annual Administration Report, North Central Division, Bombay Presidency, 1924-25 when I wrote:—

> "Judged by the only real criterion of success, namely the extent to which agricultural improvements demonstrated, are adopted by the cultivators, the year's propaganda work has proved very successful. It is therefore all the more to be regretted that more funds are not available for this work. A sum of Rs. 700 is totally inadequate for demonstration work in this Division and imposes a definite limit on expansion in this direction, even when non-official assistance is taken into account.
>
> The North Central Division (Nasik and Khandesh) comprises in all 33 talukas and petas so that the amount available for demonstration in my budgetted grants for 1924-25 was little over Rs. 20 per taluka."

QUESTION 4.—ADMINISTRATION.—(*a*) Speaking from the standpoint of a Deputy Director of Agriculture, I feel that a better co-ordination of the agricultural activities of Governments in India, especially with reference to the means to be adopted for introducing agricultural improvements to the culti-

vators, would be facilitated if provision was made for a *fuller interchange of experience and opinions* between officers of the Agricultural Departments of different Provinces, particularly of such Provinces to which certain problems are more or less common.

For instance, much of the work, both research and propaganda in Khandesh is *very similar* to the work being carried on in the Berar district of the Central Provinces and an interchange of ideas between, not only the superior officers, but also the district staff, of these two districts could not fail to be productive of mutual advantage. Further such co-operation between the agricultural staffs of adjoining or similar districts in different Provinces may be of direct practical importance as in the case of the prevention of the admixture of the Khandesh ground-nut crop or in questions affecting cotton marketing.

However, although the Deputy Director of Agriculture, Khandesh, may meet his colleagues from the Konkan or from Sind several times during the year, his only contact with the Deputy Director of Agriculture, Berar, is by correspondence, by the perusal of annual reports and similar literature or by a chance meeting at a biennial Board of Agriculture in India, provided that both officers have obtained the sanction and the wherewithal to attend from their respective Provincial Governments. The facilities afforded to other and less senior members of the district staffs for interchange of ideas and opinions are even less than these.

However convenient it may be to organise the Departments of Agriculture in provincial cadres, it appears to me that some provision is very long overdue in order to enable official workers towards agricultural improvement in all its different directions to reduce somewhat the very arbitrary restrictions imposed by purely geographical limitations. During my five years service in Khandesh I can recollect only one occasion on which the Cotton Botanist of the Central Provinces visited my cotton research station at Dhulia and similarly only one occasion on which my Cotton Breeder at Dhulia was permitted to visit the Central Provinces. As both these officers were busily engaged on work which, if successful, held vast possibilities for the improvement of the cotton crop in *both* districts, I consider that a much greater degree of personal co-operation should have been achieved, and fuller facilities provided for mutual discussion of problems so common to both areas. I have only had one opportunity of attending the All-India Board of Agriculture at Pusa and of seeing the work carried on at the Agricultural Research Institute there. In my opinion, by no means the least valuable result of this experience was the opportunity afforded to meet agricultural workers from other Provinces and to obtain from them fresh ideas and suggestions which could be adapted to meet the special requirements of agricultural problems in my own district.

(*b*) I am strongly in favour of a very effective and well-equipped *central organisation* supplementing the work of Provincial Departments and dealing in particular with problems of All-India importance.

I would not have this central organisation concentrated at one large Central Research Station but I would have a system of small investigation centres, manned by agricultural experts, and dealing with *definite agricultural problems* in tracts where the result of successful research would be to the greatest advantage to the cultivators. These centres would be maintained by a fund administered by the central organisation and they would co-operate in the fullest manner with provincial workers dealing with similar problems.

In the same way as the work of the Indian Central Cotton Committee in no way replaces provincial research on cotton improvement or enables Provincial Governments to reduce expenditure on this branch of agricultural research, so, an active central organisation dealing, not only with research but also with other equally important factors of rural development, has a definite and important place to fill in the improvement of Indian agriculture. The Institute of Plant Industry at Indore, which is largely financed by the Indian Central Cotton Committee and which is primarily intended for investigation into the cotton crop of Central India, is the type of central

research station which I advocate. The Institute has already achieved a high degree of co-operation with other cotton research stations throughout India and I see no reason why the organisation for the improvement of other crops should not follow successfully on similar lines.

Research workers are notoriously self-contained and jealous and a system which encourages research purely on a provincial basis will not succeed in developing the team spirit which, in my opinion, is essential to successful and rapid results. Further, although it may be submitted that the necessity for a central organisation is not strongly felt at present and that the work of rural development can easily be controlled and fostered within purely provincial boundaries, I believe, that with the development of *co-operative organisation* as a more potent factor in agricultural improvement, the necessity of an efficient All-India organisation will become more and more felt.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) As it is unprofitable to generalise on the subject of agricultural indebtedness I shall confine my evidence to the case of the Khandesh cotton-growers, whose condition in this respect, I have had special opportunities of observing and investigating.

In Khandesh and at the present time, there is *no evidence to show that the cotton-grower is seriously hampered by indebtedness* and, indeed, the results of a recent detailed investigation financed by the Indian Central Cotton Committee, indicate that he is very *considerably less the victim of his financing agents than is generally believed to be the case.*

(*i*) *The main causes of borrowing* are:—

(1) At the commencement of the sowing season—for current cultivation purposes, *e.g.*, purchase of seed, purchase of cattle, etc. In some villages, tenants have to pay the rent of their lands in advance and this accounts for some heavy borrowings.

(2) At harvest time, for the expenses incurred in harvesting and marketing the crop of *kapas*.

(3) For maintenance of self and family during years of crop failure.

(4) To meet the expense of social and religious obligations.

(*ii*) *The sources of credit* are:—

(1) The village *sowcar*.

(2) The co-operative credit society.

(3) Petty cotton traders.

Investigation in 10 typical cotton-growing villages of Khandesh during the 1925-26 cotton season showed that, at the commencement of the sowing period, out of 806 cultivators questioned, 620 (76·9 per cent.) had made borrowings, totalling, in all Rs. 1,70,885.

In 8 villages, there were co-operative credit societies; in 2 there were none.

Of the 620 cultivators mentioned above:—

248 (40%) took advances from *sowcars* only.

206 (33·2%) took advances from co-operative credit societies only.

163 (26·3%) took advances from both *sowcar* and co-operative credit society.

3 (·5%) took advances from petty traders.

The total amount borrowed (Rs. 1,70,885) was taken from the following sources:—

Sowcar	Rs. 82,571 (48·3%).
Co-operative credit society	Rs. 88,289 (51·7%).
Other sources	Negligible.

(*iii*) The *main reason* which would prevent repayment is, in my opinion, complete or partial failure of the cotton crop which is the money crop of the cultivators.

In West Khandesh about 12 per cent. of the cultivators investigated borrowed more than their crop realised. The percentage was higher still in East Khandesh but here, the area under ground-nut was approximately equal to that of cotton in the villages examined and advances therefore really relate to *two* cash crops instead of one.

The annewari valuation of this year's crop was—

West Khandesh	8 annas
East Khandesh	6 annas

taking the districts as a whole.

QUESTION 8.—IRRIGATION.—(*a*) In my late charge—Nasik and Khandesh—there is no considerable development of canal irrigation and I do not know of any schemes under contemplation for the construction of new canals or the extension of existing systems in the near future.

The most interesting form of irrigation in the Division is the " co-operative irrigation " which is to be found in the *patasthal* areas in Nasik and West Khandesh, especially in the Panjra valley of the last named district. This " phad " system of irrigation has its origin in the mists of antiquity but there is no doubt but that, for generations past, the cultivators of these irrigated tracts have been practising and practising successfully, a system of co-operative irrigation which is, so far as I know, quite peculiar to these districts and which is worthy of imitation wherever similar conditions exist.

The water-supply is derived from *bhandaras* built across the river bed which descends in a series of steps to the level ground around Dhulia. Many of these *bhandaras* are structures of considerable age and were obviously built to last. Distributary channels convey the water from the collecting area to the village lands, which are sub-divided into a varying number—generally three or four—large sections or " phads " from 100—500 acres in extent—or even more—according to the size of the village. All the village cultivators have holdings in each of these " phads " the size varying, of course, with the wealth and standing of the owner.

The management of the entire system is conducted by a village council or " panch " of prominent cultivators who decide not only *which phads are to receive water each year*, but also *what crops are to be grown in them*. The distribution of the water is done by village servants, generally Bhils, who receive payment in kind from each cultivator and who have certain additional privileges such as the right to grow crops in the water channels, etc., etc. Each *phad* receives water in rotation so that, in a four *phad* system, perhaps only one, or at the most two, *phads* would receive water in one year and heavily watered crops, *e.g.*, sugarcane would only be grown on any one *phad* once in four years. A typical system of few *phads* would contain one sugarcane *phad*, one wheat *phad*, one *bajri* or *jowar phad* and one *phad* devoted to miscellaneous pulses, etc. The crops to be grown each year in each *phad* are decided by the village council and, as far as my information goes, disputes or appeals to the Revenue officials of the district for mediation, are conspicuous by their absence.

The advantages of such a system are too obvious to require much mention but it is noteworthy that some of the best cultivation in Khandesh is to be found under this system, and the villagers of such tracts are generally most receptive to the introduction of improved agricultural methods or material.

It is indeed a most remarkable sight in a district of comparatively small holdings to come across a three hundred acre block of sugarcane cultivation, the ownership of which may possibly be shared by as many as sixty different cultivators. In years when water is scarce, the village council " cuts its cloth to suit its coat " and dry crops alone may be grown. Such a system, as is described above, can readily be imagined to lend itself to the development of co-operative enterprise in other directions, *e.g.*, manure supply, crop protection, etc.

I think that the possibilities of extending a system of irrigation on these lines, which has stood for generations and which is so thoroughly suited to the

needs of the irrigator and the requirements of his capital and his land, would repay the closest and most thorough investigation.

Another, but less pleasing feature of irrigation in Khandesh is the very large number of wells which have gone out of use, whether this is due to physical or to economic reasons, it is difficult to say. Probably both have had some effect. The extension of cotton cultivation and the high prices of *kapas* during the past few years, the scarcity of labour and of good work cattle are all factors which have had some influence on the decline of well irrigation. Possibly, however, the main reason is to be sought in the physical effect of long continued use of well water resulting in the frequent lowering of the water surface of the well below the sources of recuperation which thus gradually choke up and the well "goes dry."

I suggest that there is much research to be done on this problem and that the possibilities of boring, blasting or some similar mechanical treatment of the wells might repay scientific investigation.

In conclusion, I would like to mention a type of irrigation problem which was constantly being brought to my notice in Khandesh and Nasik districts. I refer to the construction of *small river bhandaras* to catch the monsoon rainfall for storage and subsequent utilisation for direct crop irrigation or for indirect use in the form of improved well-supply. Many of the schemes which I examined during my tours had to be rejected immediately on account of cost, but I believe that a combined engineering and geological survey of certain river and *nulla* beds in Khandesh might pave the way for the commencing of profitable and effective schemes of this nature. I am influenced in this opinion by the exceedingly large number of old and broken down *bhandaras* and weirs which are to be found on nearly every little stream in the district and which, to my mind, indicate that the ancestors of the present Khandesh cultivators found the production of small areas of irrigated crops a feasible and a paying proposition. My experience in the districts convinces me that the descendants of these old Khandesh cultivators are beginning to realise more and more the agricultural wisdom of their forefathers in this respect.

QUESTION 10.—FERTILISERS.—(*a*) I am of the opinion that, although the most rapid means of obtaining higher yields and better crops is by the general introduction of *better cultural methods*, much greater use could be profitably made of manures, both natural and artificial.

I do not think, however, that the time has yet come for intensive propaganda in this direction as, until cultural methods are improved considerably, the introduction of manurial treatments, especially on dry crops, can only be partly successful.

To begin with, I would advocate the fuller utilisation of *natural manures*, *e.g.*, farm-yard manure, crude night-soil and poudrette, castor and ground-nut cake, composts of different kinds and decomposed waste materials, *e.g.*, ground-nut husks, leaves, straw, cotton stalks, etc.

In most cases, one or other of the above-noted materials are generally available in comparatively large quantities in every village of the Deccan and *their proper utilisation is within the means of every cultivator.*

In detail:—

Farm-yard manure is the most commonly used manure inspite of the fact that it is largely utilised for fuel. Every cultivator is aware of the advantage to be derived from the use of farm-yard manure on his fields. Propaganda to demonstrate the advantages of this manure is not necessary. *What is badly needed* is instruction and propaganda to show:—

(*a*) the best method of storing farm-yard manure, *i.e.*, construction of manure pits, etc.;

(*b*) how to utilise small quantities of farm-yard manure to the best advantage, *i.e.*, by mixing with other waste organic materials; thorough incorporation with the soil, etc.

Crude night-soil and poudrette.—A very valuable source of nitrogenous manuring which is, *by no means, fully exploited and utilised.* In Khandesh, the results of crude night-soil manuring of the cotton crop on the Government Farm, Jalgaon, have had a most remarkable effect in overcoming long standing prejudices and in popularising the use of this material by the cultivators. The price of this material per cart has *increased at least threefold* in the past five years and the *demand is now greatly in excess of the supply.* I would advocate every assistance being given to Municipalities who wish to organise the manufacture of poudrette and I have submitted a *list of recommendations to the Government of Bombay* as the result of a full inquiry into the utilisation of night-soil and town sweepings as a source of manure in the North Central Division of the Bombay Presidency.

Castor and ground-nut cake.—The advantage of the use of these substances as a manurial treatment for the cotton crop has been one of the *chief subjects of propaganda* in Khandesh during the past five years. The extension of this improvement has been very rapid and forms, I think, the only instance of a *wholesale introduction* of a dry crop manure in the Bombay Presidency. In view of the great increase in the ground-nut crop in Khandesh, the use of ground-nut cake as a cotton manure is of increasing economic importance. On Jalgaon Farm an *average increase of over 200 lbs. of kapas per acre* has resulted from cake manuring during the past five years.

Composts.—There is much to be done in research and experiment into the value of different kinds of composts for manurial purposes and into the best methods of their preparation. I consider, however, that compost manures have a great possibility in many parts of the Presidency and that no time should be lost in investigating the potential sources of such natural manures. The forests and waste lands of the Deccan contain much material which at little expense or trouble, could be converted in the villages into a valuable source of nitrogen for the crops.

Decomposed waste materials.—Before I left my late Division, plans had been submitted for a scientific investigation into the use of waste materials for manurial purposes by the agency of bacterial decomposition. This work should be commenced *as early as possible* and every effort made to examine thoroughly the possibilities of increasing manurial supply in this direction. In Khandesh, ground-nut husks and cotton stalks are to be obtained in immense quantities and, if suitably treated, might form a valuable adjunct to the manurial resources of the district.

The most important considerations governing the use of substances, such as those mentioned above, for manurial purposes are :—

(1) They must be *available cheaply and in large quantities.*

(2) They must form a *source of nitrogen* and *add appreciably to the organic content of the soil.*

Artificial fertilisers, *e.g.*, nitrate of soda, sulphate of ammonia, etc., cannot compete with organic manures *except in the irrigated tracts and on valuable crops.* The relative expensiveness of these materials make their introduction into any area where rainfall is insecure and only dry crops are grown a most difficult and hazardous business.

In the irrigated areas and on garden crops the use of nitrate of soda and sulphate of ammonia is *increasing considerably* and is proving most profitable to the cultivators of such crops as sugarcane, onions, etc., etc.

(*b*) I have not met with any instances of the fraudulent adulteration of fertilisers in my late district. It might be possible to authorise officers of the Agricultural Department to visit the stores and godowns of dealers in artificial fertilisers in the villages, take small samples of their stocks and submit these to the Agricultural Chemist at Poona for analysis. If fraudulent admixture was detected, action by law could be then taken against the vendor and supplier.

(*c*) The only method of popularising new and improved fertilisers is:—

Demonstration followed by organisation.

By demonstration, I mean field demonstration on the villagers' crops and, by organisation, the necessary arrangements to supply the required fertiliser to the cultivator in *his own village* and *at the cheapest possible rate, consistent with good qualities, e.g.*, co-operative manure supply societies. As an inducement to cultivators to lend their fields and crops for manurial demonstrations, I used to arrange for free supplies of the manure under trial to be given to cultivators willing to allow the results on their land to be recorded and demonstrated. There was never any difficulty in getting a sufficient number of cultivators to agree to such an arrangement.

Visits to Government farms, where manurial experiments are being conducted, have proved valuable in the introduction of new manures but such farm demonstrations *must be supplemented by field demonstrations on the cultivators' own lands.*

(*d*) *In Nasik district:—*

(1) The use of *sulphate of ammonia* for the *sugarcane crop* in the canal areas. This is now a general practice in all the canal sugarcane growing tracts of Nasik district. It is rather exceptional to find a cane grower in these tracts who does not use this manure along with castor cake for his cane crop. This introduction is entirely the result of departmental demonstration.

(2) The use of *castor cake* (*400—600 lbs. per acre*) for the *chilli crop* in Nasik district.

This treatment was recommended to the cultivators as a result of experimental work in Nasik district. It is being widely adopted.

(3) The use of *nitrate of soda 200—400 lbs. per acre* for the onion crop in Nasik district.

This has been widely adopted and organisation of supply of the fertiliser is being undertaken.

(4) The use of *ammonium sulphate* as a substitute for "rab" on the rice crop in Nasik district.

After demonstration by the department, the demand for the ammonium sulphate increased ten times in one year. A special supply depôt for the rice tract was opened.

In Khandesh districts.

(1) The use of *castor cake* (300—400 lbs.) per acre for the *cotton crop.*

This practice is extending very rapidly and shows indications of becoming general. The chief necessity at present is the adequate organisation of supply.

(*e*) Some of the results of investigations into manuring with artificial nitrogenous fertilisers are given above. I would not say that the effects of such manuring have been sufficiently investigated but this *work is still going on* on our experimental farms and plots, as well as on the cultivators' fields in the districts. I do not think, from my experience, that *potash and phosphatic manures*, except in a few very special instances, *e.g.*, cocoanut, betel, vine, etc., give sufficient promise of good results to be persevered with at present when there are so many more urgent and promising lines of investigation to be explored. It is possible that better results will be obtainable from these classes of manure when a higher standard of cultivation is attained.

(*f*) I can suggest no other means except the opening up of other sources of fuel, *e.g.*, by *co-operative leasing of fuel coupes in the forests* by local associations and continuous propaganda to impress upon the cultivators that by *burning cowdung for fuel, they are burning their crops and losing their profits.*

QUESTION 11.—CROPS.—(*a*) (*i*) Apart from the improvement of crops by the introduction of better cultural methods, use of suitable manures, etc., which are dealt with under other sections of this questionnaire, the improvement of existing crops depends upon the *production of improved varieties and their general adoption by the cultivators.*

The improvement of crops takes place therefore in two stages each of which presents its own problems and its own difficulties.

The first stage, *i.e.*, the production of new and improved varieties, is the work of the plant breeder and the experimental station; the second stage, the adoption of these improved varieties by the cultivator, calls for the district demonstrator and the organiser.

What crop improvements make the greatest appeal to the cultivator? In my opinion, they are in order of importance—

(*a*) *Higher yields.*

(*b*) *Better quality.*

(*c*) *Suitability for special environmental conditions.*

The introduction of a *higher yielding variety* of an existing crop is the *easiest form of improvement* to popularise among the cultivators. It makes an immediate appeal by reason of the facility with which the advantage of the improvement is translated into *increased profit to the grower.* For instance, the introduction of N. R. cotton (*neglectum roseum*) into Khandesh has been most successful as the increase of yield of lint per acre is estimated to give an additional profit of Rs. 7 per acre over the ordinary local mixture. This, too, inspite of the fact that its quality, *i.e.*, staple length, is lower than the variety which it is replacing. The introduction of such an improvement necessitates for its success, a very *complete organisation for the provision of seed* to the cultivator, which is capable of extension as demand increases.

The work of the plant breeder and the botanical expert in evolving new and higher yielding varieties will lose the greatest part of its value and its economic importance unless the district officer and organiser is simultaneously building up his organisation for the provision of seed of the improved crop to the cultivators.

In addition, arrangements must be made to *maintain the standard of improvement* which the original introduction offered. If this standard is allowed to become lower year by year by mixing in the fields, deterioration, cross-fertilisation, etc., without the provision of an annual *renewal of stock seed of the highest quality,* the tendency will be for the improved variety to lose its distinctive qualities and return to a general level of mediocrity.

The introduction of a *better quality* variety of an existing crop demands the same precautions as in the case of the introduction of a higher yielding variety *with this addition* that the organisation must go beyond the mere provision of an adequate seed supply to the cultivators and *must be extended to ensure that the grower receives, in marketing his crop, the additional price to which its superior quality entitles him.* This is specially important in the early stages of introduction and is, indeed, the only means whereby many introductions of better quality crops can be permanently established. Take, for example, the work at present going on in the direction of obtaining a better-stapled cotton for Khandesh. The work of the plant breeder has resulted in the production of a variety which is very greatly in advance of any variety at present grown in Khandesh *with regard to staple* but which shows no improvement in yielding capacity. The introduction of this improved and better quality variety will only be successfully accomplished if—

(1) cultivation of the new variety is organised in *specially selected centres* from which an outward spread can be established.

(2) adequate arrangements are made to market the superior lint in such a way as to obtain an *adequate premium* for quality to the grower.

The introduction of improved varieties, *i.e.*, varieties more suited to special environmental conditions, *e.g.*, wilt resistant cotton, drought resistant *bajri*, etc., might also be included under higher yielding varieties as the fundamental importance of such improvements is to give a higher yield to the cultivator under special conditions of environment which reduce the yield of the ordinary crop. In this case, however, special attention has to be given to *demonstrations on the cultivators' fields* with the object of convincing the grower that his losses from the special factors which are reducing his crop yields can be considerably reduced by cultivating a variety which has been found to be more suited to the peculiar nature of the conditions under which it is to be grown.

To summarise, the improvement of existing crops is the combined work of the plant breeder and the district organiser.

The plant breeder must—

(1) have adequate scientific equipment,

(2) a definite problem to work on, and

(3) realisation of the actual conditions under which the improved variety will be grown by the cultivator.

The organiser must—

(1) be prepared to meet the demand for the improved variety by an adequate organisation for seed supply,

(2) arrange for assisting growers of better quality crops to obtain the best price for their produce, and

(3) demonstrate the advantages of the improvement amongst the cultivators who could adopt it with the greatest profit to themselves.

In my opinion, the methods of technical crop improvement which are most likely to prove successful are, in order of importance—

(1) By selection within existing varieties.

(2) By hybridisation, after all the possibilities of selection are exhausted.

(*ii*) The introduction of new crops, including new fodder crops, is, to my mind, quite an unimportant matter, which, at the present time, is not in the least likely to benefit the Indian cultivator. There is so much to do and such an immense field for work in the improvement of the staple Indian crops from the agricultural and the botanical point of view and the possibilities of increasing the fodder supply of India, without recourse to imported fodder crops, are so great that I consider all time and money should be concentrated on these matters alone.

(*iii*) As I have mentioned above, the distribution of seed is a most important consideration in the introduction of an improved variety of crop. There are many agencies through which such distribution can be carried out, and in different parts of the country different methods have proved most successful.

In Khandesh, the original distribution of N. R. cotton seed was entirely carried out by the Agricultural Department but, with the development of co-operative enterprise in the district, it has been found very advantageous and profitable to entrust the bulk of distribution to co-operative agency.

Roughly the present system is as follows:—

A Taluka Development Association or a large co-operative credit society appoints a few of its members as "seed growers". These members are supplied with seed of the improved variety

by the Agricultural Department from the Government seed farm at Jalgaon. The "seed growers" grow the improved crop under the supervision of the Agricultural Department and their Association. One half of the total seed produce of their crop is taken by the Association or society, at a price approved by the Agricultural Department, and is distributed to other members in the next year. The other half remains the property of the seed grower to dispose of as he wishes. It is generally sold to other members of his Association or society. In this way centres for the growth and distribution of N. R. seed have been formed in the district. In addition, the Agricultural Department supplies seed to two or three official "seed growers" and similarly one half of their seed produce is repurchased by the department and sold to Co-operative District Banks who supply it on indent to their constituent co-operative credit societies in the villages.

These systems of distribution have worked well and are proving effective in enabling even the small cultivators to get supplies of improved seed for cultivation.

I am strongly in favour of the work of seed distribution being *entrusted as completely as possible to co-operative and non-official agencies*. The Agricultural Department should assist in this work by providing an annual supply of pure seed to seed growers and by assisting in the "roguing", and maintenance of purity of seed growers' crops in the fields, but should not undertake the actual distribution from seed stores or depôts.

(*c*) The gradual development of ground-nut as a cultivators' crop in Khandesh from 4,119 acres in 1912-13 to 140,190 acres in 1924-25 has largely resulted from the use of quick-growing varieties of high oil content (Spanish peanut) by the Agricultural Department.

This development is important in many ways. Firstly, the better variety matures earlier and allows the cultivation of a succeeding *rabi* crop if desired. Secondly, it is worth more per acre than the local ground-nut variety and is a most excellent rotation with cotton. Thirdly, it is an equally valuable crop to grow as a substitute for cotton.

The cultivation of N. R. cotton is also an extension which has resulted in much profit to the Khandesh cultivator and it is grown over lakhs of acres in both the East and West Khandesh districts. The demand for seed of this variety is annually at least twenty times more than the available supply from all sources although this difference is gradually being reduced by the co-operation of Taluka Development Associations, Co-operative Banks, etc., in seed distribution.

QUESTION 12.—CULTIVATION.—(*i*) The improvement of tillage and crop cultivation has always been one of the *most important* items of district propaganda in my late Division (Nasik and Khandesh). There is *no other improvement* which would result in *so great or so rapid an increase in the yield of crops* or which would cost less for the cultivator to adopt. The improvements in tillage, with special reference to the cotton crop, which the Agricultural Department has been endeavouring to introduce in Khandesh are:—

(*i*) Ploughing of the land immediately after harvest and deep harrowing.

(*ii*) Two or three good ploughings and cross harrowings before sowing, in order to prepare a good seed bed.

(*iii*) A series of interculturings during the early stages of growth to mulch the soil surface and conserve soil moisture.

The existing practice in the district is to leave the land untouched from the harvesting of the last crop until shortly before the commencement of the sowing season. Then the land is roughly harrowed—in some cases

shallow ploughed with wooden plough—and seed is drilled after first rains. Interculturing is done only in a few cases after germination and the start of growth. The average yield per acre of cotton on Jalgaon farm during the past seven years is *572 lbs. of kapas per acre.* I estimate that the average yield of an average cultivator growing cotton on similar land over the same period of time will not exceed *300 lbs. of kapas per acre.* 50 per cent of the difference is, in my opinion, due to the *improved cultivation of the farm alone.*

The improvement of cultural methods in Khandesh really resolves itself into the timely preparation of a *well-tilled seed bed* and the cleaning of the land from *deep-rooted weeds.* The practice of interculturing the crops is becoming more and more common in Khandesh and I believe that the next few years will see a great improvement in field tillage in this part of the Bombay Presidency.

What is now required is continuous demonstration and propaganda combined with the organisation of a supply of suitable tillage implements at a cheap cost.

I once made the suggestion at my Divisional Board meeting that a greater advance in the adoption of good tillage methods and improved cultivation of the soil would be made if the Revenue Department could co-operate to a greater extent in measures tending to induce cultivators to improve their standard of cultivation. My idea was that rebates on land assessment fees should be granted to cultivators who obtained "good tillage certificates" from the local senior officer of the Agricultural Department. Such rebates would be for one year only and would be limited to a definite number of cultivators in each taluka. Any loss to Government would be fully compensated by the gradual rise in the standard of farming which, I believe, would result from this or some such similar measure of encouragement. Another important factor in promoting good tillage is the ready supply of improved tillage implements in the villages at the cheapest rates. As this matter is dealt with under another section of the questionnaire, it need not be further commented upon here.

(*ii*) With regard to existing rotations of crops, the only improvement which seems eminently desirable at the present time is the *increase of the part played in rotations by leguminous plants*, especially in tracts where the supply of organic manures is deficient. The cultivation of the ground-nut crop in Khandesh, which has extended so considerably during the past decade, is of great importance in the general agriculture of that district on this account.

The present rotation on Jalgaon farm, which is pre-eminently a *seed farm for the production of N. R. cotton seed*, is:—

1st year—Cotton.

2nd year—Cotton.

3rd year—Either *kharif* crops, *e.g.*, *jowar* and *udid* or ground-nut or *rabi* crops—wheat, grain or coriander.

The 1st year cotton gets one of the following manurial treatments:—

(*a*) 15 cart loads farm-yard manure per acre.

(*b*) Sheep folding (2,000 per acre for one night).

The 2nd year cotton gets 300–400 lbs. castor cake per acre.

The 3rd year rotation crops are unmanured.

From experiment, it was found that *cotton after ground-nut* yielded, over a period of six years, roughly *280 lbs. more of kapas per acre* than cotton after *juar* and that the average profit per acre of the combined crops was—

	Rs.	
Juar and cotton	86	} two-year cycles
Ground-nut and cotton	174	}

It is a very difficult matter to continue any intensive propaganda *in the districts* on the advantages of special crop rotations but evidence is not wanting, especially in the "patasthal" areas of Nasik and West Khandesh districts where large areas are under communal irrigation, that the advantages of suitable crop rotations are not neglected by the cultivators.

QUESTION 14.—IMPLEMENTS.—(*a*) Wherever and whenever possible, the improvement of existing agricultural implements is preferable to the introduction of new types.

There is practically no agricultural operation which is carried on in general farming practice in the districts where greater efficiency could not be obtained by the improvement of the indigenous implements in use. Such improvements must be cheap and easily effected in the villages.

In my late district of Khandesh, I formed, shortly before my departure, a small committee composed of non-official gentlemen and experienced members of my staff to consider all local agricultural implements and to make suggestions for their improvement. The report of this committee was to be sent, along with a sample of each implement referred to therein, to the Agricultural Engineer, Poona. I consider that a series of local enquiries of this type would supply valuable material which could be considered and discussed by the Agricultural Department in consultation with implement manufacturers and a programme of improvement commenced.

(*b*) (1) There are two distinct stages in the system whereby improved agricultural implements are brought into common use amongst the cultivators of a district. After the Agricultural Department has made sufficient tests of the implement and is satisfied of its suitability for a certain tract the first stage is *demonstration*. By that is meant the actual working of the improved implement on the fields of the cultivator, who is invited to come and form his own opinion. The second stage is *organisation*, which includes the necessary provision of facilities to the cultivator, to hire or purchase the implement for his own use.

These two stages are quite separate, though they may be going on at the same time, even in the same talukas.

It would be easy, in the case of the extension of improved implements, to sub-divide the talukas into "demonstration" talukas and "organisation" talukas and indeed that is what unconsciously is done, in outlining programmes of work.

The main difference between these two stages of extension is to be found in a consideration of the agencies which are, or should be, responsible for the work.

Demonstration is primarily the work of the Agricultural Department, assisted by manufacturers, non-official bodies and other departments of Government.

Organisation is not the work of the Agricultural Department but should be carried out by the suppliers and by co-operative organisation amongst the consumers.

(2) The extension of improved agricultural implements in my late Division has made rapid progress. The Division was formed in 1921-22. Every year since that time, the department has continued to intensify its propaganda work in the extension of improved implements. The "demonstration" stage has been adequately dealt with in practically every taluka in the Division. In 1921-22, Rs. 2,113 worth of improved implements were purchased through departmental agency. In 1923-24, this figure has risen to Rs. 14,000. In 1924-25 it is gratifying to report a decrease in this figure, due entirely to private individuals and agencies and co-operative bodies undertaking this work. Receipts from the hire of implements from the departmental depôts have risen from Rs. 435 in 1918-19 to Rs. 1,870 in 1922-23. During the past two years, a gradual decrease is again due to the activities of private bodies in this direction.

It does not seem too much to expect that, in a few years' time, the Agricultural Department, except in a few backward talukas where missionary work is still necessary, will be able to relinquish the organisation work in connection with the extension of improved implements, to non-official agencies who should be better fitted to deal with it.

The testing of improved implements, their adaptation to particular sets of conditions, and their demonstration to the public will always remain an important part of departmental work.

(3) It would not be out of place to mention here the prominent part which Taluka Development Associations have played in the demonstration and organisation of supply of improved agricultural implements to the cultivators. In 1921-22 there were only about six Agricultural Associations in Khandesh and two in Nasik districts who took any part in this work. The total receipts from hire charges did not exceed Rs. 700. In 1924-25, there were eleven Taluka Development Associations, whose officers conducted over 250 plough demonstrations in the Division and whose receipts from plough hire averaged almost Rs. 200 in the year. Some of these Associations also gave ploughs free for trial to their members.

To assist these Associations in this work, the department arranged to supply them with ploughs on the instalment system, one-third of the total price to be paid on receipt of the ploughs, one-third after one year, and the remaining third after two years.

It is gratifying to note that every Taluka Development Association in this Division has taken advantage of this facility and that 92 ploughs worth Rs. 3,200 have been supplied on the above system. All instalments are being repaid regularly as they fall due. As a matter of interest, the 92 ploughs above are of the following makes:—

Kirloskar 100	56
Kirloskar 9	7
Kirloskar 15	8
Kirloskar 11	2
Watandar No. 120	2
Ransom C. T. 1	6
Ransom B. T. 2	7
Others	4

(4) This work which is being done by Taluka Development Associations has rather usurped the functions of non-credit societies and there is not much to report on the part played by implement societies in the Division. The future of such implement societies would appear to be most promising if they undertake the business of co-operative purchase of expensive implements and power machinery on behalf of their members.

It is interesting and gratifying to note that the business of hiring ploughs and agricultural implements is being largely taken up by private individuals. That such work is profitable cannot be doubted and, under personal management, a return of 10—12 per cent on the capital utilised should be easily obtainable.

(5) In conclusion, I would like to express my opinion that a great deal more could and should be done by the manufacturing firms and their agents in the work of extending improved implements. To limit their activities to supplementing departmental and non-official work and to the production and distribution of literature seems to me to be a short-sighted policy. Kirloskar Brothers have, I know, extended their agency system throughout the Presidency. Other firms are following suit. I would however be glad to see a demonstration campaign inaugurated by some enterprising firm, itinerant demonstrators despatched through the country districts and some intensive effort made, quite unofficially, to increase sales in a particular district.

(6) Proposals for further extension of improved implements:—

(1) A taluka census of the number of improved agricultural implements, iron ploughs, cane mills, etc., actually in use in each taluka in the Division should be taken.

(2) The Agricultural Department should adopt the policy of placing implement depôts and conducting implement demonstrations only in backward talukas or where there is no other agency for the purpose. At all depôts, farms, Agricultural Overseers' offices, etc., a small stock of spares for the most popular types of ploughs, etc., should be kept.

(3) Itinerant demonstrations should be arranged during the ploughing season, especially in areas where further extension of the iron plough is desirable.

(4) Taluka Development Associations should be encouraged to stock more ploughs on the instalment system for hiring to members. Each Taluka Development Association fieldman should hold, at least, 60 plough demonstrations during the year.

(5) Co-operative Credit Societies should be permitted to stock a few ploughs for sale, on instalment system, to members. Each Co-operative Credit Society should be asked to arrange for a meeting of members once during the year, when a demonstration of the iron plough can be given by the departmental staff.

(6) The formation of co-operative distributive societies should be encouraged and the supply of improved agricultural implements should form part of the business of such institutions.

(7) Every encouragement should be given to manufacturing firms and their agents in the extension of their goods in the districts. This can be done by notification of gatherings of cultivators, arrangements for tests and assistance in placing articles for sale on consignment account with co-operative bodies, etc.

(8) As good cultivation is a *sine qua non* to good crops, the department, Taluka Development Associations and credit societies should only appoint as registered seed growers such cultivators as are in the habit of using improved implements for tillage purposes.

(9) Leaflets should be prepared, in the vernacular, on each type of improved agricultural implement, illustrating its use and giving the current prices and sources of supply of the most suitable makes. These leaflets should be distributed in the villages through the agency of the Revenue Department.

(10) An inquiry should be made to find out to what extent, the extension of improved agricultural implements is being restricted by lack of, or an inferior service of, spares, etc. The result of this inquiry should be published.

QUESTION 16.—ANIMAL HUSBANDRY.—(*a*) In Nasik and Khandesh, there are at least six important breeds of cattle. These are:—

(1) Tapti Khillari,

(2) Sonkheri,

(3) Nimari,

(4) Khargundi,

(5) Malvi,

(6) Dangi.

Two non-official associations, Shirpur Agricultural Association, West Khandesh, and Jamner Agricultural Association, East Khandesh, started breeding farms for two of these breeds, the Tapti Khillari and the Khargundi respectively. The Tapti Khillari herd at Sangvi Cattle Breeding Farm,

Shirpur, West Khandesh, is one of the finest pure-bred cattle herds in the Presidency.

To improve the breeds of the Division, action on the part of Government is absolutely necessary—

(*a*) To investigate the *sources of supply of good breeding bulls* of the above-noted breeds and to make arrangements for their placing on the "premium" system with approved cultivators.

It is a great hindrance to the extension of cattle improvement in Khandesh and Nasik that no adequate source of supply of breeding bulls of the chief breeds is available.

In addition to the above works, steps should be taken to compile lists of owners of good *cows* of these breeds, which would be suitable for breeding purposes. The advantage of such information would be to enable the fullest use to be made of good bulls, either by stationing them in suitable centres or by planning out itineraries for service purposes.

(*b*) To encourage, to a much greater extent than is done at present, the *formation of co-operative cattle-breeding societies*, by granting forest grazing areas on concession terms.

Co-operative cattle-breeding is a subject which is arousing considerable interest in Khandesh and I have received many inquiries dealing with proposals of this type. Essential conditions to the success of such schemes are the segregation of a good grazing area for the herd and careful selection of a first class breeding bull. There is a considerable disinclination on the part of forest officers to reduce forest revenues by granting sole rights of grazing over forest grazing coupes at concession rates to such societies. I am of the opinion that, provided the members of such societies are prepared to *enclose their special grazing area* and to follow the advice of livestock experts in *selecting the female stock*, a first class breeding bull should be supplied *free* by Government and the Forest Department should be prepared to forego the loss of revenue which such schemes might entail. In the sum, such losses could only amount to a very inconsiderable amount, and the result of schemes of this nature would be of inestimable value to the cultivators.

(*c*) To increase the staff under the *Livestock Expert* to Government in order to provide *at least one livestock officer* for each Division of the Presidency.

This measure should be supplemented by the formation of *Divisional Cattle Committees*, largely non-official in character, who could discuss and direct the livestock policy of the Division. Such a Committee would be invaluable not only in the execution of its official duties but as a means of interesting big landowners in the improvement of livestock.

(*d*) To increase the supply of *trained practical cattle men* of the "Kamgar" type who would be available for employment under co-operative cattle-breeding schemes or under private owners of herds of improved cattle. Suitable men could be selected from the districts and trained on one or other of the larger Government cattle farms in the practical care of cattle and other livestock. The herd of Tapti Khillari, maintained by the Shirpur Agricultural Association, was suffering badly from lack of such skilled attention and, although efforts were made to obtain an efficient working manager, they were not successful.

(*b*) (*i*) Overstocking of common pastures, *e.g.*, village waste lands, etc., is *considerably intensified*, as a source of injury to cattle—

(*a*) by the poor *sparse covering of inferior grass* generally found on such places.

(*b*) by the large proportion of *unthrifty and worthless cattle* which graze upon them.

I suggest efforts should be made to *improve the quality* of the better type of village common lands, by the *introduction of better grasses* combined with a system of *rotational grazing*. This would require co-operation of the villagers and might be attempted, in the first instance, where such co-operation is offered.

(*ii*) I do not think that there is much hope of increasing fodder-supply by *any considerable augmentation* of enclosed pasture land. Grazing on grass borders in tilled fields is a common practice but, in Khandesh at least, enclosed pastures are most uncommon. The planting of such perennial fodders as Guinea grass along the borders of water channels might be valuable in some irrigated districts.

(*iii*) There is no doubt but that the use of dry fodders, *e.g.*, *kadbi*, straw, etc., could be carried on to much greater profit and advantage if the cultivators could be induced to *prepare the material* in a suitable manner before feeding it to their cattle. I believe that, at least, *25 per cent of these materials are wasted* when they are fed to cattle *without being previously shredded or chaffed*.

In Khandesh, the increase of the ground-nut crop should provide a valuable additional source of fodder. The haulms and leaves, however, are very *brittle* when dry and must be removed from the field and stacked immediately after harvest.

(*iv*) The absence of green fodder in dry seasons must be specially *injurious to dairy cattle*. On unirrigated holdings, silage seems to be the only alternative measure.

(*v*) I do not think this is important although I would advise cattle-owners to allow their animals access to salt or include that substance in their feeds from time to time.

(*c*) In Khandesh, fodder shortage is most marked in the months of March, April, May and June, and sometimes July. Scarcity of fodder may be said to exist for 12—14 weeks. After this period of scarcity, about 3—5 weeks are necessary before growing cattle begin to thrive on the fresh abundance of fodder which comes in with the rains.

(*d*) Before I left Khandesh, I had laid out a scheme for work on the fodder problems of the district. The main points of this scheme were:—

(1) Provision for careful and detailed investigation into successful schemes of *co-operative fodder storage* in the Presidency with the object of introducing and organising similar work, adapted to the special requirements of Khandesh.

(2) Propaganda in favour of schemes of *co-operative fodder storage* in those parts of the Division where such work would be most useful.

(3) Construction and demonstration of "*kutcha*" *silo pits* and silage making at several selected village centres.

(4) The erection of a "pucca" silo at Jalgaon farm, East Khandesh, to demonstrate the manufacture and use of silage.

(5) The wide demonstration of *hand power chaff-cutters* in the district and the provision of facilities for the *supply* of these implements, *on part payment system*, to cultivators desirous of using them. Tests of different types of chaff-cutters manufactured in India were also to be made at Jalgaon farm.

If facilities had been available, I would also have added:—

(6) A *complete investigation* into cultivated fodder crops in the Division with the object of working out a *system of intensive cultivation*, giving the highest yields from the minimum area, and suitable for cultivators' practice.

In addition to the above, I would like to suggest that *co-operative bodies* such as Taluka Development Associations, large co-operative credit societies, etc., might consider the possibility of *taking a forest grass or grazing area on co-operative lines.* Much of this business is in the hands of contractors who make considerable profits. When such forest facilities are auctioned or otherwise disposed of, certain coupes might be offered at concession rates to encourage co-operative enterprises of this kind.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—I do not propose to offer detailed replies to the sub-heads of this question which deals with subjects to which I have not been able to give particular attention or study.

With regard to subsidiary industries to agriculture, the chief source of revenue for the Khandesh cultivator, apart from his agriculture, is the hire received for the use of his carts and bullocks when not required for his own purposes.

The development of other subsidiary industries appears to me to be *directly dependent upon the progress of the co-operative movement.* I do not think that isolated attempts at starting such industries are likely to succeed as cultivators will not be prepared to undertake the purchase of raw materials and the disposal of finished produce on their own account.

A great deal of educative work has yet to be done before any great expansions in this direction can be hoped for.

QUESTION 20.—MARKETING.—(*a*) and (*b*) Under this head, I desire to confine my evidence to *cotton marketing in Khandesh.* I do *not* consider the existing market facilities and system of marketing to be satisfactory.

There are two chief methods by which the cotton-grower in Khandesh disposes of his *kapas*:—

(*a*) By sale to itinerant petty dealers in his village.

(*b*) By sale through "adatyas" or brokers at some recognised market centre.

Of these two methods, the first is by far the most common and popular.

(NOTE.—A recent enquiry into cotton finance in Khandesh showed that out of 806 cultivators whose sales were investigated—

680 (84·4 per cent) sold all their *kapas* in the villages.

97 (12 per cent) sold all their *kapas* at a market through a broker.

29 (3·6 per cent) sold some *kapas* both in village and at market.

Only 26 cultivators ginned their cotton and sold lint.)

In my opinion, the reasons for the preference shown to village sales are:—

(*a*) Convenience and absence of trouble connected with carting to market and selling there.

(*b*) Difficulties in getting the price agreed in market sales, owing to disputes about quality and weighment, etc.

There is no reason to believe that village sale is to any great extent necessary on account of financial indebtedness of the cultivator. The rates obtained in the markets are, on the whole, considerably higher than those given in the villages and this fact is well known to the cultivators but, under present market conditions, is not a sufficient inducement to give up village sale and take their *kapas* to the market.

Khandesh cotton markets.—There are about 35 established cotton markets in Khandesh, the chief of which is Dhulia, West Khandesh. The system of sale is everywhere much the same. Carts gather in the early morning, *dalals* are fixed and show samples to merchants, bids are made *under cover* and the seller accepts a rate. No memorandum of sale is given at this stage. The carts are then removed to a ginning factory designated by the buyer where the *kapas* is weighed. *After this,* a memorandum of the weight and rate is given to the cultivator who collects his money at the *dalal's* office in the evening. Payment is generally made on the day of sale and the cultivator can go off to his village at nightfall.

Prices and rates.— The daily rates are fixed by the merchants and *dalals* and are based upon telegrams giving the previous day's closing rates in Bombay. These telegrams are not posted up in the markets and the rates are not known to the average seller. It is doubtful, however, whether such knowledge, under present market conditions, would be of much use to him.

Storage.—There is no storage accommodation for *kapas* in any of the markets. In some centres, merchants and *dalals* can get storage accommodation in the compounds of ginneries and press houses.

Weighments.—Commonly weighments are all made in the compounds of the ginning factories on Avery Beam balances. In some markets, platform balances have been installed but these are distrusted by the cultivators. I do not think that much loss is caused to the cultivators by incorrect weighments. The weighmen are usually servants of the broker or *adatya*.

There is no definite standard of weights which vary in different markets, *e.g.*,—

West Khandesh—

(*a*) Dhulia	.	.	.	.	.	1 Maund	=	72 seers.
(*b*) Shirpur	.	.	.	.	.	1 Maund	=	50 seers.
(*c*) Navapur	.	.	.	.	.	1 Maund	=	40 seers.

East Khandesh—

(*a*) Pachora	.	.	.	.	.	1 Maund	=	80 seers.
(*b*) Amalner	.	.	.	.	.	1 Maund	=	72 seers.
(*c*) Jalgaon	.	.	.	.	.	1 Maund	=	48 seers.
(*d*) Edlabad	.	.	.	.	.	1 Maund	=	22 seers.
(*e*) Bodwad	.	.	.	.	.	1 Maund	=	21½ seers.

There are similar variations at other market centres.

N.B.—1 seer = approximately 2 lbs. (avoir.).

Allowances and deductions.—The rates of special market allowances and deductions vary considerably from place to place. The average payment made by the cultivator on this account amounts to approximately Rs. 2 per cart or 3—4 annas per large maund.

The chief complaint of the growers with regard to the present market conditions is that the rate fixed at the time of sale in the market is very seldom the rate actually received owing to "Vandhas" or disputes about quality, weight, etc., of the *kapas* after weighment in the ginning factory compound. In such cases, the cultivator has no option but to accept the reduction which generally amounts to 4—8 annas per maund but may be much higher.

(NOTE.—In the course of the investigation mentioned above, 79 out of 97 cultivators who sold their cotton at market centres stated that they had suffered loss by reductions on account of disputes after weighment.)

Improvement of Khandesh cotton marketing.—In my opinion, the improvement of cotton marketing in Khandesh can be brought about by—

(*a*) The *organisation of regulated cotton markets* with open prices, controlled and managed by Market Committees which *include a large growers' representation* and the introduction of definite market rules and by-laws. I understand that a draft Cotton Markets Bill for the establishment of open cotton markets of this nature and constitution is under the consideration of the Government of Bombay.

(*b*) The development and extension of *co-operative cotton marketing*, especially in conjunction with *co-operative cotton ginning* and sale of *lint*.

The essentials to the success of such societies are that the working system adopted should be suited to local requirements, that the volume of business controlled must be large enough to influence the market, that

producers only should be members, that a system of grading produce be adopted and that management should be expert and efficient. In addition, the society should avoid incurring the hostility of *dalals* and merchants and be willing to conduct its business with their help and through established agencies.

QUESTION 22.—CO-OPERATION.—(*a*) In my opinion, the *only hope of any general rise of the standard of living in rural India depends entirely upon the development of the co-operative movement.*

Apart from the agricultural research work carried on by the Agricultural Department and the urban co-operation work of the Co-operative Department, the remaining activities of these two departments of Government could profitably be combined in a *Rural Development Department* and organised and carried on as an indivisible and complete organisation for the development of rural India.

If this had been done originally, all agricultural research work could have been conducted by an All-India organisation and we would now be hearing less about the function of such an organisation under the present system. However, as things are, I am firmly convinced that the rate of agricultural progress and, indeed, of general rural uplift, in any Province, will, in the future, largely depend upon the extent to which working co-operation between the Agricultural and Co-operative Departments can be achieved and on the ability of these two sister departments to enlist *non-official interest and assistance* in their common task. Government can assist the growth of the co-operative movement—

(1) By providing very much larger funds for its development than have hitherto been granted and by expending these funds, not only through the agency of a Co-operative Department or non-official co-operative institutions but through *every* agency which is capable of extending the movement among the cultivators.

These funds should be devoted to educational and propaganda purposes.

(2) By enabling all its officers working among the rural communities to obtain sufficient knowledge of the co-operative movement to fit them for propaganda work on its behalf in the districts. In this connection, facilities for personal study of the co-operative movement in other countries are important. In addition officers of the Co-operative Department should be in possession of a certain amount of agricultural knowledge, not necessarily sufficient to make them capable of giving expert advice, but certainly enough to ensure their appreciation of the practical agricultural problems of the district in which they are working.

(3) By encouraging cultivators to become members of co-operative societies, both credit and non-credit, by granting concessions, facilities, exemptions, etc., to these societies, *but not money.*

(4) By assisting non-official co-operative bodies in management and supervision in the initial stages and by fostering independence by withdrawing such interest when it appears to be no longer required.

(5) By collecting information and diffusing knowledge of the working of the co-operative movement in India and in other countries of the world.

Government should *not* take any active part in the organisation of co-operative societies. I have experienced the results of such authoritatively organised societies in Khandesh and Nasik and the result is *almost always* failure and liquidation, resulting in a set-back to the movement in the locality. Likewise Government should *not* give direct subsidies to co-operative societies although many enthusiastic and keen co-operators will disagree. For instance, Government subsidies up to a maximum of Rs. 1,000 and equivalent to the amount raised by local subscriptions are given annually to Taluka Development Associations. The result is that now these associations, in many cases, are appealing for larger donations from Government to extend their activities, instead of increasing their resources by adding to their membership as the result of village to village propaganda in their area. If any such subsidy is given to a new society at its beginning,

it should be definitely earmarked for organisation and not utilised for any other purpose.

Non-official agencies can best encourage the co-operative movement by—

(1) Organisation.

(2) Propaganda and education.

In this connection, I would remark upon the excellent work done by the Bombay Central Co-operative Institute and its branches in the districts, which cannot be too highly praised. Every member of a successful co-operative society becomes a disciple in the movement and it is a great pity that it is not possible to utilise the villagers of such a village as Hadapsar, near Poona, on missionary tours on behalf of the co-operative movement throughout the Presidency.

A great hindrance to the extension of the co-operative movement in many villages is the existence of "factions" in the village. The special difficulty encountered by co-operative missionaries in such cases is that while one faction is anxious to form a society, the other as a matter of course is opposed to it. The society is formed and naturally fails. Non-officials with influence in the districts could do much if they were to endeavour to reconcile the opposing parties and pave the way for common agreement in such places.

(*b*) I desire to offer evidence on the following types of co-operative societies only:—

(1) Purchase Societies.

(2) Cotton Sale Societies.

(1) *Purchase Societies.*

Distributive co-operative societies and stores in relation to the present economic situation in Khandesh.—In Khandesh, the development of agriculture is accelerating. There is an increasing demand for agricultural requisites among the cultivators. This demand is specially noticeable in the case of manures for the cotton and sugarcane crop, better seeds for sowing and improved implements of tillage. Certain materials, which were formerly deemed luxuries, are now looked upon as necessities. It appears reasonable to anticipate that this demand will continue to increase and will extend to cover articles, not purely agricultural, but including domestic and industrial requirements.

What is being done to meet this demand? What facilities are being made available to the cultivators to assist them to obtain, at reasonable prices, agricultural requisites of good quality and guaranteed standard?

Government, by the institution of implement depôts, etc., are doing a little; the suppliers and manufacturers in the trade, even less. The great potentiality of *co-operative organisation* in this matter remains unexplored and the few tentative efforts which have been made, have, often than not, resulted in failure and set-back. In most other countries, where co-operative distribution has developed to any great extent, its origin can be traced to a realisation of the necessity of co-operative action as a defence against the exploitation of increasing demand on the part of the supplying trade. Such realisation results from education. I am doubtful whether this stage has yet been reached in Khandesh. If goods are found too dear or of inferior quality, the tendency will be, not to organise for improvement, but to discontinue their use altogether.

In this fact lies the necessity for official propaganda and even for official organisation. All the research work of an Agricultural Department is futile unless the results of such research are definitely incorporated in common agricultural practice. In India, this can only be done, on an effective scale, by co-operation among the cultivators. The demand for such co-operation must be awakened from within by education and propaganda. Its translation into practice must be done in the first place under ex-

part official direction. The co-operative distributive movement will only extend, as it should, in the rural areas of India, when officials and non-officials combine, firstly, to arouse local interest and enthusiasm; secondly, to perfect organisation; and, lastly, to co-ordinate the interests of industry and agriculture in the stabilisation of the movement.

Distributive societies—the difficulties to be overcome.—From consideration of the history of co-operative distribution in other countries and confirmatory evidence obtained from study of the many past failures in such organisation in India, the chief difficulties to be overcome may be summarised as under:—

(*a*) *To ensure the loyalty of members to their societies or stores.*—This major difficulty includes many smaller ones. Amongst these are, the consideration of the suitability of any area, with reference to the common requirements of the inhabitants, for the organisation of a distributive society; the question of credit sales as against cash payments; the nature of business to be done and the financial interest of members.

(*b*) *To ensure efficient business management.*—The technical side of management, professional or otherwise, the advertisement and general publicity policy of the society or store, and the realisation of an adequate annual turn-over.

(*c*) *To ensure adequate control and supervision.*—This comprises consideration of the functions of Government in the movement; the determination of the size of units; adequate finance and a common financial policy and the education and training of organisers, workers and members.

Suggestions for the primary organisation of distributive co-operative societies and stores.—Space does not permit me to do more than give a very brief outline of what, in my opinion, might be done at once towards the organisation of distributive co-operative societies and stores.

Area of operation.—Distributive co-operative society stores should only be organised in areas where there is an assured and definitely increasing demand for, at least, one main type of agricultural requisite, *e.g.*, Nasik district—artificial nitrogenous manures for garden and irrigated crops; East Khandesh—artificial manures for cotton crop and improved cotton seed.

The area of operation of a single society or store should be limited at present to four talukas. This is liable to extension as experience dictates.

Membership.—The qualification for membership should be the holding of one 5-rupee share in the society or the membership of a co-operative credit society. All members, including shareholders, should pay an annual membership fee of Re. 1.

The privileges of membership will be the option of obtaining goods on cash payment or on a certain period of credit and a participation in the profits of the society by an annual bonus distributed according to the total amount spent in purchases from the store.

Capital.—Should be raised by—

(*a*) Issue of 5-rupee shares to the public.

(*b*) Members' annual subscriptions of Re. 1 per member.

(*c*) Loans.

(*d*) Donations and gifts.

No distributive society store should be started until Rs. 5,000 have been collected as share capital.

Management.—Each shareholder is entitled to 5 votes in virtue of each share in the society, which he holds. Each member is entitled to one vote. Thus a member holding 3 shares will be entitled to 16 votes at the Annual General Meeting.

An Annual General Meeting of all members will be held to appoint office-bearers, Managing Committee and non-official auditor.

An Advisory Board consisting of the Deputy Director of Agriculture, the Assistant Registrar, Co-operative Societies, and the *Prant* Officer will be formed and will attend personally, or by delegate, each meeting of the Managing Committee.

The Managing Committee will meet monthly and will appoint a paid store-keeper and will conduct the business of the society.

The District Agricultural Overseer of the district will act as honorary supervisor of the store and will report monthly to the Managing Committee and Advisory Board on its working. A paid store-keeper will be appointed on a monthly wage *plus* commission on the annual *profits* of the store. He should receive preliminary training in the work of the store, which should be arranged by the Agricultural and Co-operative Departments.

Any member of the Managing Committee or the Advisory Board can inspect the working of the store at any time. Such inspections should be arranged at the monthly meetings of the Managing Committee to take place at least once a week.

The society and store will be registered under the Co-operative Societies Act. The accounts will be audited half-yearly by the official auditor of the Co-operative Department in collaboration with the non-official auditor appointed at the Annual General Meeting.

Business.—The store will be empowered to deal in all agricultural and domestic requisites according to the discretion of the Managing Committee and Advisory Board. The store shall be open, *i.e.*, sales may be made to any one. Non-members must only be supplied on cash-payment, members on cash-payment or credit, if desired.

A list of articles, which it is decided to stock in the store, should be sent, *with fixed prices*, to each co-operative credit society, at a definite time each half-year. These societies should be asked to submit members' indents and requirements, by a fixed date, to facilitate stocking and estimate of turn-over required.

It might be considered whether a certain percentage of the purchase price should not accompany these indents.

In the case of credit sales to members, recoveries should be made in three months' time through the credit societies to which they belong.

General.—The Agricultural and Co-operative Departments, with the assistance of interested non-officials, should undertake the organisation of these distributive societies and stores and the collection of share capital. A circular inviting membership should be sent to each co-operative credit society, who should be asked to forward a list of their members desirous of joining the store along with their annual subscription for the coming year. All annual subscriptions should be collected through the credit co-operative societies.

The Annual General Meeting should be convened by the Assistant Registrar, Co-operative Societies, and the Managing Committee, auditor and store-keeper appointed at that meeting.

The Managing Committee and Advisory Board should, at their first meeting, scrutinise indents, etc., and decide on the outlay of capital on stock, loans required, etc., etc. At each store a maximum and minimum schedule of stock should be prepared. Recoveries from members should be made through co-operative credit societies. The period of credit to be allowed should be fixed half-yearly by the Managing Committee and Advisory Board.

Profits should be disbursed, annually or half-annually, as under:—

(*a*) Commission to store-keeper.

(*b*) Interest on loans.

(*c*) Dividend to shareholders.

(*d*) Bonus on purchases made by members.

(*e*) Reserve fund.

These will be fixed by the Managing Committee and Advisory Board and declared at the Annual General Meeting.

It is not possible to go into details of management, supervision, system of business, accounting, etc., in this note. The main principles, however, which should be followed, are shown above in a general way and include:—

(*a*) Sale at usual trade prices (or slightly less to attract custom and patronage).

(*b*) Cash sales only to non-members; cash or short-time credit (through co-operative credit societies) sales to members.

(*c*) Distribution of profits in (1) dividends to shareholders, (2) bonuses to members, in accordance with total amount spent by each member in the store.

(*d*) Membership confined to (*a*) shareholders, (*b*) members of co-operative credit societies.

(*e*) Each shareholder, 5 votes for each share held; each member, one vote.

(*f*) Shares on sale to the general public.

(*g*) Control and management by members, through Managing Committee appointed at Annual General Meeting, and supervision and direction by Managing Committee, advised and assisted by Advisory Board and honorary supervisor.

(2) *Cotton Sale Societies.*

Khandesh is a very large cotton growing tract and produces annually about 3¼ lakhs of bales. There are about 35 market centres in the district. Several attempts have been made to organise "Cotton Sale Societies" for the benefit of the cotton grower by securing for him fair dealings and better prices and to protect him against the inconveniences of the present marketing system.

The almost general result of these attempts has been failure and the only surviving society, at Pachora, East Khandesh, is not working on co-operative lines and does little more than secure fair weighment to cultivators who make use of it.

The causes of this continued failure may be summarised in order of importance, as—

(*a*) Inefficient management.

(*b*) Hostility of merchants.

(*c*) Lack of effective preliminary propaganda among the growers.

(*d*) Inadequate finance.

In addition, the market rate of Khandesh cotton is liable to sudden variations and the cultivators are averse to hold or store their *kapas* in the hope of better prices. Further, as no superior qualities of cotton were offered for sale, there was no inducement for competition among buyers and grading was impracticable.

I do not see any prospect of successful cotton sale societies being established in Khandesh until considerable propaganda work has been carried out among the cultivators, efficient management and adequate finance provided through the agency of the Provincial or District Co-operative Bank and until a sufficient quantity of *superior* cotton is available to enable grading to be done and for sales to be made by auction through the agency of the sale society.

In the event of the introduction of a better staple cotton into the Khandesh tract, the sale society would not only be an advantage but a necessity to the growers of the improved type.

I would suggest that, in the meantime, preliminary propaganda be carried on among the cultivators and special consideration be given to the future financing of cotton sale societies in this important cotton producing area of the Presidency.

In connection with cotton sale societies, it may be mentioned that much interest is being evinced by cotton growers in Khandesh in the possibilities of organising *village co-operative cotton ginning societies.* I believe that such societies could be successfully organised and worked in several parts of the district and, as the sale of lint is more profitable than that of *kapas* and as commercial ginning charges are, in many places, very high, these societies would prove valuable and profitable organisations.

(*c*) I am of the opinion that resort to legislation to enforce co-operative action in schemes for joint improvement would not only be inadvisable but that, in the great majority of cases, will be found to be unnecessary.

My only experience of such co-operative schemes for joint improvement is in connection with fencing societies for the protection of valuable crops against wild animals.

While endeavouring to organise such a society in an irrigated (*patasthal*) tract of Nasik district, I found that local enthusiasm was inversely proportional to the distance of the villagers' lands from the outskirts of the area it was proposed to fence. The landowners on the boundaries were enthusiastic over the scheme whereas the cultivator who had the bulk of his holding in the centre of the "phad" evinced very little interest in the project. If recourse to legislation had been taken and "compulsory" co-operation resulted, I feel sure that the failure of the society could not be avoided. The method adopted was to suggest a graduated scale of payment, the outside owner—who suffered most—paying considerably more to the cost of the project than the interior landowner whose contribution was small. This suggestion was generally approved and, when I left the Division, the area had been surveyed and there was every prospect of a successful scheme resulting.

(*d*) I have no remarks to make in this connection except to draw attention to my views on the future organisation of agricultural co-operative societies as expressed on page 7 of the Report of Inquiries made into the Agricultural Co-operative Movement in Denmark (copy attached).*

* Not printed.

सत्यमेव जयते

Oral Evidence.

7236. *The Chairman:* Mr. Jenkins, you are Deputy and Officiating Secretary of the Indian Central Cotton Committee, and you are late Deputy Director of Agriculture of the North Central Division, that is to say Nasik and Khandesh, of the Bombay Presidency. I understand that you do not wish to be examined in your capacity as Deputy and Officiating Secretary of the Indian Central Cotton Committee, on points other than those which you have set down in your memorandum. Is that so?—Yes.

7237. And you would rather that the Commission's special attention to the Central Cotton Committee should be directed to another witness. Is that so?—Yes.

7238. You have put in a very full and, if I may say so, interesting note of what you propose to lay before the Commission, and we are greatly obliged to you for that. Would you like, at this stage, to make any statement of a general nature, or would you proceed to question and answer?—I should like to proceed to question and answer.

7239. I think you have in your hand a note of your evidence?—Yes.

7240. On page 438, you are talking about the development of new varieties of wheat in the Tapti valley area in East and West Khandesh, and you say that such work, to be effective and to make an appeal to the Tapti cultivator cannot be done at Poona, or even at Jalgaon or Dhulia. You suggest that a small wheat research station could be started in the Tapti area and the problems of the local wheat crops studied and investigated. You suggest the figure there of Rs. 1,500 as the cost of such a small station. I can understand that demonstration must be local, but I do not quite see why research should be local. Would you develop that idea?—My sole idea was to interest the people in the district, where improvements are going to be introduced, in the methods whereby such improvements may be arrived at. At present, taking the same instance, the wheat crop, the plant breeder at Poona concentrates his wheat work at Poona. He sends up different varieties for trial and test in the District of East Khandesh and Nasik, and it is quite impossible to test them on any but the smallest percentage of the areas where we hope to establish better varieties of wheat; and I feel that in a case such as this, where one large crop is concentrated in a special area, the cultivators would be very much more inclined to adopt improved varieties and better methods of cultivation, etc., if they could actually see the effects of these from the demonstrations being worked out among them.

7241. And yet inspite of holding that view, you do not attach nearly as much value to demonstration farms as you do to experiments worked out on the cultivators' own fields?—I refer here to experimental work which is done on the fields of the cultivators. I do not advocate establishing an experimental farm; I advocate leasing a few acres of land for a short period and conducting the work among the cultivators on their own fields.

7242. Do you think that that could be carried out at the cost you mention?—I think it could.

7243. What do you contemplate, a house for the Director?—No, nothing like that. I contemplate leasing probably 15 to 20 acres of land, say, in Nandurbar, in the centre of the wheat-growing area, having a fieldman there in charge of the plot, and it would be supervised by my own plant breeder from Dhulia. There would be nothing on a large scale at all, merely a small station under identical conditions to those under which the cultivators work, where their problems could be worked out among them.

7244. In the light of that answer, how do you propose to spend your Rs. 1,500?—If we lease, say, 15 acres of land, at Rs. 30 an acre, and we had a fieldman on Rs. 30 a month, who would merely supervise and look after the plot, if we spend, say, another Rs. 300 on material and hiring of bullocks, and then an additional travelling allowance for supervision, I think we shall arrive at somewhere near that figure.

7245. On page 439, you say, " The ideal organisation of research work is, in my opinion, the present system of co-operation in cotton research between the Indian Central Cotton Committee and Provincial Governments." You go on to describe the outlines of the working of that scheme. Should I be right, if I suggested that continuity and co-ordination were the principal advantages gained by this scheme?—Yes, I think so.

7246. You attach great importance to an assured financial future for research work?—Yes.

7247. You cannot reduce and expand expenditure on research according to whether provincial budgets are easy or difficult?—I do not see how it can be done.

7248. In your experience has the scheme, as it has so far worked, led to correlation and co-ordination of work?—I think most decidedly it has.

7249. Has the degree of centralisation which it involves in any way restricted or narrowed the line of research?—No, not at all.

7250. You go on, as I said a moment ago, to apply this principle as a possible solution of the problem of organising provincial research. Have you gone a step further in your own mind, and applied this principle to research as an All-India problem?—Yes, I think I have mentioned that in my notes on Administration.

7251. You have, but I think it is convenient to take it up at this stage. You are, broadly speaking, in favour of the setting up of a Central Research Committee or Commission, or call it what you will?—Yes, not entirely confined to research.

7252. For agricultural progress in the widest sense?—Yes.

7253. Would you favour the development of research upon crops other than cotton being organised on the basis of the crop itself, and regardless of territorial boundaries?—Yes, I would, if it could be co-ordinated with the interests of the trade, and if the trade interested in that crop could be represented on the research committee controlling it.

7254. Of what crops are you thinking?—I am thinking of crops such as rice, jute, and wheat.

7255. I take it that all these crops, and indeed cotton, do present certain problems for solution which are of a purely local nature, and in your larger scheme you deal with these local areas?—Yes.

7256. But the major problems of more general application are dealt with according to expediency?—Yes.

7257. And the position of existing research stations and research facilities?—Yes.

7258. You attach importance, do you not, to representation on the cotton committee, or for example the jute or rice committee, if these existed, of the cultivator, the distributor, the manufacturer, and of course representatives of the Agricultural or other public Departments concerned?—I think it is quite essential.

7259. In your experience, the presence of these various interests on the Central Cotton Committee has resulted in a broad outlook over the problem as a whole?—There is no doubt about it.

7260. On page 440, in answer to question 1 (*d*), " Sheep-breeding for wool production," you say, " In Khandesh, the chief income from sheep farming is derived from folding. The immense improvement in the wool which selective breeding could accomplish in a very short period of time is quite uninvestigated, an important and valuable line of research for the livestock experts." There are two points about that. You say that the chief income from sheep farming is derived from folding?—Yes.

7261. What do you mean exactly by that?—The herdsmen in Khandesh are in the habit of travelling over the country with large flocks of sheep; in the commencement of the cultivating season they come down with these flocks to the agricultural lands, and they obtain a considerable income from

allowing these sheep to remain and to be folded on the lands during the night. At the Jalgaon farm, we folded a considerable area of the farm. We had 2,000 sheep per night on the farm at the rate of a rupee an acre per night. These sheep live on the land during the night or for two or three nights as required and their dung and urine fertilise the land and make it ready for sowing.

7262. Are these sheep receiving any ration apart from what they pick up on the land?—No.

7263. Is importance attached to the effect of the tread of the sheep on the land?—I have never heard of any importance being attached to that. The sole importance is the manure.

7264. Is it your suggestion that the cultivators should themselves take up sheep-farming?—In some of the hilly districts of Khandesh, I consider it would be profitable if they did; but to begin with, I would confine myself to these wandering herdsmen who form a large portion of the population on the fringes of the small hills surrounding the Satpuras.

7265. But do you suggest it would be possible for a nomadic shepherd to improve the breed by control?—He would have to have a settled herd for some time, in order to do that, and we would have to organise the marketing of his produce.

7266. It would be a good deal easier for the cultivator to improve the breed?—It would.

7267. How do they market the wool at present?—At present, I understand the wool is merely marketed in the large bazaars of Dhulia and such large towns in Khandesh, and, as far as I know, they do not get more than 12 annas to a rupee per fleece.

7268. Is it true that this wool is hardly segmented at all?—You get anything from stuff like goat's hair to very fine wool.

7269. You do get fine wool?—Yes.

7270. I suppose the goat's hair type is used for felting?—I am talking about examining these herds of sheep. You will find sheep with wool that resembles goat's hair and in the same herd you will find sheep with wool of quite a good standard.

7271. I was thinking of marketing. I take it some one does grade this wool sooner or later, because of course so-called wool which is in fact hair is useless for the ordinary purposes?—I suppose it is used for felting and stuffing.

7272. Do you know anything about the prices obtained for the wool in the markets available to the herdsmen?—I think 12 annas to a rupee per fleece.

7273. Have you traced the value of that wool any further in its course in the wholesale market?—I have not.

7274. Then, on page 440, you say, "Another point which is worthy of mention is the necessity of encouraging, and if necessary subsidising, non-official gentlemen who have facilities and are desirous of conducting small schemes of research work on their own farms, under the guidance and direction of officers of the Agricultural Department." What grade of officer would you suggest should be employed on that work?—The district agricultural officer and the expert officers who were at my disposal in Khandesh would be quite capable of doing that. As a matter of fact, in several cases we did do it.

7275. It does not mean constant attendance on the farm?—No.

7276. You just lay out the experiment, and rely upon the landowner to carry it out?—Yes. Many of these landowners are quite capable of conducting it without assistance.

7277. Are they capable of keeping records?—Yes.

7278. Did you find any encouragement necessary or were they really keen?—In Khandesh there are large numbers who are only too anxious to undertake the work.

7279. They are enthusiastic?—Yes.

7280. On page 440, you talk about the establishment of the Dhulia Vernacular Agricultural School, but you do not give your opinion as to the value of the work carried on at that school. Can you tell us anything about that?—This was the first effort at agricultural education of this type in the Division. The school was largely started through non-official agencies. The people of Dhulia pressed very strongly to get a school of this type founded, and they assisted considerably in its foundation. The school has now been running for three years, and I think there is no doubt that those boys who have completed the school course and who have returned to the land will, if suitably followed up, be very useful agents in the spread of agricultural improvements in the district. Further on I have mentioned that several of these boys have applied for *kamgars'* posts in the Agricultural Department; and I say that I have no objection to that, because I consider it a matter of primary importance that men of the *kamgar* type should be available both to the Agricultural Department and more so for the use of larger cultivators in Khandesh. I think it is rather early yet to say whether the school has really justified its existence or not but I certainly believe that every sign points in that direction.

7281. How do you reconcile your statement that the local cultivators called for the school with the fact that since it has been started, according to your own showing, it has been extremely difficult to get a full complement of boys?—It was not entirely the cultivators that called for the school; it was their educated representatives in Dhulia, members of the association.

7282. Have the members of the association, who called for the establishment of the school, taken a hand in encouraging their boys to go to the school?—Yes, very considerably.

7283. On page 441, you are giving your views about the openings available for these boys. Do you think that the absence of experience in farm management is a serious handicap to these boys when they go out into the world and try to obtain positions as managers and so on?—I do not think that is the sort of position which these boys would seek.

7284. How old are they, when they leave school?—About 18 to 20.

7285. Do you not think, if management posts were available, that would be an extremely suitable type of occupation for them?—I hardly think they are qualified for a manager's post even after the school training.

7286. Have you followed up the careers of those who have returned to their own land?—We were just starting to follow them up. I think they may be useful for propaganda work in the villages.

7287. Do you agree that in the working of these schools, each of which is an experiment, it is important that an accurate record of the after-careers of the boys should be kept?—I think it extremely important.

7288. You are not alarmed by the fact that a large proportion of the boys leaving the school are anxious to obtain public appointments?—No, I welcome it.

7289. That, of course, is in line with the experience in Europe and other countries, is it not?—I think education in other countries is generally directed on two lines, for boys who intend to return to their own lands, and for those who wish to seek employment other than on their own land.

7290. If you know the secret of education which makes boys return to their own land, I should like to know it, because we have not discovered it in Scotland yet. On page 443, you say you do not think much of the cinema for purposes of propaganda, unless it is backed up by other agencies?—No, or the magic lantern.

7291. Are you satisfied with the quality of the films that have been produced?—The ones I have seen are very good. The only ones I have seen come from America.

7292. Do you think in the matter of sanitation and hygiene there is an important future before the film without other agencies?—No.

7293. Why?—Because I think the lesson which is taught by the film is not retained sufficiently long to have any real effect. It is more or less a fleeting impression and it is not retained by the ordinary cultivator beyond a very short period of time. I know it is a very difficult thing even for an educated person to recall the details of films, with presumably educational objects, which he has seen.

7294. On page 444, you say: "A great deal of progress in agricultural improvement could be made if more use were made of co-operative credit societies to organise field demonstrations for their members." To what extent are co-operative credit societies used as agencies for demonstration and education in your experience?—In my division of Khandesh I think very little use was made of them, not nearly as much as should have been. We were only starting to make use of this agency during the last year or two years as an active agent in demonstration and propaganda. For instance, in the case of propaganda against smut disease of *juar*, we circularised every co-operative credit society in Khandesh, asking them if they would stock a small number of packets of copper sulphate and issue these to their members, and if they were willing to arrange to summon their members together and hold a demonstration, at which an officer of my department would attend. I think only five co-operative credit societies in the whole Division replied to that circular. I think we ought to make use, and much greater use, of these co-operative credit societies, which are so numerous in Khandesh, as instruments in agricultural propaganda.

7295. How many societies are there in Khandesh?—I am afraid I cannot say offhand.

7296. Approximately, how many? Have you any idea?—I should say very nearly a thousand.

7297. Are they primary societies?—Co-operative credit societies; I am open to correction.

7298. A very important number?—Yes, quite a useful number.

7299. Only five out of the total even answered your request?—Yes.

7300. Now, do you attach most importance to the educative and, if I may so call it, moral side of co-operation, or to the provision of financial credit?—At present I attach most importance to the educative value of co-operative credit societies.

7301. On the same page, you are talking about the supply and maintenance of improved implements of tillage. You say, "Manufacturers and suppliers are not assisting, as they ought to do, in this aspect of agricultural development." What do you mean by "they ought to do"?—I think until quite recently, the Agricultural Department has been working alone in most of the districts of Khandesh in this matter. I admit that agencies of manufacturers are now being started in many parts and many towns in Khandesh; but these agencies have not been started until it has been obvious to the manufacturers from the work of the department that such business is going to pay them in the end; and I think that we might expect fuller co-operation from the manufacturers of agricultural implements, especially such as are cheap enough to appeal to the cultivators, in the actual work of propaganda in backward districts.

7302. Do you mean as a public duty, or as a venture in the interests of their shareholders?—I think if they consider both these lines, it would be to their advantage to do it.

7303. Does it not surprise you that, if there is this commercial field undeveloped and even unexplored, enterprise in India does not step into the breach and develop it?—In Khandesh at least it is doing it now, but not until the track had been blazed for them.

7304. Do you know of any difficulties in the way of Indian manufacture and distribution of agricultural implements?—There is the scattered nature of the districts over which these implements have got to be spread; there is probably the difficulty of obtaining reliable and suitable agents in

some of the backward tracts; and there is the question of finding a certain amount of capital which they will have to lay out for a considerable time.

7305. Would you proceed by direct sale or by loan?—I think the only hope is by sale on the instalment system; at least in the average tract of the district.

7306. And I see you advocate the appointment of a special *patel* whose business it would be to advertise agricultural improvements?—The reason for this proposal is that I feel that the Agricultural Department and the other departments interested in rural development are not getting down to the actual man in the village. Apart from the more educated and more wealthy cultivators our activities hitherto have not reached the people whom we wanted to reach, and I think we must have some local organisation which will continue to carry on stationary propaganda all through the year and interest the people in these activities if we are to be successful.

7307. I see that on page 446, you express the opinion that a great deal of money and energy has been wasted in the accurate recording of demonstrations on cultivators' fields and so on?—I would not go to the length of saying that money and time have been wasted; it has been valuable in educating fieldmen on the importance of results. But I think when improvements have been shown to be improvements, there is now no necessity for the accurate recording of results or weighing of produce such as is going on now.

7308. You think a certain amount of valuable data as to costing may be collected during the earlier stages of a demonstration, but that once they have been worked out, all attempts to keep accurate records should be abandoned?—I would differentiate between demonstration and experiment.

7309. On the same page, I do not feel sure that you are on such firm ground when you say, " Research work is of no value whatever to the agricultural masses of India unless the results obtained from it are brought to the notice of the cultivators and are incorporated in their general agricultural practice." Founded on that premise you say that the amounts of money spent on research work and propaganda are quite disproportionate. I follow the argument, but surely it is essential that research should keep ahead of current practice and therefore to some extent ahead of demonstration?—I agree, but I think demonstration is too far behind.

7310. It is a matter of degree?—Yes.

7311. You point out on page 447, the importance of a fuller interchange of experience and opinions between workers in various Provinces engaged on the same type of research. In your experience, is a good deal of improvement possible in that direction?—I think so. In this connection I might suggest something of the nature of crop conferences where the workers on the same crop in the different Provinces might meet and discuss important problems.

7312. Do you regard the great distances in India and the consequent high cost involved in these meetings as an important consideration?—I was especially thinking of the experiments on the cotton crop when I wrote this, in which the workers are scattered over Central India, Central Provinces, Berar, and Khandesh. The expense of holding such conferences in that case would not be very much. But I quite appreciate the difficulty that arises in the case of crops spread over the whole of India.

7313. In any case, do you not think that such conferences of research workers are of much value and workers even at considerable distances should be brought together?—I think it is necessary.

7314. I wonder what you mean actually when you link the development of the co-operative organisation throughout India with the idea of an All-India Agricultural Commission?—I was visualising the time when the development of non-credit agricultural co-operative societies, such as sales societies, marketing societies, and producers' societies will have reached an extent where the development of their further interests can be best facilitated

by an organisation which is not purely provincial. I may be looking a long way ahead.

7315. I am quite prepared to look a long way ahead, but I do not quite follow what the development of the co-operative idea has got to do one way or the other with the provincial organisation or All-India organisation of agriculture?—Take the case of manure societies. If we reach a stage when the demand for artificial manure is practically complete over all the big sugar-growing areas of India, I consider that the organisation of the supply of manure, such as calcium cyanamide and sulphate of ammonia and Chilian nitrate, from the sources from which these articles are derived will be necessary, and the supply of these manures could be done better and cheaper by an All-India organisation.

7316. An All-India co-operative organisation?—It would amount to that.

7317. You mention the investigations of a committee into the marketing of cotton. Is the report of that committee published?—The report is not published, but it is mentioned in the Minutes of the Central Cotton Committee.

7318. What exactly is the scope of that report?—The report deals with the finance of cotton cultivation in Khandesh.

7319. Including marketing?—Yes.

7320. I think it is very important that this Commission should have a copy of the report as soon as possible?—A copy was sent to the Commission, I think, early in October, of the final report of the Khandesh enquiry.

7321. Is not some enquiry going on at the moment?—We are carrying on enquiries in Gujarat, Central Provinces and Berar and Madras. These are all complete. I expect the reports of those enquiries will be submitted to the Cotton Committee in January.

7322. On page 451, you say you have submitted a list of recommendations about the manufacture of manure from night-soil. Could we have a list of those recommendations?—I can send it.*

7323. Do you know anything about the work of Mr. Fowler who is making investigations into this question?—Yes, he was working with me at Nasik.

7324. He is working privately now?—Yes, but we did work together on this problem.

7325. Where is he working now?—I do not know where he is now.

7326. Do you keep in touch with his work?—No, I have lost touch with him now.

7327. On page 452, you are talking about the need for continuous propaganda to persuade cultivators to give up the habit of burning cowdung. Have you studied the cooking habits of the villagers?—Not particularly, except that I have observed them.

7328. Has it occurred to you that there is probably something in the nature of their cooking vessels or in the practice of their cookery which requires a smouldering fuel?—Yes, I think there is.

7329. May that not be one of the principal reasons why the women object to giving up the use of cowdung fuel?—I had not thought of it before, but I think it is probably so.

7330. On page 453, you bring out in a very clear way the urgent need for getting for growers of better qualities of crop a higher price for the quality as against the volume factor?—Yes.

7331. Do these better varieties of, for instance, cotton involve a higher cost of cultivation?—The cost of cultivation is the same.

7332. He has to pay slightly more for the seed?—Yes. But the cost of cultivation is the same. When introducing a new variety we would naturally try to induce the cultivator to adopt the best methods of cultivation.

---

* *Vide* Appendix.

7333. If there is any reduction in the yield per acre, you have the improvement in quality?—That is so in Khandesh particularly where the poor quality cotton has the highest yielding quality.

7334. Are you familiar with the orders that have been issued in some Indian States in the Presidency, Rajpipla for instance, according to which growers are all compelled to grow approved varieties?—Yes, I am familiar with them.

7335. Do you know anything about the results of those orders?—The last report from Rajpipla pointed out that several legal cases had taken place over them, but that it was generally becoming the practice of the cultivator.

7336. Have you any information as to improved price as the result of bulking these good varieties for market?—When combined with the Cotton Transport Act they get the benefit of the good price.

7337. Is that assured now?—Yes.

7338. The Cotton Transport Act and the Cotton Ginning and Pressing Factories Act have proved very successful, have they not?—Yes, they have, especially in Bombay.

7339. On page 457, as to implements, you point out the advisability of improving the existing rather than introducing new implements, and then you talk about organising a local committee to investigate these possibilities. Would you not use some existing local body for that?—The committee I refer to, is a committee of my Divisional Board.

7340. Have you not got your Taluka Development Associations?—Yes, Khandesh is very fortunate in its Taluka Development Associations.

7341. Would they not be suitable bodies for this work? Can you not have sub-committees of those associations?—The Divisional Board I refer to contained representatives of the Taluka Development Associations; it was really a representative committee of the Taluka Development Associations.

7342. Your idea would be to have a small committee?—Yes.

7343. On page 459, you say, "Leaflets should be prepared in the vernacular on each type of improved agricultural implements, illustrating its use and giving the current prices and sources of supply of the most suitable makes. These leaflets should be distributed in the villages through the agency of the Revenue Department." How do you deal with proprietary articles in that way?—In that case we should write to proprietors for leaflets; most of them have already prepared them.

7344. But as public servants have you any instructions as to how to deal with proprietary articles?—No. I recommend what I think best.

7345. And you mentioned the proprietary articles by name?—I do.

7346. I wanted to know whether there are any particular instructions in the matter from Government?—No, I have not received any.

7347. On page 460, speaking about improving the breeds of cattle, you say, "To encourage to a much greater extent than is done at present the formation of co-operative cattle-breeding societies, by granting forest grazing areas on concession terms." Do you mean a very substantial reduction in terms?—No, we have had numerous proposals of this sort in Khandesh recently, and, as I have mentioned later, one of the essentials is that the grazing area where the breeding herd is to be kept should be segregated. That means that the cultivators who are members of the association have to undertake to fence by some means or other the area which is allotted to them for grazing purposes; I think this fact ought to weigh with the Forest Department in judging the price which is to be charged for the use of these grazing areas.

7348. Have you any personal experience of a scheme such as this?—I have.

7349. Has it proved successful?—It was held up through this very difficulty. There was a village near Dhulia where all the villagers were

willing to supply one or two cows each for a co-operative breeding scheme; they were further prepared to purchase a bull from the Agricultural Department under the premium system; they were further prepared to fence the area which was allotted to them by the Forest Department. In this case, unfortunately, the area was one which was covered with young trees, and the Forest officials of the district were afraid that these trees would be damaged by the people cutting and pulling the leaves for fodder in the dry season. When I left the district, the prospect of the formation of a society was very small on account of this fact.

7350. I suppose the difficulty was a material one from the forestry point of view?—From the forestry point of view it was, yes.

7351. They were young trees deliberately introduced?— I think it was a self-seeded area which had been cleared.

7352. Cleared and kept clear to encourage the growth?—Yes.

7353. What area known to you has the best type of cattle?—The best type of working cattle in Khandesh comes down from the Malwa plateau through the Satpura forests.

7354. Are many animals bred in Khandesh?—No, there is not much cattle-breeding in Khandesh.

7355. Do you associate enclosure with an improvement in cattle-breeding? —I think it would certainly assist the ordinary cultivator on the plains of Khandesh who was willing to take it up. As a matter of fact it would be necessary.

7356. The practical difficulties in the way of controlling breeding in existing conditions are almost insurmountable?- Almost insurmountable, and the result is that the cattle are brought down every year from Malwa and purchased by the cultivators.

7357. I do not quite understand this passage of yours on page 461, "I do not think there is much hope of increasing fodder supply by any considerable augmentation of enclosed pasture land." I should have thought that the enclosure of pasture land and grazing under a controlled system might make a substantial contribution to the fodder supply?—True; but all the land that is fit for grazing and pasture is already utilised for the cultivation of the more paying crops like cotton.

7358. You do not under-estimate the value of controlled grazing?—By no means.

7359. Do you think there would be much feeling against enclosure of part of the village common grazing grounds by groups willing to attempt improvement in the breeds?—I think it would be very unwise to attempt it except in villages where the co-operation of the people had been previously obtained.

7360. Do you think that a small minority should be in a position to defeat such schemes?—No, I do not; but I do not think the scheme would be successful unless the unanimous opinion of the people was in favour of it.

7361. The active opposition of the small minority would be very effective? —It would be sufficient to defeat the scheme.

7362. In dealing with Maketing (page 463) you give instances of extraordinary variations in maunds. Maunds are 72 seers, 50 seers, 40 seers, and so on, according to the places. Do you suggest standardisation of weights?— Yes.

7363. Do you think public opinion is ripe for such change?—I think in many parts of Khandesh it is.

7364. Do you think this complication in the unit of exchange operates against the interests of the cultivator and in favour of the buyer or the middleman?—I do not think it operates to any great extent against the cultivator, but where it operates at all it is against the interests of the cultivator.

7365. Where there are complications and difficulties, the man who is doing it all day and every day is likely to be better at it than the man who only

does it when he markets his own produce?—Yes, but I do not think this complication is an important contribution to any loss the cultivator may incur.

7366. Would you say the same thing about the system of dealing under the cloth?—Yes.

7367. You think that is definitely against the interests of the cultivators?—No, I do not think it is.

7368. I want to be quite sure about it. You do not think that the arrangement according to which commission agents buy and sell under the cloth is against the interests of the cultivator?—I do not think it is in the least, so long as there is no system of auction sale.

7369. The trouble appears to begin after the sale has been nominally completed?—Yes.

7370. That is when the cultivator begins to be milched, is it not?—Yes.

7371. Complaints are lodged and the weighments are challenged, and the cultivator having parted with his goods is more or less bound by *force majeur* to give way?—He has already emptied his cart, and rather than have the trouble of re-loading it and taking it away, in many cases he prefers to take the reduced rate. But I do not think it is altogether the fault of the dealers, because in many cases the best stuff is put on the top of the cart and the worst in the middle. But it certainly is the chief complaint of the cultivator against the present marketing system in Khandesh. I understand that in the Central Provinces there is a market law which forces any buyer complaining after weighment to re-load the cart of the cultivator if the cultivator is not willing to accept the reduced weight.

7372. What do you think of such a law here?—I think something on that line would be effective in checking the extraordinarily large reductions which are sometimes forced on cultivators in this way.

7373. The cultivator has to face not merely the labour of re-loading his cart, but also the economic cost of carting it back to his farm?—Yes, and trying to sell it each day.

7374. Are middlemen organised together?—The retailers or *dalals* are more or less organised.

7375. If the cultivator has a difference with one *dalal*, does he find it extremely difficult to sell his produce to another *dalal* next day?—Yes.

7376. What are the market charges?—They amount to about Rs. 2 per cart.

7377. Do you think that is excessive having regard to the services rendered?—I do not think it is excessive.

7378. Does that include the charity cess?—Yes.

7379. Are there any other charges?—The marketing charges are simply for stocking the goods. Then there are the *dalal's* charges, *i.e.*, broker's charges; charitable charges; and in some villages there is a charge for the national school; they mount up.

7380. Who levies the charge for a national school?—The market authorities levy it. It is levied in some of the markets in West Khandesh. It is a very small charge of one anna per cart.

7381. What is a national school?—There was a national school founded there, and this was one of the methods adopted for raising the money to run it.

7382. Did not the cultivators object to that charge?—No, the cultivators accept it.

7383. *Dr. Hyder:* Do you not think that the charges are excessive?—It is 3 or 4 annas per maund. Rs. 2 is the charge per cart.

7384. How many maunds are loaded in a cart?—About ten maunds.

7385. *The Chairman:* Is there no octroi as it would be called in France, or local tax?—No. In some of the markets, they have to pay small charges like 2 annas per cart for standing room. I think Nandurbar is a typical

market of this sort, the carts arrive overnight and in the market they pay 4 annas per cart for standing room and for water facilities.

7386. The produce is always sold off the producer's cart, is it not?—Yes.

7387. Not in a godown?—No.

7388. Are there any storage facilities? —No, there are no storage facilities.

7389. *Sir Henry Lawrence:* Are there any octroi charges for goods coming into the market?—No, I do not know of any charges being put on carts coming into a market for that reason.

7390. *The Chairman:* Do you think a case exists for investigation into, and analysis of, the price structure of produce grown and consumed in India and again of produce grown in India and exported?—Do you think it is important that the price structure of these goods should be recorded and analysed?—I think it would be valuable in the case of articles which form a considerable portion of export.

7391. But not of articles consumed in India?—I do not think in the case of *jowar* and most food crops it would be very valuable.

7392. Do you think the cultivator gets a better share of the world's price in the case of produce exported than he gets of the retail price of produce grown and sold in India?—I think he does. In the case of exported articles like cotton the price is connected with factors outside India altogether.

7393. And large and important buyers are at work in all the districts and their activities have a great effect on the local price, have they not?—In Khandesh the chief factor affecting the price given to the cultivator is the price in Bombay for lint on the preceding day.

7394. Is it not the case in the matter of produce consumed in India, that it is handled as a rule by smaller buyers than is the case with exported produce?—Yes; it is.

7395. Do you not think the cultivator is more likely to get a lower price than that which the retail price justifies in the case of produce consumed in India, than in the case of produce consumed overseas?—I really do not feel qualified to answer that question; I have not studied it.

7396. In the case, for instance, of a cultivator who is in debt, and who is bound to hand over his produce to the lender, is it not easier for the lender to discount an unfairly small amount of the loan in the case of a produce to be consumed locally than it would be for instance in the case of cotton where the price is known?—Yes; it would be.

7397. Do you not think a careful investigation of the marketing of all produce consumed in India might be illuminating?—I certainly think so; I think investigation of the marketing of all produce would be very valuable.

7398. Is much known at the moment as to the details and finance of marketing in India?—I do not think there is nearly enough.

7399. It is no use going on mere prejudice and hearsay in these matters?—No, hearsay is a very bad guide in this case.

7400. On page 466, in connection with the management of co-operative societies you say, "Each shareholder is entitled to five votes in virtue of each share in the society, which he holds." Is it the custom in India for societies to attach the vote to the share and not to the member?—I am afraid I cannot answer that. It is just a scheme I have submitted as a means of financing distributive co-operative societies.

7401. I wondered whether you thought it was in tune with the spirit of co-operation to attach the vote to the share and not to the member?—I want to attract as large a sum as possible to these societies.

7402. *Sir James MacKenna:* You are in favour of a central organisation for the development of agricultural research, and in your opinion the Central Cotton Committee has reached the high water mark of such centralised direction of a particular crop?—I think it is the best example in India.

7403. Am I right in thinking that was the direct result of the Indian Cotton Committee of 1917?—It was.

7404. Do you think that without an equally intensive inquiry into other crops, such as rice and wheat, we could build up an equally effective organisation?—I think an investigation of the same nature as that made by the Indian Cotton Committee would be extremely valuable, but experience of the working of the Indian Central Cotton Committee would do away with a certain amount of the investigation necessary in the case of other crops.

7405. Have you thought out in any detail how the central organisation would function or be composed?—I have thought a good deal about it, and I would suggest that the central organisation should be composed on very much the same lines as the Imperial Department of Agriculture in India, with the exception that it would not be centred at one large research station tucked away in the corner of a Province and not available for people to see. It should control throughout the Provinces small research stations, preferably situated according to crop requirement; and in addition it should co-operate very closely with the Provincial Research Committees. Under your main big committee you would have smaller provincial committees working on particular crops and particular items of research necessary for that Province.

7406. The big advisory central committee would necessarily work largely through sub-committees?—Yes, in the Provinces, which would have representatives on the central committee.

7407. Would you have trade representation as well?—Most decidedly; in every case possible.

7408. In all cases where the crop was commercial?—Yes.

7409. Have you any views about financing such a central body? It would require money, of course?—Yes.

7410. Have you thought of that aspect of it at all?—I have not, really. I only think it should be provided with the maximum amount of money possible.

7411. Wherever it comes from?—Yes.

7412. You have no suggestions to put forward on that? It is not quite as easy as the cotton proposition, where there was an organised trade willing to tax itself?—That is quite true.

7413. *Professor Gangulee:* Are you satisfied that the success hitherto achieved by the Central Cotton Committee justifies the adoption of similar methods of work in regard to important food crops?—I think so. I think the success of the Central Cotton Committee is the most outstanding feature in the agriculture of India in recent years.

7414. I follow that. But is there sufficient trade interest in Indian food crops to mobilise resources in the manner possible in the case of cotton?—No; I think that would be a difficulty in building up a similar organisation, but in the case of food crops mostly consumed in India the finance of any such organisation will have to come from some other source than trade.

7415. Am I right in thinking that the basic work of the Central Cotton Committee is in the field of research, and not in the field of propaganda?—The Indian Central Cotton Committee decided, at their initial meeting, that they would not touch subjects dealing with propaganda to begin with, but would confine their attention to research into the improvement of the Indian Cotton Crop. But I do not think that precludes them from adopting propaganda work, when they found it might be in the interests of the Indian cotton-growers to do so.

7416. Hitherto, you have not directed your attention to any propaganda work?—Only in a very small way, such as sending exhibits to the Poona Agricultural Show, and little things of that nature.

7417. Here you make a reference to it, and in answer to the Chairman you have already explained that you attach a great deal of importance to propaganda work?—I do.

7418. And you consider that amounts spent on research and on propaganda are disproportionate?—I think so.

7419. In the event of having an organisation like that of the Central Cotton Committee, you would not have it devoted solely to research work? Research is a fundamental pre-requisite to propaganda? Do you agree to that?—I do.

7420. Research, in the case of the Central Cotton Committee, is its basic motive?—At present it is, but I do not agree that it will always remain that.

7421. Gradually it will undertake some sort of propaganda work?—I think the propaganda side will develop, but at present there are so many urgent problems awaiting solution that the Central Cotton Committee decided it was more profitable to confine their attention to research to begin with.

7422. How do you organise your research work? When you have to formulate a definite programme, how do you proceed?—Definite programmes are submitted to us by the Provincial Governments. The Indian Central Cotton Committee consider them, first of all in an agricultural research sub-committee and finally at a full meeting of the Committee. They are discussed from every aspect, agriculture, trade, etc., and if they are considered of sufficient importance, the Central Cotton Committee allot a special grant to that Provincial Government, to be administered through the executive of that Government, in this definite line of work. That grant is granted for a special term of years, and every year the reports on that work are considered by the Committee, and at any time the Committee can stop it, or have the power of extending it.

7423. In this way, are you able to eliminate the possibilities of overlapping of research work?—I am not very frightened of overlapping in research work. We have two schemes at present, of which one is going on in Dharwar and the other in the Central Provinces, on the same problem, and we are much more likely to arrive at a solution as a result of both investigations than we would have been by one.

7424. By this Cotton Committee, you have been developing a sort of spirit of team work among the investigators?—I think we have.

7425. That is, a group of workers tackling one fundamental problem?—Yes.

7426. Can you cite an instance of an item of research that you have been able to undertake since the existence of the Indian Central Cotton Committee, to which inadequate attention was given by the Provinces?—Yes. We have got the subject of the boll worm, which is a problem, which affects not only the United Provinces, but also Gujarat and Khandesh, and creeps into the Central Provinces and Berar.

7427. The shedding of the boll worm?—The effect of the boll worm in the shedding of the bolls and the resultant loss in cotton. This problem could not have been undertaken properly except by an All-India organisation of the type of the Indian Central Cotton Committee.

7428. Take the case of the work begun by Dr. Leake. Am I right in thinking that this fundamental research work that he started would never have received much attention from the Economic Botanist of that particular Province, had it not been for the Indian Central Cotton Committee?—I think that the way to look at this is that the research worker in a Province is bound to direct his attention to those problems which appear to be most pressing for that Province for the time being, and he may have to alter occasionally. But when you have an organisation like the Central Cotton Committee, which is independent and provided with funds of its own, it can undertake a definite problem and get results, and the only justification of all research work is getting results.

7429. You have undertaken some fundamental researches on cotton?—We have.

7430. During the period of your service as Deputy Director of Agriculture were you obliged to give up any line of research on account of fluctuations of provincial budget grants?—As Deputy Director of Agriculture, I was never able to take up any research. My time was occupied with propaganda and

work in the districts, and I had practically no facilities for going in for research work at all.

7431. Would you have liked to have those facilities?—I enjoyed my work in the districts, but I should have liked to have a laboratory on one of my farms, where I could have undertaken little pieces of research work which seemed to me to be of importance in the districts.

7432. From the general trend of your memorandum, I gather that you consider that the time has come for the Indian Agricultural Department to devote more attention to propaganda than to research?—As a district officer, I feel more propaganda is necessary to put the results which research has brought to notice into practice.

7433. And you say you are handicapped by insufficient demonstrators?—We are handicapped for want of staff and money.

7434. There, do you agree that in order to have fieldmen and demonstrators, the next step of development must be in the direction of agricultural education?—Yes, we certainly need that.

7435. Therefore you would lay a great deal of emphasis on agricultural education schemes?—Of that type which will produce the men required, yes.

7436. You make a very interesting statement about non-official gentlemen taking a great deal of interest in the spreading of improved methods. Do you mean large landowners?—Some of them are landowners, but others are not.

7437. In the event of holding any demonstration, would they co-operate with their tenants?—They do.

7438. Is it your experience that the example of large farmers has in any way influenced the smaller farmers in the introduction of better methods of farming?—I am afraid I cannot say it has.

7439. It does not percolate down to the small man?—If it does so, it is a very slow process.

7440. Could you suggest any method of accelerating that process?—The only method of accelerating that process would be, as I have mentioned in my note, by making available the sources of supply of the material which are necessary for introducing these improvements at a cheap rate, and making these sources easily available to the small cultivator. The big cultivator can go himself and get these things and pay for them; but the smaller cultivator cannot, and they must be put down at his door if we are going to have any general rise in the standard of agriculture.

7441. On page 438, you make the suggestion that you would like to have a committee which would administer a special permanent research fund, but though throughout the memorandum you have emphasised the importance of propaganda, you have not made any suggestions for a fund for propaganda purposes?—I do not consider that money is so essential to propaganda work. What we want is to interest the people and get non-official co-operation. Any success we have had in Khandesh has been entirely due to that. But, at the same time, I think that the money we do get for propaganda work is insufficient. Demonstrations cost money. We have to cart ploughs about the country and to make arrangements for demonstrations in villages, and that needs money.

7442. For propaganda work you would depend on non-official agencies?—I think it is absolutely essential. We must have the co-operation of non-official agencies in all the villages if propaganda is going to be extended as it ought to be.

7443. In order to get them sufficiently interested, the State will have to take the initiative in this direction?—It is doing so now. We are subsidising associations.

7444. Are you of opinion that there are already agencies in rural areas, through which propaganda could be effected?—Every good cultivator is an influence.

7445. I am referring to organisations like the Taluka Development Associations?—Yes. We have good experience of these in Khandesh, and they have proved most valuable, especially in the direction of propaganda work.

7446. Would you call Taluka Development Associations voluntary organisations?—Yes, entirely.

7447. They were not organised by any impetus from the official side; they organised themselves?—They came entirely from within, and in that lies their special value.

7448. They are subsidised by the Government?—Yes, and I criticise that.

7449. The initiative came from themselves?—Entirely.

7450. Their growth is organic?—The growth is from within, and not due to any external pressure from officials.

7451. Do you hope to see these organisations as local nuclei for rural betterment?—I hope so. In Khandesh, my experience has been that the need is not to assist in the formation of these organisations, but to stop them from forming too quickly.

7452. Who are the organisers?—In most cases, they are men who are interested in agriculture themselves, often town dwellers, and are generally men of some public note.

7453. By training, they have had some agricultural education?—Most of them are farmers themselves. We have found that generally these organisations, as one would expect, arise in the taluka town.

7454. What was the motive behind their organisation? Were they purely co-operative organisations for the spread of agricultural knowledge?—I could see no motive, except to try to improve the agriculture of their district.

7455. Were they formed from any religious, social or political bias?—No. There was nothing of that.

7456. Do they correspond to the County Agents in the United States or the *Konsulents* in Denmark?—They are in the same category as the agricultural associations of Denmark.

7457. I am referring to the organisers?—The *Konsulents* in Denmark are generally men who are experts in agriculture.

7458. And so are the County Agents in the United States of America?—Yes, in these cases, the organisers of these Taluka Development Associations are, as I have stated, people who take an interest in the agriculture of the taluka, and generally men who are high up in the public life of the district.

7459. You have stated that you do not approve of State help (Rs. 1,000 a year, I understand it is) for the Taluka Development Association. Do I understand you aright?—Yes.

7460. You think the State should not give any aid at all?—No, I think the State should give its aid in the way of giving them an experienced graduate and paying him and letting him organise the collection of subscriptions and the local funds within the associations. I do not think it is in the interests of these associations to give them any pecuniary help.

7461. In addition to the number of village officials already in existence, you have made a suggestion with regard to the creation of a new official called the Agricultural *Patel*. What would be his status? Under whom would he work?—This is merely an attempt to bring agricultural improvements in closer contact with the actual villagers.

7462. Would he be a village official?—He would be no more an official than the ordinary *mulki* and police *patel* in the village; probably less so.

7463. Would he be under the Revenue Department?—No, under the Agricultural Department. It matters not which department he is under, as a matter of fact.

7464. Are the Revenue officers popular among the villagers?—In Khandesh the Revenue Department and the Agricultural Department have always co-operated extremely closely, and I have had nothing but very valuable help

from the officials of the Revenue Department all over the district ever since I went there.

7465. On page 441, you suggest that the teachers in rural areas should be drawn from the agricultural classes. What sort of education would you consider suitable for these teachers?—I am afraid I am not an authority on agricultural education. I merely think that if a teacher is going to work in an agricultural bias school, and teach the sons of agriculturists, he must know their mode of life, and he must not come from a town. He must be able to appreciate the point of view of an agricultural boy.

7466. Do you agree with me that agricultural education, in order to be effective, must rest on a basis of broad general education?—To a certain extent I do, but not entirely.

7467. On page 442, you make a very interesting suggestion. You say, "I would also suggest that students at the Poona Agricultural College who take general farming or farm economics as their special subject should be obliged to spend a definite period of time on a Government farm in the district before being allowed to appear for their final examination." Did you place that suggestion before the authorities?—I did when I was asked to submit my suggestions for the extension of the Poona Agricultural College. That was one of my suggestions.

7468. It has not been carried out?—Not as far as I know.

7469. From your personal knowledge of the co-operative movement, can you tell us if this movement is yet a living force in the rural areas where it exists?—I can only speak for Khandesh, and in many parts of Khandesh I think I would be speaking the truth if I stated that the co-operative activities of the societies in that district are the only force which is operating towards agricultural improvement, the only real non-official force, in any case.

7470. As far as Khandesh is concerned this movement has gained a dynamic character?—Yes, it has.

7471. You make a suggestion that the distribution of seed should be in the hands of a non-official agency. With the development of plant-breeding work in this country, do you agree that it is essential to have a satisfactory organisation for the distribution of seed?—Once it has been decided that the results of the plant-breeder's efforts are fit to be put in the districts, then the organisation of an adequate distribution of seed is essential.

7472. Would you entrust the co-operative or non-official agencies with this fundamental work?—I would.

7473. Would you exercise any control over them?—I would not exercise any control, but co-operate.

7474. Would you not exercise control over the purity of the seed and the germination tests?—The initial supply of seed has got to come from official sources, say, the Government farms, but I think after the seed has been produced on the farm, the function of Government and the officers of the Agricultural Department is merely to assist non-official bodies such as co-operative societies in their methods of distribution.

7475. I agree, but do you realise that the economic loss on account of bad germination is tremendous in this as in other countries, and that the only check is to have official control over the seed trade? In Denmark, although the whole trade originated from non-official agencies, the famine in 1893 made it necessary for the Danish Government to take charge of the seed trade, and have State seed-testing stations. In England a seed-testing station has recently been opened. Are you suggesting any such seed-testing stations?—I do not think that will be necessary for a long time to come yet.

7476. *Mr. Calvert:* You suggest a small wheat research station in the Tapti Valley area. Would the problems in wheat there be different from the problems now being studied at Pusa, in the United Provinces, or in the Punjab?—Yes, because I understand in the Punjab it is mostly an irrigated crop in the Tapti valley it is a dry crop. I do not know much about wheat in the Punjab. I have never been there.

7477. There are about four million acres dry?—This is practically entirely a dry crop, and the nature of the soil which is a deep black soil verging down to river silt, is of such a kind that it seems to be specially fitted for research on the spot.

7478. Do you really think that there are problems of almost purely local importance so great as to justify a research station?—Yes.

7479. Apart from the general work on the same crop in other Provinces?—I think so.

7480. Then you say that there are very few facilities for the training of men of the Mukadam type in specialised forms of agriculture. Have you tried special classes on your farms at all?—We have had foremen on the farm and endeavoured to give them the training they would require for special posts. But I think that is not enough. I think we ought to make more use of our agricultural stations for training this type of men.

7481. May I take it that what you advocate is beyond the present power of the Deputy Directors to carry out?—Absolutely beyond their powers.

7482. More staff would be required?—I have no facilities for training men in tractor-driving or well-boring in Khandesh.

7483. In fruit cultivation and repairs of implements?—I could give training in fruit cultivation with non-official assistance, because I am fortunate enough in having a very fine fruit grower who is willing to undertake the duty.

7484. Do you want a separate centre of activity in your own Division?—I should not confine it to my Division. I would like to be able to send men from my own division to a place where such training could be got.

7485. With expansion of activity, it practically comes to having a centre of training under each Deputy Director?—I do not think so. I might have no centre in Khandesh; I may have to send all the men I want trained to other parts of the Bombay Presidency.

7486. On the question of propaganda, have you tried concentrating propaganda within a few villages and trying to convert the whole of the cultivators of those few villages, rather than dispersing propaganda over all the villages?—We have gone further than that, and concentrated propaganda in one village in my district of Nasik.

7487. Did you find good results?—Since at the time I left we had been doing it only a year, I think the results of the attempts which we made were very good indeed. We disposed of nearly 170 ploughs in the village and round about it.

7488. What was the link binding your concentration? The co-operative society?—Yes.

7489. Was there a better-farming society?—No.

7490. In your entire district, have you any specific societies for promoting better-farming?—No.

7491. If you had such organisations, as we have in the Punjab, would you give them preference over the unorganised public?—I would. I would do everything which would encourage them.

7492. Japan practically forces people into the co-operative guilds by refusing help to anyone unless he belongs to them. Would you be prepared to go as far as that?—Yes; I think in many cases the end would justify the means.

7493. It is merely a question of using your present staff to the full capacity?—It is.

7494. Would you favour co-operative organisation for better farming by giving them preference over individuals?—I would.

7495. In discussing crops and manures you talk of "an additional profit per acre." Do you mean by that net profit?—Yes.

7496. It is page 453 where you are discussing cotton and saying there will be an additional profit of Rs. 7 per acre?—Yes, profit.

7497. We have been told that these new types of seed require better cultivation and more manures than the other types. Is that your experience?—No.

7498. That to get the best results from your improved seeds you must have better cultivation?—That is quite true, but to get the best results from the old seed also you must have better methods of cultivation. It is not a special point in connection with the improved varieties.

7499. I was trying to find out how much of your extra profit is due to better cultivation and how much to better seed?—This Rs. 7 is the additional profit per acre with the improved N. R. seed grown on the cultivator's fields in the same way as they grew the old seed. It is due to higher ginning percentage and better yield.

7500. Under Animal Husbandry, you seem to consider that the formation of co-operative cattle-breeding societies depends on getting some concession from the Forest Department. Are there any existing obstacles to organised co-operative cattle-breeding?—The great difficulty is the question of a grazing area in my district; that is why I have laid such stress on concessions from the forest authorities because I consider it to be so important that these societies should be given facilities for segregated grazing. We cannot hope for success attending such societies unless the forest authorities are prepared to co-operate.

7501. If you can get a whole village to join the co-operative organisation, using their existing grazing ground, would not that meet the difficulty?—The trouble is that all the cattle of that village every dry weather go to the forest and mix with cattle from other villages.

7502. And you think they are exposed to disease?—Yes, and to indiscriminate breeding.

7503. It is difficult to improve the breed of cattle unless you secure immunity from disease and risk of breeding with the bad bulls?—Yes.

7504. Would you advocate steps being taken to prevent breeding with the bad bulls?—Yes.

7505. Do you advocate castration?—We do advocate castration.

7506. Do you find that the opposition to castration is dying out now?—I do not think it is strong in Khandesh.

7507. On page 461, you talk about fodder crops on a system of intensive cultivation giving higher yields. Is the obtaining of the highest yield the important part of it or the highest net profit?—In this case all the fodder raised will be given to the cattle of the grower so that yield is really what we should aim at. If the cultivator has got, say, 2½ acres as a whole, I would have him set aside a few *gunthas* of that area for the cultivation of some high yielding fodder under intensive cultivation and heavy manuring in order to get as high a yield of fodder as possible for his cattle.

7508. Such yield must be limited by the question of profit?—Yes, that is so. But what I was thinking of, when I wrote this, was a man growing his own fodder for his own cattle. He should get as much fodder as he can out of a small area.

7509. But eventually it is a question of profit. He can purchase his fodder if he can get it cheaper?—Yes.

7510. You can sometimes purchase your highest yields too expensively?—Undoubtedly.

7511. Coming to marketing, I gather you have no experience of co-operative marketing on a commission basis?—No. The only thing approaching that is the co-operative sale society at Pachora, which does nothing more than realise fair weighments and payments on the same day to its members. The members sell most of their *kapas* outside; it only deals with about 4,000 carts a year.

7512. I gather that society does not incur the hostility of the *dalals*, for at the end of your section on marketing you say, "The society should avoid

incurring the hostility of *dalals*"?—The *dalals* are mostly members of the society, but very few cultivators bring their carts there. The only people doing so are petty merchants who have bought cotton in the villages. 99 out of every 100 carts belong to them.

7513. Not actual producers?—Not actual cultivators, no; they bring cotton bought in the villages and brought to Pachora, where it is sold to the gin owners.

7514. You stress the fact that the society should avoid incurring the hostility of *dalals*. Why cannot the society be its own *dalal*?—If these societies are to be successful in Khandesh they will have to interfere as little as possible with existing conditions. If they can utilise more reliable and better *dalals* they have a very much better chance of establishing themselves.

7515. You would rather work with the present system than fight it?—I would.

7516. You say that officers of the Co-operative Department require some knowledge of agriculture. Do these officers regularly visit your farms and go through them once or twice a year?—Yes. We often have visits from officers of the Co-operative Department in Khandesh; they take a great interest in the work of agriculture.

7517. Is there any systematic attempt to keep them abreast of your developments?—There is no course of training or anything of that sort.

7518. Is there no short course for them in agriculture?—No.

7519. Would it be difficult to organise such short courses?—I do not imagine so, and I think it would be very desirable to have a short course in co-operation for agricultural officers and a short course in agriculture for co-operative officers.

7520. In the Punjab the superior staff have to go through one month's course in the Agricultural College, and others take a six months' turn in practical agriculture?—I do not think the agricultural college would be any use for this. I think any course ought to take place on the Government farm of the district where they work.

7521. The college course is in rural economy?—I am referring to a course in practical agriculture and the methods of the district.

7522. You think that could be arranged?—Yes, I think so.

7523. I am not quite certain about your attitude towards Government taking an active part in organisation. At page 464 you say Government should not take any active part in the organisation of co-operative societies, but on page 465 you speak of the necessity for official organisation?—On page 465 I do not refer to the organisation of the society. The organisation of the society has got to come from the people themselves. But after the society has been formed, the organisation of their management and the way they do their work must have official, expert help in the initial stages at least.

7524. Do you not think that the organisation is more important than the origin of the organisation? What we want is the organisation; never mind the source?—Are you speaking of particular societies or generally?

7525. I am speaking of organisation of the people generally for agricultural co-operation. The main thing is that we should have agricultural co-operation?—I do not think so. I have found in the Nasik district that the failure of many societies of this nature that were organised officially has caused a great set-back to the co-operative movement in that district. It would have been very much better if such societies had never been organised and had never come into existence.

7526. Do you know that in Japan agricultural organisation is entirely a State affair?—Yes.

7527. Japan has started her co-operative movement from above?—I do not know the conditions in Japan.

7528. You stressed, I think in answer to the Chairman, the educational value of co-operation. If the education comes from the official agency, will you have any objection?—No.

7529. Dealing with your scheme to give votes by shares, as to which the Chairman asked you some questions, are you not stressing the non-co-operative element by that?—My whole idea was to obtain as much capital as possible to give these societies a start off.

7530. You have no objection to its being a purely co-operative organisation?—None at all.

7531. You have given us an interesting note on Denmark.* But do you think the example of Denmark is a suitable one to hold up to India? There are certain differences. Is not Denmark dealing mainly with animal products? It is mostly that and dairying, which you do not get in India?—Yes, that is true.

7532. And there you have mostly cultivating ownership, whereas half Bombay is cultivated by tenants?—Yes.

7533. Do you know whether tenants enter co-operative societies in your division?—Judging by the inquiry we held, I think they do, because a large number of tenants we inquired of had borrowed from co-operative societies, and so must have been members. I think there is no doubt that they do join co-operative societies.

7534. And then Denmark has no large towns dominating its rural areas; it is entirely a rural country?—It is.

7535. Denmark has also had the good sense to imitate Scotland in its agriculture. Also it is a free-trade country?—Yes.

7536. So it is not quite fair to hold up Denmark as an example for India to follow?—I would not go to the length of comparing them, but the principles underlying the practice are the same.

7537. The difficulties are different?—Yes.

7538. Are the persons whom you mention as taking interest in agriculture, cultivating owners or rent receivers?—In most cases they are cultivating owners.

7539. Does the pure rent receiver take much interest?—None, except in the political field.

7540. *Mr. Kamat:* On page 438 you advocate that Bombay should have a Provincial Research Committee and also a special permanent Research Fund. Should this fund be a provincial fund or an All-India fund?—This refers entirely to the Province; it will be a provincial fund.

7541. You prefer to have a provincial fund?—Yes, in this case.

7542. Do you wish to give any opinion on the question whether this fund should be raised from the general tax-payer or from a particular trade; for instance, funds for cotton research will be raised from the cotton trade and for oil-seed research from the oil-seed trade?—I do not really mind where the money comes from as long as it is obtained. What I have advocated here, however, is purely a provincial organisation, and I do not think you can organise trade money on a provincial basis; it must be on an All-India basis. If only the cotton mills of Bombay had to pay a cess of 2 annas a bale, they would be placed at a disadvantage compared with mills in other parts of India. So any trade cess must, I think, be on an All-India basis.

7543. The pupils in the Dhulia Agricultural School get free boarding and free lodging?—Yes.

7544. But part of the money is raised by a local committee of non-official gentry?—Yes.

---

* *Co-operation in Denmark.*—Reprint of Report to the Government of Bombay, published in the *Bombay Co-operative Quarterly*, September and December, 1925.

7545. The school came into existence because it was financed by non-official gentlemen or members of the Agricultural Association?—Yes.

7546. But you are finding it difficult to get boys for the school and the headmaster has to go round the Division and induce the cultivators to send their boys?—Yes.

7547. So that the people who pressed for this school did not really reflect the mind of the cultivators?—I am afraid they did not.

7548. And therefore, would you be rather cautious in pressing such experimental schools in other parts of the Division?—I would be very cautious.

7549. For the purpose of propaganda you are advocating a scheme of *shetki patels* in each village?—In each of the larger villages.

7550. I presume you expect them to be conversant with agricultural practice, that is to say, they should be trained men, if possible?—Good cultivators.

7551. Ordinary cultivators?—Yes.

7552. Do you think that ordinary cultivators if invested with powers as *shekti patels* will be able to carry on propaganda work efficiently?—They can certainly assist propaganda agencies in their village.

7553. Do you think such work cannot be done by the ordinary revenue *patel*?—If the revenue *patel* would do it, it would be quite a good solution.

7554. Otherwise, your idea is not to have *shetki patels* on an honorary basis but to give them some small remuneration from Government funds?—Yes, but on the whole I should be chary of using the revenue *patels*. I do not want to make the villagers think that there is any compulsion about the introduction of agricultural improvement, and they might associate that with the use of the revenue *patel* as a propaganda agent.

7555. You want a separate institution?—Yes.

7556. Divorced from the revenue *patel*?—Yes.

7557. And which would mean the provision of funds?—Yes, at least to a certain extent.

7558. You say on page 464 you are averse to Government taking an active part in the organisation of co-operative societies. I presume you are also averse on principle to the idea of subsidies from Government to such bodies as Taluka Development Associations?—Subsidies in money, yes.

7559. Both with reference to co-operative societies and Taluka Development Associations, leaving aside, perhaps, the special case of Khandesh, do you think in the whole of the Presidency either the one or the other would have come into being without any active help from Government?—I do not think they would have come into being without the educative force which Government can supply or assist in supplying, but I do not want to be misunderstood. What I object to is a Government officer of any department whatsoever going to a village, calling a meeting of the cultivators, and saying, "Let us have a co-operative society here," and getting that meeting to nominate officials and having the society registered by the Registrar of Co-operative Societies as a co-operative society. In such cases I consider failure is almost inevitable. A great deal of educational and propaganda work should have been done in that village first, so that the people themselves would realise the advantages of having a co-operative society and instead of having it forced on them would have come and demanded it.

7560. Do you not think that goes at the very root of the idea of having a Co-operative Department?—No, I do not think so in the least. There is plenty of work for them to do apart from this.

7561. How many Taluka Development Associations are there in the whole of the Presidency?—In Khandesh there were 11 out of 33 talukas which had them, but I believe there are now 13 or 14.

7562. So that even in the best and most prosperous of our districts, Khandesh, you have not yet got a Taluka Development Association for each taluka?—No

7563. Yet you think Government should not take any active part or subsidise these associations?—As far as Khandesh is concerned, there would have been no difficulty whatever in having a Taluka Development Association for each taluka while I was there, but we only recommended for registration such associations as we thought were likely to be successful. We have had applications from practically all except the most backward talukas in the division for the formation of Taluka Development Associations; they have even come from talukas where no propaganda work has been done at all.

7564. How do you reconcile the fact that you are not in favour of a Government subsidy for these associations with your view as to the desirability of appointing a special *patel* in the villages, to be paid out of Government funds?—What I recommend is that Government should provide these associations with a graduate rather than a sum of money. This money was originally given for the association to provide itself with a trained man to guide its activities and help the organisers. I think it would have been very much better if Government had given the man instead of the money, because now when these associations find themselves in difficulties they apply to Government to increase the subsidy; whereas if from the beginning they had been given the staff and the means to introduce agricultural improvements in a form other than money they would be very much more independent and likely to rely on their own resources. At least, that is my opinion.

7565. Do they not press for more money because the problems for solution are increasing?—Yes, that is the reason, but what I mean is that they would devote more attention to the collection of money within their own limits if they did not think they could get their subsidy from Government increased.

7566. In Khandesh you are having an increase in the area under new crops like ground-nut?—Yes.

7567. And also, perhaps, improved cotton?—Yes.

7568. Is that displacing food crops?—Ground-nuts are displacing *bajri* considerably.

7569. Do you think the evil is growing to such an extent that you will have to import food grains?—No, I do not think so.

7570. *Dewan Bahadur Malji:* How many years were you Deputy Director?—From August 1921 until May of this year, when I left Khandesh and came to Bombay.

7571. Can you talk Marathi?—I can.

7572. So you have had opportunities of mixing with the agriculturists in the interior?—I have spent half my time in the interior.

7573. The agricultural bias schools are certainly a need of the day?—Yes, I think they are.

7574. Do I take it that all such schools are provided with plots to work on?—All the bias schools are, and many of the other primary schools also.

7575. And the students are made to take an interest in these plots?—They are made to do a certain amount of work on them. I am not prepared to say that all the plots are what they should be or are filling the place they ought to fill.

7576. There is still great scope for improvement?—I think so.

7577. With regard to practical lessons given after graduation to students of the agricultural college in farm management and marketing, you have said something about that in your note?—My only experience of any post-graduate training is with the course we endeavoured to form at Jalgaon farm on farm management. It is a big farm of 204 acres. Sir Chunilal Mehta, when Minister for Agriculture, suggested this farm might be utilised to train the graduates of Poona College in farm management and economics, but, as I have said in my note, it was not a success.

7578. Can you make this an attractive thing? If you can, it is very important?—Very important. I have suggested ways of making this course more attractive.

7579. By means of scholarships?—I think some form of allowance should be paid to the students.

7580. Is it your experience that the Taluka Development Associations are very useful and are making progress in Khandesh?—I think they are one of the most useful agencies in agricultural improvement.

7581. Are they doing anything in connection with co-operative purchase and sale?—Yes.

7582. May I know the names of the associations doing that work?—The Pachora, Jalgaon and Nasik Taluka Development Associations purchase manure and fertilisers wholesale, and implements and so on.

7583. They are not dealing in agricultural products yet?—No.

7584. Do you look forward to the day when they will do that?—I do not altogether agree with that. I think that requires a different type of organisation altogether; a more specialised type.

7585. *The Chairman:* You are in favour of the single purpose society?—Yes; I am not in favour of Taluka Development Associations doing this work.

7586. *Dewan Bahadur Malji:* Where there are no seed supplying associations, would you like the Taluka Development Associations to do the work?—They do it; they are the main source of supply.

7587. The Supervising Unions could act as a very reliable agency for the supply of pure seed? Wherever Development Associations do not exist and there are Supervising Unions or District Banks do you not think they could act as agents for the supply of pure seeds?—Yes; they are doing it in Khandesh, where the District Banks are very valuable agents in seed distribution.

7588. On page 455 of your memorandum you suggest honorary organisers for co-operative and agricultural work. Have you tried this experiment in Khandesh?—We have honorary organisers of co-operative societies there.

7589. Have they been tried anywhere for propaganda in regard to agriculture?—All the members of the committee of a Taluka Development Association are really honorary agricultural organisers, because many of these organisations send their members into the villages.

7590. You think the Agricultural and Co-operative Departments can work hand in hand in these matters?—They must certainly do so if any progress is to be made.

7591. As regards the grass contracts in the forest area, do you think Development Associations such as exist in Khandesh can be utilised very much in that direction?—I do not think it is outside the scope of the activities of Taluka Development Associations to take co-operative grazing in the forests.

7592. As you say there is a large margin for contractors, cannot you bring home these advantages to the co-operative societies?—We are trying to do that.

7593. Are you in favour of the standardisation of weights and measures?—I am.

7594. With reference to the visits of rural leaders from places such as Hadapsar to different parts of the country, carrying knowledge into the areas which they visit, do you not think this sort of propaganda can be advantageously carried out by the department?—Yes, but I think the value of such propaganda would lie in its non-official nature, if we could have people who have actually experienced the advantage and personal profit resulting from good co-operation.

7595. Perhaps you would look to the Institute for propaganda?—I would look to some organisation such as the Bombay Central Co-operative Institute.

7596. *Sir Henry Lawrence:* Your work has been confined to Khandesh and the Nasik districts, has it not?—Yes.

7597. Can you tell me the expenditure of the budget for your particular branch in those districts?—Roughly about Rs. 40,000.

7598. On what scale would you wish to see it developed; what do you think should be the expenditure for the additional officers that you desire for propaganda work? Would you want it two or three times as big?—I could utilise twice that amount easily under present conditions in putting officers where they are urgently required.

7599. That would cover the whole of the propaganda work in present circumstances?—Yes, I think so.

7600. You spoke of cultivators doing research work, as I understand; what type of cultivators are these; are they the village *patels* or men of a higher status?—They are landowners who cultivate their own lands, mostly proprietary cultivators.

7601. Men with a college and English education?—Most of them have; the ones I am thinking of have, but it is not essential.

7602. Are any of them *Inamdars*?—A few, yes.

7603. They take an interest in the cultivation of their estates and desire to spread agricultural improvements?—They do.

7604. Have you been in other parts of Bombay; do you find that same type of man elsewhere?—I have not been sufficiently long in any other part of the Presidency to find that out.

7605. Have you been to Dharwar?—I have been to Dharwar, but only for a very short time.

7606. Have you been to Poona?—I was in Poona for a few months.

7607. You cannot say whether the intelligent Khandesh cultivator is to be found elsewhere?—I think you find more of them in Khandesh than any other part of the Presidency.

7608. You spoke well of the Dhulia Agricultural School; is that of the type which is known as the Loni school?—It is of the same nature as the Loni school, yes; the boys live in the school.

7609. And the course of farming is identical, is it?—Exactly the same, yes.

7610. You found that to be of value, and you wish to see the members of that school increase, do you?—Not unless there is an expressed demand for them.

7611. You think the one school in Dhulia will be sufficient for your purpose in the Khandesh district?—It is at present, because we have some difficulty in filling it; that is why I think it would be inadvisable to start other schools until we find there is an assured demand for them.

7612. Are all these cultivators who are willing to accept improvements, of the *Kunbi* type?—Yes, mostly.

7613. Do you find any such men amongst the Bhils or the Mahars?—Very seldom; it is very unusual to find the Bhils taking to improved agriculture.

7614. You have a large population of Bhils?—We have.

7615. What is the proportion? Is it 25 per cent.?—In West Khandesh I should think at least 25 per cent.

7616. What is the proportion of *Mahars* in East Khandesh?—I am afraid I cannot say.

7617. But there are very large numbers of them?—They are there in large numbers, yes.

7618. You do not regard them as at present open to teaching in improved agriculture?—No, I think first of all we shall have to teach them to resort to settled agriculture before trying to teach them improved methods of agriculture.

7619. You spoke of the Cotton Transport Act as being a great success in this Presidency?—Yes.

7620. Are you satisfied that that Act has brought better profits to the cultivator?—Yes.

7621. You do not regard it merely from the point of view of the convenience of the trader?—No.

7622. It is beneficial to the cultivator as well as to the trader?—Undoubtedly I think, especially in the Surat area.

7623. We have been told that it would be a great improvement in Bombay agriculture if we could substitute wheat on a large scale for millets and coarser grains such as *bajri*?—Yes.

7624. Do you regard that as an improvement within sight?—I am very doubtful of any improvement which contemplates interfering with the cultivator's own ideas as to what crop he should grow. I think in some parts of Nasik District wheat could probably be profitably grown, but to attempt to replace *bajri* and these inferior millets on anything like a large scale would not I think be successful.

7625. Perhaps the seasons are not quite suitable?—The seasons, the soil and the water-supply.

7626. Experiments are being made on farms in your charge as regards the possibility of extending the growth of wheat?—Wheat is merely grown as a *rabi* rotation crop on cotton farms. We have no wheat-growing area at all.

7627. Do you desire to see one?—I desire to see one in the wheat-growing tract, but all I have been able to do is to conduct some small experiments in spacing of wheat and inter-culture of wheat; I have had no opportunities of conducting any expensive experiments in the Khandesh wheat tract.

7628. Wheat is a *rabi* crop?—Wheat is a *rabi* crop in Khandesh. There is a *kharif* crop grown under irrigation.

7629. The millets are *kharif* crops?—The millets are grown during the rains.

7630. You spoke of segregated grazing in forest areas and you anticipated some objection from the Forest Department. Can you give us any idea of what is the total area that you would ask the Forest Department to give up?—I should think, for an ordinary village cattle-breeding society, about 600 to 1,000 acres, with some water-supply enclosed.

7631. You would not want that in each of your 2,000 villages in Khandesh?—No, I do not advocate starting cattle-breeding societies in every village.

7632. What is the total demand you are likely to make?—I should think six villages in each district; six in East and six in West Khandesh.

7633. About 12,000 acres in all?—Yes.

7634. You think they are not likely to accept that willingly?—As I say, the whole progress of co-operative cattle-breeding is being held up by that difficulty at present.

7635. *Sir Ganga Ram:* I understand there are three districts in your jurisdiction?—Yes.

7636. Out of that area how much is irrigated; is there any canal there?—There are small canal systems in Nasik District; there is practically no irrigation at all in Khandesh.

7637. And wells?—There is a lot of well-irrigation all through the district.

7638. Could you give me roughly an idea of the amount of well-irrigated area?—I am afraid I could not give the actual figures.

7639. Will you let us have the information afterwards?—I can certainly give you the information afterwards.*

7640. Is any part of your district subject to famine?—The whole of the district is subject to periodic famine, some parts much worse than others.

---

		acres.
*Area irrigated by wells in	West Khandesh . . .	12,194
	East Khandesh . . .	19,880

7641. In the last 20 years, how many famines have occurred?—I should say on an average once every five years has been very bad.

7642. In which district?—Especially in the East District of Nasik and in East Khandesh.

7643. I understand that you grow a very good area of wheat? How many times do you plough before sowing wheat?—The ordinary cultivator only ploughs his field just before putting it in.

7644. How many times?—He probably ploughs it twice and harrows it once or twice.

7645. That is all?—That is all.

7646. What yield do they get?—They get about 500 or 600 lbs.

7647. About 7 maunds?—Yes.

7648. Is that all?—Yes.

7649. You have never tried whether by ploughing and harrowing more you could get a bigger crop?—Yes, we do; we get 1,200 lbs. on Dhulia farm.

7650. How many times do you plough it?—The land is ploughed with an iron plough; then it is cross-ploughed; then it is run over by a harrow three or four times, and then it is rolled, the clods are broken down and the seed beds prepared.

7651. Do you use as propaganda to your cultivators the difference between 7 and 12 maunds?—We do; we spend a lot of time on that.

7652. Do you give demonstrations?—We do; that is one of the most important items of our work, demonstrating improved cultivation.

7653. I have seen a part of that district; there is a great channel running through; do they make any use of that water?—I do not know what place you are referring to.

7654. Is that channel of water utilised?—I believe it is being utilised now; there is a pumping plant there.

7655. Where?—On that pool.

7656. Is the whole of the water used?—It is used, yes.

7657. Why do not the Irrigation Department take it up? Does the Tapti pass through your region?—Yes.

7658. And the water is not utilised?—I think the main reason for that is that the banks of the Tapti are so extremely liable to flood.

7659. But there is no difficulty in overcoming that?—It means a considerably long lead and different lengths of pumping.

7660. That is all within engineering possibility?—Yes.

7661. But they have never attempted it?—It has never been attempted.

7662. How much water does it discharge?—I do not know.

7663. You still grow *rabi juar*; could you not substitute wheat?—*Rabi juar* is grown in Nandurbar taluka; it is grown largely as a fodder crop.

7664. Have you ever studied what chemical properties are left in the land by each crop?—I have an idea of what the crops take out of the soil.

7665. Is it based on some scientific investigation or is it based simply on observation?—Based on what I have been taught.

7666. Could you refer me to any book on that subject?—Yes, I think most general text-books on agriculture deal with that.

7667. But is there any book dealing with special investigation of this soil?—No, I have not conducted such an investigation.

7668. And nobody has?—Not as far as I know.

7669. What is the depth of soil?—It varies considerably all over Khandesh.

7670. Between what limits does it vary?—I suppose in some parts of East Khandesh it is very difficult to get to any subsoil; in other parts there is practically no surface soil at all.

7671. You grow oil-seeds?—Yes.

7672. Merely ground-nuts and no others?—Linseed and the pulses.

7673. You do not grow rape-seed?—Rape-seed is grown, yes.

7674. Which gives the best crop?—I am afraid I cannot answer that question.

7675. You say that for demonstration purposes you paid Rs. 30 an acre. What rate per cent. on the investment does that give?—It is wheat land.

7676. Does it give a return of Rs. 500 or anything like that?—No, not as much as that.

7677. You spoke of sheep breeding; before putting the sheep on the land, do you plough it?—There is no sheep breeding; they put the sheep on for folding.

7678. Do the cultivator plough the land before putting the sheep on?—In many cases not; I think in most cases they do not plough the land beforehand, but they plough it afterwards to plough the manure in.

7679. Do you use any artificial fertilisers?—Yes, quite a lot.

7680. For what crops?—Sugarcane, and nowadays a good deal of castor cake is being used for the dry cotton crop.

7681. In cotton areas do you post up daily market prices?—No.

7682. Is it not a recommendation of the Central Cotton Committee to do so?—Yes, when there is a cotton sale society it will probably be done, but at present it is not done.

7683. Is there much wheat exported?—No, I do not think there is much, except with firms like Rallis.

7684. I suppose you have no surplus wheat to export?—There is a little export by the foreign firms, but not very much.

7685. Do they export it in its pure state or do they dirty it to get it to the London standard? In London there is a standard of Indian wheat which is very dirty?—I am afraid I have no information on that matter.

7686. Are there many big landowners in your district?—Yes, there are.

7687. Do they take a cash rent or do they participate in kind?—I think in most cases they take cash rent.

7688. They do not participate in kind?—In some cases they do.

7689. How much do they take?—A quarter or a third; it varies in different parts of the district.

7690. Taking only a quarter, they cannot make Rs. 30 an acre?—It depends on what crops are grown.

7691. What is the value of the gross produce?—The average cotton cultivator will make Rs. 30 an acre.

7692. Then if they take only a quarter, the landowner will only get Rs. 7 according to your figures. What classes of cotton do you sell?—The main cotton in Khandesh is the ordinary Khandesh mixture.

7693. Not American?—No, there is no American cotton.

7694. Khandesh cotton seed is not imported, it is the original seed, is it not?—The seed is mostly used for cattle food.

7695. But the seed is not imported, it is country seed, is it not?—It is country seed; it is not imported; it is an indigenous variety.

7696. Is it necessary to renew the seed every five years, or is the same seed used?—With the local variety the same seed goes on.

7697. The cultivator keeps his own seed?—Yes; or gets it from the ginning houses.

7698. Does the Agricultural Department guide them in getting pure seed?—The Agricultural Department endeavours to get them to grow N. R. cotton which is the important Khandesh cotton.

7699. What does that mean?—*Neglectum Roseum.*

7700. That is the one which comes from the Central Provinces?—It is also grown in the Central Provinces, but it has always been grown in Khandesh.

7701. How much do you get out of that?—The average yield for the district is not more than about 350 lbs. of *kapas*, which is about 100 lbs. of lint per acre.

7702. Is not that very low?—It is very low.

7703. What measures are you taking to improve it?—With improved cultivation and a small amount of manure, I firmly believe it can be raised to 550 lbs. per acre.

7704. Is it your goal to produce a maximum of 550 lbs.?—I have no maximum goal.

7705. What is the best yield that you can get?—The very best we ever got was 1,800 lbs. to the acre in the Dhulia farm on a small patch heavily manured with crude night-soil.

7706. That is with manure?—Yes.

7707. You have not obtained such results without manure?—Never, without manure.

7708. Are you aware that the Bombay Presidency imports onions from Italy?—They also import potatoes; they do not produce their own potatoes, do they?—A lot of potatoes are imported for seed.

7709. Only for seed?—I do not know.

7710. Do not they keep their own seed on the farm?—We do not grow potatoes in my division.

7711. But potatoes are grown in the Bombay Presidency, I suppose?—In Poona they grow a lot of potatoes.

7712. Do you grow onions?—We grow a lot of onions.

7713. Do you know onions are imported?—I do not know.

7714. How many kinds of onions do you grow, two crops?—The main crop is the cold weather crop; there are two crops.

7715. It matures in cold weather?—Yes.

7716. How is it that the Punjab imports onions for the cold weather, can you not supply them?—I do not think so. I have never considered that.

7717. They call them Karachi onions?—Yes.

7718. But they are really imported onions?—Yes.

7719. On page 440 of your memorandum you say you want help from the Government. Is it financial help that you want?—I want every kind of help.

7720. But do you want financial help?—Yes; financial help.

7721. To what extent?—To enable me to help in the agricultural improvement of my district.

7722. Have you got any borings for wells?—Yes; we have done borings in Khandesh.

7723. To what depths?—Two hundred feet.

7724. Not beyond 200 ft.?—No.

7725. Up to 200 ft. do you get any water-bearing strata?—We have struck water on several occasions.

7726. Can you let me have a section of the soil down to 200 ft.?—I have not got it at present; I have been away from Khandesh for six months.

7727. You said that Kirloskar implements are very generally used?—Yes.

7728. Which implements?—Kirloskar's No. 100 plough seems to be generally popular in Khandesh; it is very similar to the Ransome C. T. 2.

7729. Kirloskar complains that he cannot compete with foreign makers because his raw material has to pay a 40 per cent. duty. Do you recommend that he should be allowed some rebate on the duty on the raw materials for his implements, because otherwise he cannot compete with the foreigner?—I

should advise everything to be done which will encourage the production of these implements in India.

7730. His angle iron and that sort of thing have paid a duty of 40 per cent.?—Yes.

7731. While the finished material of the foreigner comes in free of duty. Therefore Kirloskar is at a disadvantage of 40 per cent.?—I think that certainly requires investigation; and if he is handicapped it ought to be removed.

7732. In your district, is there any adulteration of cotton?—Do you mean mixing of cotton?

7733. Yes; I mean mixing some other kind of cotton with the Khandesh cotton. I understand Khandesh is rather good quality cotton?—No; it is the worst in India.

7734. *Dr. Hyder:* I desire to examine you with regard to the success of these irrigation societies and the failure of the fencing societies. How long have you been in Khandesh?—I have been since August 1921, nearly five years.

7735. You know the Khandesh tract well?—Yes.

7736. Is the water distribution by village communities a very old system?—I think it is extremely old.

7737. Is it a Bhil institution?—No. There are no Bhils; they are mostly persons of the Kunbi type.

7738. Your villages are more or less homogeneous as regards their population?—Yes; I think certain tracts are of that sort.

7739. Are there any disputes between villages just as we might have disputes between the Bombay Government and the Punjab Government; the villagers at one end might think the villagers at the other end are holding up the water and making little use of it?—We do come across instances of that kind.

7740. Under this system of distribution do you think everybody gets his fair share of water?—I think where this system has been established for a long time, everybody does.

7741. Are there people of different castes inhabiting the same village?—I think the villages are more or less homogeneous with regard to population.

7742. So, there is no suppression of lower castes by higher castes; I mean by the more numerous people?—It has never come to my notice.

7743. These irrigation channels are not owned or operated by the Government?—They are operated entirely by the people themselves.

7744. The Government has no hand in it?—I think the Irrigation Department occasionally helps in problems with regard to the maintenance of these canals or in technical problems connected with their improvement.

7745. How are the repairs undertaken?—The repairs are done by the people themselves.

7746. *Sir Ganga Ram:* They do not interfere with the regulation?—No.

7747. *Dr. Hyder:* Do you think the inhabitants of the villages make the most economical use of the water?—I think that under a system of this type they make a more economical use of the water than they do under the Irrigation Department.

7748. Do the Bhils own much land in West Khandesh?—There are a few Bhil settlements.

7749. Do they distribute the water?—On these irrigation schemes they distribute the water.

7750. What are the essential factors for the success of such a system, if it is introduced in other areas?—Collective action is absolutely necessary, and the adoption of a suitable rotation for the crops.

7751. Collective action is the essential thing?—I think so.

7752. Distributing this water without any modules, everyone will get a fair share?—No complaints as to water distribution have come to my notice.

7753. Do people whose land is situated at a distance from the channels complain?—In all my experience of this system I have never had any complaints.

7754. Have you heard of this system of distribution by village communities being used anywhere else?—I think Dr. Mann endeavoured to organise such a society in one district, but that is all.

7755. *Sir Chunilal Mehta:* In reply to Sir Henry Lawrence, you said you would require another Rs. 40,000 to carry out your propaganda work. Do you base that on any calculation?—I was roughly calculating to have a District Agricultural Overseer in each taluka.

7756. That is all the assistance you require?—I should like to begin with that.

7757. It seems to me you would require a good deal more money for all the various activities you have mentioned here?—I have no doubt I could do with it.

7758. On page 439 you advocate research in regard to other crops on the lines of that at present being conducted by the Indian Central Cotton Committee?—Yes. I suggest that in the organisation of research in a Province the framework used by the Indian Central Cotton Committee should be followed. In place of the Cotton Committee there should be a provincial research committee, and in place of the Provincial Government which submits its proposals for research to the Cotton Committee there should be the district workers and the central expert who should submit their scheme for research in particular areas to the provincial research committee. Instead of the funds of the Cotton Committee there should be a special fund administered by the provincial research committee. I am drawing a parallel between the organisation of the Indian Central Cotton Committee and the Provincial Governments in cotton research and what I suggest for the organisation of research within a Province.

7759. Where does the Minister for Agriculture come in in this scheme?—He would occupy the same position as the Agricultural Adviser in the Cotton Committee scheme; he would be the President and final controller.

7760. You would have the Minister as President?—If not that, he should have the power of veto and exactly the same powers as the Government of India have over the Cotton Committee.

7761. On page 448 you give the causes of agricultural indebtedness. Is inadequate finance or over-finance one of those causes?—The only point I can mention in that regard is that 26 per cent. of the cultivators took advances from both the co-operative credit societies and the *sowcars*. That seems to indicate inadequate finance by the societies.

7762. Since 1923 steps have been taken to finance the cultivators in Khandesh through co-operative societies on a very much bigger scale than before?—Yes.

7763. You do not think that has had the required effect yet?—I think it has improved matters considerably.

7764. On page 450 you are talking of minor irrigation schemes; there is not much canal irrigation in your district?—No.

7765. Nor is much possible?—No.

7766. Do you anticipate much use of these minor irrigation schemes of the type you mention?—I refer to a fact which must strike anyone who visits the district, *i.e.*, the remarkable number of abandoned irrigation works on the rivers and *nullahs* of the district. It seems to me the water which at present runs down the *nullahs* and escapes might be utilised if some of these old works were resuscitated.

7767. Do you know the reason for their abandonment?—I should think it was due to successive famines. Their history goes right back beyond the Mussalman period.

7768. There is water in them now?—Yes, in the rainy season.

7769. And not used?—No.

7770. *Dr. Hyder:* Why were they abandoned?—I do not know. They are found near every village and river in West Khandesh.

7771. Have the lands gone out of cultivation?—They are growing dry crops.

7772. But before?—They must have been growing irrigated crops.

7773. *Sir Chunilal Mehta:* The examination of such sites and schemes is one of the important functions which Mr. Lowsley is to perform?—Yes. I think it very important that these should be examined.

7774. On page 451 you say you submitted a list of recommendations to Government from the committee over which you presided. Do you know what has happened to those recommendations?—No.

7775. It was some little time ago?—Yes.

The only note I find here is that on account of want of finance the scheme has been held up.

7776. On page 460 you speak of Animal Husbandry. This farm at Shirpur was started by a non-official agency?—Yes.

7777. Do you know whether they tried to introduce a good milk strain in their animals?—They were trying to do so.

7778. Is it your view that even for Khandesh we should aim at a dual purpose animal?—I think so, wherever there is a breed suitable for it.

7779. Have you such breeds in your district?—I think there are two which would be suitable.

7780. When that society was started it got a sufficient area of land from the forest?—That is so.

7781. That being so, is there any reason why cattle-breeding societies should not be able to get land from the forest?—I think the reason they got this land was probably because it was the first attempt in the district, and they were fortunate in getting the District Collector to push the scheme and help them.

7782. There is plenty of forest area in your district?—Yes.

7783. This land could be made available?—I think it ought to be.

7784. In fact, the Forest Department are trying to help you in this, so long as the important timber trees are not damaged?—Yes. They are very sympathetic, but they seem to be bound down by certain definite regulations with regard to injury to trees and so on.

7785. Is not the water-supply in these areas one of the difficulties which prevents the use of them for these purposes?—In most cases, if there is not a source of water-supply in the actual area, the forest people are always willing to give a channel through the forest to a proper source of water-supply.

7786. On the same page you refer to owners of good cows. Are there many owners who possess herds of good animals?—There are more cows than buffaloes in Khandesh.

7787. Are there individual private owners who possess good herds?—Yes.

7788. Do you believe in stall feeding for the animals? For breeding purposes, would you prefer stall feeding or have them graze in the forest?—In the majority of cases I would prefer grazing in the forest.

7789. The grass is enough?—They could graze all day, and that could be supplemented by cake when they were brought in.

7790. That would have to be done?—That is necessary, especially if the aim is to improve the breed.

7791. On page 464 you say the Government should provide very much larger funds for the development of the co-operative movement, and you add " by expending these funds..... through every agency which is capable of extending the movement among the cultivators." What exactly do you mean by that, " every agency which is capable of extending "?—I mean that a great deal could be done to extend propaganda in favour of co-operation in the

villages through agencies such as the Irrigation, Revenue and Agricultural Departments, and still more by non-official agencies.

7792. Do you propose to pay the non-official agency?—No. I suggest, for instance that members of the Taluka Development Association committees, who are probably educated men and understand the value of the co-operative movement, should have certain travelling expenses paid to enable them to go to the villages and tell the cultivators about the movement.

7793. That is the extent of the assistance you would give?—That is one way in which I would utilise these funds.

7794. Do you consider the maximum grant of Rs. 1,000 payable by Government to Taluka Development Associations is not justified?—I consider it quite justified; I was in favour of it, and tried in my own Division to get it increased; but I think it was a mistake not to give men instead of money.

7795. Is not there a condition definitely laid down for the creation of these associations that the grant from Government depends on the fact that they employ a paid man to carry out their work?—Yes, and that they should collect a similar sum themselves.

7796. If they are taking the place of your non-official agency, what objection could you have to paying them for the specific purpose of appointing a paid staff?—The only reason I make that proposal is that experience shows that now for every new development they come to Government for another subsidy.

7797. But they do not get it?—They may not, but they ask for it, and that is something one should not find in an association which ought to be purely of a co-operative character.

7798. Do you agree that such an association ought to have a paid man under it?—Certainly.

7799. The former associations failed because there was no paid staff the association could hold in any way responsible?—Yes.

7800. That was the reason why this was the only condition laid down for the formation of Taluka Development Associations?—Yes.

7801. The type of man employed by these associations is not as good as you would like?—That is so.

7802. Would you not require to pay them more to get better men?—No. I think you could get good men at the same price.

7803. You are paying Rs. 50 to Rs. 60 a month?—Yes.

7804. Is that enough?—You could get the fieldman type of man suitably trained at that price.

7805. If a higher type of man were employed, would you object on principle to Government paying the association sufficient to cover that expenditure?—Very much. I would prefer Government to give the man.

7806. Who would control him?—He would be entirely under the control of the association.

7807. Where the system of giving a man from Government service has been tried, has it not been found that the man considers himself independent of the association?—That difficulty could be overcome by supervision by the local officers of the Agricultural Department.

7808. Our experience was the association did not feel he was their man until he was paid by them?—I refer to the case of Pachora, where an agricultural graduate was engaged with the subsidy given by Government. After two years they found the receipts from their own people were falling off, and they dismissed him. If they had known that man would be there for three years, paid for by Government, they could have gone on developing internally without having to consider the position of this man's pay year by year.

7809. If the members of the association will not pay the money even to carry on with a small staff, is it worth while continuing the association?—I think if you had a suitable man he could organise the collection of subscriptions very much better than someone of the fieldman type.

7810. Has the Cotton Transport Act been tried in any other Province?—Yes, Madras.

7811. How is it working?—Well, but they are having more difficulties, because the area is not so well defined as in Bombay.

7812. You suggest the appointment of an agricultural *patel*?—Yes.

7813. Do you consider he would be a sufficiently important man to employ for general rural development?—I would not give him any executive powers at all; I merely want to have an agent in the village to whom my local staff could go and say "I want some help in organising a demonstration in this village; will you arrange to call a meeting of the people?" and that sort of thing.

7814. *Dr. Hyder:* Besides the *patel* responsible to the police authorities, have you in your villages men who could undertake such duties?—In the larger villages of Khandesh we could get men who would do this work on an honorary basis.

7815. *Sir Chunilal Mehta:* You would like a higher type of man to take up the problem of rural development as a whole; the idea would be to get the cultivators to help themselves?—Yes, always.

7816. You would also like to have a higher type of man employed by the Taluka Associations, or would you have someone like this agricultural *patel*?—You would have to have a higher type of man as well.

7817. Have you examined the question of roads and transport in your districts?—I have made no particular examination of that question. I know there is great difficulty in certain parts of Khandesh owing to inadequate road facilities.

7818. You have not studied the question of whether a certain amount of money spent on new roads in the village areas would yield a return by giving a better return to the cultivators?—No.

7819. You only say a few words in your memorandum on spare-time occupations for cultivators?—Yes.

7820. In the districts with which you are familiar, do the cultivators have enough time to devote to other occupations?—Yes; about half the year. They do a lot of carting.

7821. Does everybody do carting?—Most of the cotton cultivators do.

7822. Have you considered whether there is any other spare-time occupation they might take up?—I should like to see them take up such things as cattle-breeding. I do not believe in turning cultivators into weavers.

7823. *Dr. Hyder:* Is weaving looked down upon as being the occupation of a lower caste?—I do not think so. In some parts of my Division it is very important; but I think the agriculturist could more profitably occupy his spare time in more agricultural pursuits.

7824. *Sir Chunilal Mehta:* If you could provide wells they could do agriculture all the year round, but is such a thing possible all over the district?—No, but wherever it is possible it should be encouraged.

7825. The first and whole-time occupation of the cultivator ought to be agriculture?—Yes.

7826. I agree, but where there is of necessity spare time, would you rule out hand-weaving?—No, but I do not think it will be introduced successfully except where it can be done on co-operative lines.

7827. *Sir Ganga Ram:* With well irrigation, how big an area does a well command?—2½ to 2½ acres.

7828. For the sake of 2½ acres they lift water from what depth?—30 feet. It varies, of course.

7829. Does it pay them to do that for the sake of 2½ acres? What can they grow on 2½ acres that will make it pay?—They can grow valuable garden crops, which will give a profit of Rs. 200 to Rs. 300 an acre.

7830. That would be Rs. 500 for 2½ acres. What is the cost of lifting the water?—A couple of bullocks will only cost Rs. 1-8 a day.

7831. You are positive about that 2½ acres?—Not absolutely positive; I think it is that.

7832. When is the cotton finished with?—Generally the harvest is over by the end of December.

7833. What do you sow in the same field next?—Generally cotton again.

7834. Cotton on cotton?—Yes; that is common in Khandesh.

7835. That ruins the land?—The normal rotation is cotton and *bajri*.

Sir Ganga Ram: We put wheat on cotton.

7836. *Mr. Calvert:* In your memorandum you mention co-operative fodder storage; is that a practical business proposition?—I think if it was run on business lines, getting contractors to do the storage, it would be in Khandesh.

7837. We had some evidence that the Forest Department's effort to store fodder resulted in a loss. Could a co-operative society do it profitably?—I see no reason why they should not. In Khandesh prices are high.

7838. In answer to Sir Ganga Ram you gave Rs. 30 an acre as the cultivator's profit on cotton cultivation?—Yes.

7839. In arriving at that figure, have you deducted wages for the labour of the cultivator and his family?—Yes. That includes Rs. 27 for additional labour of his family, interest on capital, etc., Rs. 27 has already been deducted; Rs. 30 is profit.

7840. Have you a figure like that for wheat?—I have not worked it out; I only prepared figures for the cotton crop, in which I am chiefly interested. I think it is considerably less.

7841. Allowing for wages for the cultivator and his family, would wheat cultivation show a surplus?—I think it would, but a very much smaller one; probably Rs. 9 or 10.

7842. *Professor Gangulee:* You mentioned cattle-breeding as a subsidiary occupation. We were told in Poona that cattle-breeding is not a paying proposition; what is your view on that?—It is rather a large statement to make.

7843. *Sir Chunilal Mehta:* The cattle-breeding association wanted to hand all operations over to Government because it did not pay?—No, because they could not supervise it; that was the difficulty. It is in an isolated part of the forest.

7844. They are getting a subsidy from Government now?—Yes.

7845. *Professor Gangulee:* Could a Taluka Development Association make a start without the help received from Government? Is there sufficient enthusiasm among the people to start an association without Government assistance?—Undoubtedly.

7846. They could do it?—In some talukas in Khandesh they had already collected very large funds for the purpose.

7847. On page 447 basing your argument on the success of the Indian Cotton Committee, you give it as your definite opinion that an active central organisation dealing not only with research, but with other equally important factors of rural development, has an important place to fill in the development of Indian agriculture. Further, on page 464, you suggest a Rural Development Department, and indicate the nature of the organisation, its constitution and finance. Crystallize your thoughts in a definite form and give us an indication of what organisation you would have for this Rural Development Department; how would it function; what would be its constitution, and so on?—I feel that if I were called upon to organise some means of agricultural improvement in an entirely fresh area, from my experience in the districts of Khandesh, I would not go about it by organising an Agricultural Department and a Co-operative Department.

7848. How would you deal with the situation as a whole?—I would organise a department with a rural development association under the Provincial Co-

vernment. The research in my new area would be under the Central Government. I do not know what department I would put urban co-operation under; I should probably put it under municipalities or something of that sort. This Rural Development Department would take into account, from the very start, the potentialities of co-operative organisation in extending agricultural improvements and would not just come in at a later stage and have to build up a sort of adult co-operation.

7849. Who would control this Rural Development Department; would it be under the Minister in the Provinces?—Yes; it would.

7850. Would you consider irrigation to be one of the factors that ought to be taken into consideration by the Rural Development Department?—I would rather keep irrigation out of this altogether; I would co-operate with them in every way; I should also leave forests outside, because after all Irrigation and Forests are revenue producing Departments.

7851. You would have no central organisation to direct the Provincial Rural Development Associations?—We would have very much the same organisation as we have now. Only instead of having an agricultural and a co-operative department, we would have a Rural Development Department; research in the Provinces would be conducted by an All-India Research Board such as I suggest in my Administration note.

7852. *Dr. Hyder:* You would have district research?—I am supposing that a new Province would be organised; I am afraid we cannot do that nowadays; things have gone too far.

7853. *The Chairman:* Do you think it would be helpful if a medal or some such decoration were given to leading cultivators or landholders who take a prominent part in research or organisation or improvement?—Yes, I think so; it has been done.

7854. Have you anything of the sort in the district you know so well?—Some of the associations have given medals and certificates to prominent workers.

7855. Have they been appreciated?—Yes, especially when presented by the Collector of the district or some official.

7856. They require a ceremony?—Yes.

7857. No doubt they are worn at agricultural shows and so on?—Yes; they are very proud of them.

7858. On page 456, in order to encourage better cultivation your idea is that rebates of land assessment fees should be granted to cultivators who obtain good tillage certificates from the local senior officer of the Agricultural Department. You would not, I suppose, put those certificates in the hands of Revenue Department?—I would; the Revenue Officers I have met in Khandesh; I certainly would.

7859. They are in favour of it?—Yes.

7860. Do you know the official view of the Revenue Department as such, on any scheme of this sort?—I do not know.

7861. Do you know what it would cost to revenue?—That would naturally depend upon the number of certificates one is allowed to issue.

7862. Before deciding on the policy you would have to form some estimate?—Yes.

7863. I am not criticising; I merely wish to know whether you have measured the problem from the revenue angle?—The land assessment is Rs. 4 to Rs. 5 an acre.

7864. If progressive agriculture is to be financed, Government must have a fair share of the increment, the result of the improvement; otherwise, the more important expenditure required in the future for agricultural research and demonstration cannot be financed. Here you are straightway not increasing but reducing assessment as a direct consequence of improvement of the

fertility of the land, are you not?—Yes; but I consider that Government would obtain an increased revenue in the long run resulting from this improved cultivation of the land.

But that would take a long time, would it not?

7865. *Mr. Kamat:* Some of the agricultural associations in Khandesh are doing excellent work, are they not?—Yes.

7866. Have they attempted cattle improvement or cattle-breeding on their own account?—Two agricultural associations have done nothing else so far.

7867. You are of opinion that cattle-breeding is a practicable proposition in Khandesh?—I think so; yes.

(The witness withdrew.)

The Commission then adjourned till 2-30 p.m. on Tuesday, the 2nd November 1926.

APPENDIX.

Summary of recommendations "on the manufacture of manure from night-soil and on the extension of that manure in the North Central Division of the Bombay Presidency."

(*a*) In large villages, towns and municipal areas, the minimum number of public latrine seats, provided for the use of the people, should be 10 per 1,000 of population.

(*b*) Greater care and forethought should be exercised in the siting of public latrines.

(*c*) Collection of crude night-soil should be invariably done by crude night-soil carts and not by tins and baskets carried by *bhangis*. Municipalities should satisfy themselves that they have sufficient cart accommodation to deal with the daily output, without imposing undue strain on servants and bullocks.

(*d*) Staff on the scale laid down in the Manual of Public Health and Vital Statistics (Dr. Munsiff) should be maintained.

(*e*) The Nasik system of converting crude night-soil into poudrette should be standardised and universally adopted. The use of crude night-soil, as such, for manurial purposes should, except under exceptional circumstances, be discontinued.

(*f*) Government should establish a training class at Nasik under the direction of the Public Health Department and the Nasik Municipality, where men, sent from various towns and municipalities in the Division could receive a thorough training in the Nasik system of disposal of crude night-soil. This training class should be commenced as early as possible.

(*g*) All large towns and municipalities should be invited to send a suitable man to Nasik for a course of training as indicated above.

(*h*) Poudrette produced by municipalities, etc., should always be sold by public auction and such auctions should be well advertised among the surrounding cultivators. The systems of sale by private arrangement and by contract should be discontinued.

(*i*) Village Sanitary Committees should be started, as an experimental measure, in villages with populations between four and eight thousand. These Committees should receive a grant from Government, in direct proportion to the sum raised locally, to assist them in their work.

(*j*) Government should appoint a small committee consisting of representatives from the Public Health, Public Works and Agricultural Departments, along with one or two non-official gentlemen to supervise these experiments in village Sanitary Committees and ultimately to draw up a detailed scheme for adoption by such bodies.

(*k*) A suitable officer, trained at Nasik Depôt, should be deputed to visit other towns and municipalities, lecture on the Nasik system of poudrette manufacture and assist local governing bodies to organise the disposal of their town refuse on the best lines.

(*l*) Demonstrations of the value of poudrette as a manure should be systematically arranged by the Agricultural Department in consultation with Municipalities, etc.; plots should be laid out and meetings of cultivators arranged to inspect them.

(*m*) Short leaflets in the vernacular on the value of poudrette as a field manure, should be prepared by the Agricultural Department and circulated in the villages.

Tuesday, November 2nd, 1926.

BOMBAY.

PRESENT:

The MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.
Rai Bahadur Sir GANGA RAM, Kt., C.I.E., M.V.O.
Sir JAMES MACKENNA, Kt., C.I.E., I.C.S.
Mr. H. CALVERT, C.I.E., I.C.S.
Professor N. GANGULEE.
Dr. L. K. HYDER.
Mr. B. S. KAMAT.

The Hon'ble Sir CHUNILAL V. MEHTA.
Dewan Bahadur A. U. MALJI. } (*Co-opted Members.*)

Mr. J. A. MADAN, I.C.S.
Mr. F. W. H. SMITH. } (*Joint Secretaries.*)

Rao Bahadur P. C. PATIL, L. Ag., M. Sc. (in Agricultural Economics), Professor of Agricultural Economics and Acting Principal, Agricultural College, Poona.

Replies to the Questionnaire.

General Statement.

Improvement of agriculture, in an old country, is not an easy task. It does not mean that Indian agriculture is perfect. But looking to the different factors of production and the natural and economic conditions under which Indian agriculture is carried on the matter is not easy as perhaps many think.

Indian agriculture is perhaps 5,000 years old and the methods are crystallised by long experience. One can easily increase the produce per acre but the question is whether it is possible to do so economically, as the law of diminishing returns sets in early in agriculture and more so, where the methods are crystallised.

The Indian farmer has shown not only willingness but keenness in adopting improvements which promise to pay him. The prompt acceptance of iron ploughs, sugarcane mills, power crushers, concentrated manures (as fish, oil-cake and ammonia sulphate), selected seeds (as the strains of cotton, groundnut, rice, etc.), amply testify his keenness. One often sees weedy fields and unimproved lands and forms poor opinion of the farmer. To such man I would only request to look into the natural and economic conditions besetting the farmer before jumping to such conclusions.

To my mind, the improvement of agriculture and agriculturists requires careful consideration of many things some of which are detailed below:—

(1) The factors of production (land, labour, capital and management), their quality, quantity and the proportion in which they are available for combination.

(2) This naturally follows the study of the cost of production and

(3) the study of the distribution and marketing.

(4) The property rights including the land policies and tenancies.

(5) The availability of credit and the facilities for organising the same.

(6) Rules and regulations regarding land, labour, trade and commerce including the question of tariff.

While treating each of the above-named factors, I do not wish to theorise but try to give their bearing on the labour incomes and profits of the farmer in India (especially of the Bombay Presidency).

(1) *Factors of Production.*

(A) Land:—

It may, at the outset, be said that the land available for cultivation per family and *per capita* in India especially in the Konkan, Gujarat and western parts of the Deccan is *insufficient*. In the eastern parts of the Presidency, the holdings are large but the *amount of rainfall and its distribution is poor.*

There are several countries in which the cultivated area per head is less than in India. One thing, however, which many people forget is that *in India the proportion of agricultural population to that engaged in other vocations is largest.*

As a result, the farmer as a business man, gets very little land to work. In India, about 70 per cent. of the population is engaged in agriculture whereas in the United States of America only 37 per cent. of the population is engaged in agriculture.

As a result the area available per farmer in the Bombay Presidency may be about 12 acres. In the United States of America the average farm is about 160 acres and in England which is a crowded country it is perhaps 60 acres.

In this connection, I append a note which I had once drafted which shows some possibilities of the adjustment of population and cultivated and cultivable area.

(B) Labour:—

I think we have plenty of labour. Some of our farmers complain that it is costly and that they cannot afford to pay the market rate of wages; this is not due to the scarcity of labour. It is more due to the small labour income which the cultivator makes and he naturally grumbles to pay more than he can make himself.

(C) Capital:—

The amount of capital available in India is small. Unless there is surplus, capital will not accumulate. In agriculture as it is carried out, there is very little or no surplus.

Capital, moreover, is shy in India and so it is costly. In the year 1920-21 in Wisconsin (United States of America) the average rate of interest for agricultural capital was between 4 and 4·5 per cent., whereas in India it varies between 12 and 20 per cent.

(D) Manager or Farmer:—

On the whole, the Indian farmer (I can at least say about the Gujarathi, Khandeshi, Konkani and West Deccan farmers) is not an ignorant fool. Where nature responds, he works hard. Where nature does not respond, it is true, he takes things easy and becomes fatalist.

I have seen and known some farmers (whom the Europeans will call peasants) on the canals, taking life easy and not working hard themselves. This seems to be due to the comparatively better economic condition of his. If such men put in as hard work as the Mawal peasant does, certainly he will do better. I, however, am not inclined to think that even the farmer on the canal is a spendthrift.

If the costs of production is charged at the market rates, generally there is no profit left for the cultivator. He, however, continues in his business, because of the inertia and want of opening elsewhere.

I have been financing about ten peasants at Wadgaon (in the Kolhapur State) for the last ten years. I do not take bonds and in fact ration the finance by giving money only at a time when it is required and charge interest at nine per cent. Since these people are in partnership with me in sugarcane plantation, the receipts of the produce (*Gul*) come to me from which I take interest and part of the capital if I can. But my finding is that with all my care, except in one case where the man has purchased additional land all others either lost part of their land or have their debts increased.

In the marginal industry cheap capital means only extending the lease of life of that industry.

In another observation, I found the same thing. A piece of land about 8 acres in area and assessed at Rs. 40 used to be rented at Rs. 180 (when auctioned by the *mamlatdar*). After watching this for a number of years a gentleman whom I know and trust, got this land from the State. He has now given this land to a near relative of his, on share rent, and takes half the produce (except fodder) on the thrashing floor. I have watched his receipts, they vary between 100 and 120 rupees only, and yet in auction the land will surely fetch much more. It is so because of the scarcity of land.

I have been watching the costs and receipts from particular fields near Poona and of some partnerships growing sugarcane in the Kolhapur State. The two years under observation were not bad years and yet there is very little labour income for the owners and workers of these lands.

Cost of Production.

The cost of production began increasing with the commencement of the World War and probably rose to the highest pitch in 1921. The prices of agricultural products also were increasing along with the costs and in the case of some commodities, the rise of the prices was proportionately greater.

Since about 1920 prices are on the decline. The costs also declined but they lagged behind. In many cases the prices of agricultural commodities have come down to the pre-war level whereas costs have remained high and this has brought about the present agricultural depression.

Taking the case of sugarcane, it may be said that the price of *gul* was probably Rs. 18 to Rs. 20 per *palla* in 1913. It rose as high as Rs. 40 and even Rs. 50. It has steadily gone down and last year it was only Rs. 28 or less.

On the side of costs, sugarcane mill (Bari) used to cost Rs. 125 to Rs. 140 before the War. The price rose up to Rs. 250 and has now (1926) come down to only Rs. 220. Kerosene oil used to cost Rs. 4·37 per case in 1911. Cost of the same in 1925 was Rs. 7·35. Clothing per pound was Rs. 0·59. In the year 1925, it was Rs. 1·1. It may therefore be said that the costs have not fallen in proportion to the prices of agricultural commodities.

It seems very desirable that the study of cost of production be taken up seriously, with a view to find whether these cannot be reduced.

Distribution and marketing.

Exchanging commodities for cash is only a part of marketing. Improvements of marketing in broad sense require the improvement of—

(1) Marketing services including

(*a*) grading of commodities and standardizing them,

(*b*) transport (railways, roads),

(*c*) use of standard weights and measures,

(*d*) processing of commodities,

(*e*) providing adequate storages and ware-houses,

(*f*) financing, etc.

(2) Marketing methods of which I strongly recommend Integrated system where if possible the farmer should have interest in assembling, grading, processing, financing and distributing.

(3) Marketing agencies of which I recommend co-operative marketing.

Suggestions regarding improving marketing services.

1. *Transport.—Costly transport.*—It can be said that Indian farmer has to spend proportionately more on transport. The communication from the farm to the village and from the village to the market is poor. It not only costs more but increases the depreciation charges of the carts and bullocks.

As regards railway transport, it is observed that adequate number of wagons cannot be got in the harvest season. In the year 1924-25, the sugarcane-growers and merchants of Poona found great difficulties to move *gul* out of Poona and prices fell materially.

Railway transport costs about 50 per cent. more for wheat in India as compared to America.

For my lectures last year, I compared the freights and they were as under:—

Cost in rupees to move one ton of wheat for 200 miles.

	Rs.
United States of America	7·56
Madras and Southern Mahratta Railway . .	10·32
Great Indian Peninsula Railway	11·06

2. *Godowns, Ware-houses and Storages.*—These have considerable influence in stabilizing prices.

I think in the year 1924-25, there was no room to ware-house *gul* and the need of godowns was materially felt at Poona, Kopergaon and for ground-nut last year at Kolhapur.

It seems necessary to encourage ware-house. As co-operative sale gains ground, co-operative ware-houses and elevators will be necessary.

3. *Too many middlemen.*—Want of opening for the teeming population of the country has brought in too many middlemen between the producer and the consumer. Each middleman handling a small business naturally increases the marketing costs.

Co-operative Sale Societies of the producers on the model of the Haveli Gul Sale Society at Poona, will not only reduce the cost but will bring the cost of the services to the producers. The Poona Gul Sale Society, after paying the expenses and dividend on share capital, have paid per cart of *gul* about twelve annas patronage dividend on the business transacted by the members.

4. *Too many varieties of weights and measures.*—The large number of different kinds of weights and measures is most confusing and uneconomical. No other civilised country would have tolerated the waste of energy and the clumsiness in exchange involved by the want of uniformity in weights and measures.

5. *Necessity of maintaining quality.*—I think the Gujarat farmer has learnt to his cost the value of maintaining quality of his cotton and especially the Bombay trade has given good response. The Department of Agriculture has done very useful work in this direction by way of developing suitable strains (as 1027 ALF, D.G.N.R., etc.), of cotton for particular tracts and getting the legislature to enact certain laws. Ground-nut crop lends for similar work and it will pay to investigate this crop as well. While I was Deputy Director of Agriculture, some attempts in this direction were made in 1922-23 and 1923-24 and I believe it is continued.

6. Markets for perishable goods such as fruit and potatoes cannot be improved in the hands of private people. They need help of the Government, Municipality and Railway companies.

Suggestions for improving marketing.

(1) It is very essential that the question of marketing the farm-products should receive special attention of the Government and the Universities. For this purpose, the Central as well as Provincial Departments of Agriculture should open marketing sections and the Agricultural Colleges, introduce Agricultural Economics and marketing in their curriculum. The earlier they grapple with this important question, the better it is.

(2) I have in the beginning of this chapter said that I would prefer integrated method and co-operative agency. In fact, Co-operative Sale Society (in the primary market) can, with the help of the Co-operative Credit Societies, achieve this. For example, the Gul Sale Society at Poona is selling the *gul* (about one-third of the total coming in Poona) for the members of the different co-operative credit societies (round Poona) who finance the members (sugarcane-growers). One of the manure societies, in addition, supplies concentrated manures. The Sale Society sees that the loans, taken by the member from the credit societies, are first returned. Since the members accept deferred payments for *gul*, the Sale Society does not require outside finance on large scale. At this stage, I, however, like to make it clear that it is no use increasing the number of Sale Societies unless they are founded on strong co-operation of the producers only. Never mind, if the growth is slow but never take from the beginning any man who is not a producer of that commodity or who is interested in the sale organisation elsewhere.

General suggestions.

Present civilisation tends towards raising the standard of life. In America one sees the labourer going in for piano, motor-car, vacuum cleaner, etc., by instalment system, paving his future income. In England the miner is fighting hard to maintain his high standard of living.

In India also the standard of living is rising. The cultivator was satisfied with simple food and scanty clothing. Contract with European civilisation has brought in petty luxuries such as tea, sugar, finer clothing, etc. He, however, has bought these luxuries at the expense of necessary food. He cannot afford to have these luxuries and yet does not give these up. It seems very necessary for Indians to adopt plainer life.

The balance between food and non-food crops is disturbed. Crops like cotton, sugarcane, coffee, tea and oil-seeds have displaced considerable area of *jouar* and *bajri*, with the result that sufficient food is not raised. It may be contended that cotton and sugarcane bring in more profits. I do not subscribe to this view. Moreover the extension of cotton and sugarcane in other countries has depressed and is likely to further depress prices of these products.

Since in India rural interests predominate it seems necessary to create opinion in favour of rural life in all matters and to discourage luxuries, which are unnecessary and which we cannot afford to pay for. It is equally necessary to re-establish the old balance between the food and non-food crops. It will not only help the country to produce more food for her large population but will also help her to produce more fodder for the cattle.

As will be seen from my answer to the question 17—Agricultural Industries — it does not seem necessary to introduce power machinery which displaces manual labour. Perhaps power machinery doing the work of cattle may be useful, as with the growth of population, marginal land, which grew grass and fodder, is put to crops more and more and the question of feeding cattle is becoming more difficult.

Wherever necessary, the help of legislature may be sought, but the most essential thing is to create opinion in the interest of the rural population.

QUESTION 1.—RESEARCH.—(*a*) and (*c*) Research on crop production including plant breeding, plant pests can be said to be going on well. Some of the sections in the Provincial Departments are, however, under-manned. Research on marketing including co-operative marketing, farm management (including cost study) is essential.

At present we go in for producers' societies (as Sale Societies) and consumers' societies without first knowing the marketing costs charged by the middlemen and without considering if these are reasonable or not.

Research in marketing of different farm produce in different tracts is essential before attempting improvement of marketing or opening co-operative sale organisations.

QUESTION 2.—AGRICULTURAL EDUCATION.—(*iii*) Yes.

(*iv*) No. Attendance is not satisfactory. Majority of the peasant farmers is poor and the farmer likes to utilise the services of his children on the farm and to tend his cattle. Moreover boys who learn up to vernacular V or VI do not like manual work on the farm.

Majority of the teachers themselves being drawn from communities not accustomed to manual labour, unconsciously impart their dislike for manual work to their pupils.

Recruiting teachers from agricultural communities and training them in agriculture as is done for preparing teachers for bias schools will improve the situation.

(*vi*) Yes.

(*vii*) and (*viii*) The course attempted for bias schools seems to be satisfactory. The main idea should be to create love for farm work and encourage observation. The school plots and nature study are of course very essential.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) and (*d*) Demonstration plots on the farms of cultivators have proved very useful in introducing—

(1) Iron plough and sugarcane mill (Iron) in the Deccan.
(2) N. R. cotton seed in Khandesh.
(3) Use of sulphate of ammonia in Poona, Nagar, Nasik and Satara districts.
(4) Wide method of planting sugarcane.
(5) Poona furnace in Nasik, Satara and Karnatic.
(6) Multiple furnace in the canal tract.
(7) Use of fungicides.
(8) Strains of rice, cotton and sugarcane and so on, are good examples.

(*b*) and (*c*) Demonstrators should, as far as possible, be drawn from a community for whose benefit the demonstrations are arranged, as the man then can move freely with such men. The community believes one of their own men more readily.

QUESTION 4.—ADMINISTRATION.—(*a*) Provincial Departments will seek—and I believe do seek—assistance from the Government of India where they think useful help is available. I, as Deputy Director of Agriculture, Southern Command Division always availed myself of the assistance of Rao Saheb Venkatraman, the Sugarcane Expert. I had to draw upon Rao Saheb Venkatraman because we have not got sugarcane breeder and because I knew that Rao Saheb Venkatraman could assist us.

I, however, think that it is better to make the Provincial Departments complete units by providing all sections.

As the Agricultural Departments are steadily Indianized it seems necessary to give more facilities for the Indian officers (both of Imperial and Provincial grades) to attend Agricultural Boards and get in touch with the workers in different Provinces and at Pusa. So far as I know, no Indian officers (except from the States) are invited or deputed as Members of the Board of Agriculture and perhaps the want of personal touch and acquaintance is responsible for the want of close co-operation between the Central and Provincial Departments.

I am sure that the Indian officers are doing as good work as European officers and perhaps the former have advantages to know the real difficulties and problems of the land, inasmuch as they can mix and talk more freely with the agriculturists.

In certain branches, for example, in the study of Agricultural Economics, Land Economics, Marketing and Co-operation, the Central Government has better facilities and if these sections are opened by the Government of India and by the Provincial Governments, certainly the Central Government can render more effective help. The question of railways, roads, tariffs, weights and measures are very useful subjects to be tackled by the Central Department.

The Central Government, by studying the supplies and demands of several Provinces and of foreign countries, can direct the producing Provinces to send the several products where these are in demand. The Federal Department of Marketing at Washington and the several State Departments, working in co-operation, are rendering very useful services to the farmers in the United States of America.

(*c*) (*ii*) As I have indicated in my general statement (under Marketing) the Railway Freight on Agricultural commodities should be lightened. Tracts like Kanara should be opened by opening railway lines and facilities of docks given to bunders like Ratnagiri, Vengurla, etc.

(*iii*) The trunk roads, though few, are good. There is necessity of having more second class roads to connect villages with primary markets.

(*iv*) I do not think that the farmer or the Provincial Departments of Agriculture get much useful help from the Meteorological Department.

QUESTION 5.—FINANCE.—(*a*) The Co-operative Department of the Presidency and the people taking interest in co-operative work have done a great deal to offer credit, especially short-term credit, to the cultivators. Except in few isolated areas the cultivators' economic position is not improved. Provincial Co-operative Banks are giving assistance to the Government and the people.

The important question is whether the farmer can repay the loans. Agriculture, on small scale, in most parts of Bombay is a marginal industry. There is no surplus and unless there is any surplus cheap capital cannot help the cultivator.

(*b*) There is no question of inducing cultivators to take *taccavi*. He takes *taccavi* or any kinds of loans as fast as they are made available.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) (*i*) The marginal nature of small scale agriculture in India is the main cause. Litigation and heavy court charges. In the Indian States changes in laws increase litigation.

(*ii*) The village *sowcar* and co-operative credit societies are the main sources of credit.

(*iii*) Causes of preventing repayment.

(1) Marginal nature of small scale agriculture.

(2) Insufficiency and ill-distribution of rainfall.

(3) Deaths of cattle by epidemic. In a little village of 60 houses 15 mote bullocks (worth about Rs. 1,500 to Rs. 2,000) and several milch cattle died within 15 days. It will be years before such losses can be recouped.

(*b*) Perhaps very careful rationing of finance at low rate (not more than 6 per cent.) may help the farmer as he otherwise cannot pay his debt back.

(*c*) Limiting the right of mortgage and sale sounds hard and looks as if personal liberty is tampered with. But under Indian conditions perhaps it is better if restrictions are put in on sales.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(*a*) No. I fear I cannot think of any effective way.

(*b*) If the holding is left with the eldest boy there is no opening for the other brothers except perhaps day labour. Moreover it is difficult for the agriculturists to take a new business. Nor have they got capital. The usual way of dividing lands is not rational as each field is divided. Facilities by way of giving free services for measuring lands and valuing them may be useful to rational division. Also adjustments and exchanges may be encour-

aged. In Japan the Government have created a department for such adjustments.

QUESTION 10.—FERTILISERS.—(*a*), (*b*), (*c*) and (*d*) In the Bombay Presidency fish, oil-cake and sulphate of ammonia are freely used for sugarcane. To some extent oil-cake is recently used for cotton in Khandesh.

More liberal doses are not found economical.

The distribution of sulphate of ammonia was taken up in the Deccan in 1908. For sometime it was given free. In some cases it was sold at half cost and then at full cost. For many years it was stocked at Government depôts for sale. When it was given free or at half cost cultivators were required to maintain check plots and give results.

At the instance of the Bombay Department of Agriculture I have drawn a leaflet (No. 3 of 1923) which deals with this question. (A copy* accompanies.)

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*a*) Number of working days. We have not yet investigated the problem. I have, however, taken up three average families (one in each district) and with the help of the bias agricultural school teachers I am getting weekly diaries to get some idea. Intensive study on large scale is necessary to get some idea of the working days. The number of working days will vary in each tract. My inference is that in a family of about five persons working days (on the farm) in the year will be about 180 for each person.

(*c*) For bee-keeping, sericulture and fish-culture most tracts of Bombay do not lend themselves well. Most farmers in the Deccan make their own baskets and ropes and many keep poultry. Poultry keeping should be improved, encouraged and helped.

(*d*) Yes.

(*e*) Yes. Power machinery, however, cannot afford any relief. The reason is that an operator on power machinery perhaps turns out as much as 5 to 10 times more produce. He thus displaces 5 to 10 craftsmen. Unless the purchasing power of the masses is greater or there is good market outside, power machinery, instead of giving relief, will increase unemployment. Most of our markets for yarn and cloth are closed as those countries which purchased our products have become manufacturers themselves.

I agreed to shifting industrial concerns to rural area because of the two evils the proposed one is less harmful.

(*g*) Propaganda amongst people to use hand-made things.

(*h*) To throw more responsibility on the village people, encourage village panchayets and give them part of the revenue collections provided they raise some funds locally.

QUESTION 18.—AGRICULTURAL LABOUR.—(*a*) Please see my Note on Colonisation appended.

QUESTION 20.—MARKETING.—In my statement I have given under "distribution" and "marketing" my detailed views.

QUESTION 25.—WELFARE OF RURAL POPULATION.—(*b*) Yes. Detailed inquiry of typical villages in each district may be conducted on the lines followed by Dr. Mann for Jategaon.

Less elaborate surveys should be attempted by the District Agricultural Overseers with the help of fieldmen appointed for this purpose. In this class of inquiry instead of attempting the costs and receipts of most individuals, only typical individuals may be selected and the costs and receipts worked out. Area under irrigation and different crops, also the total population, cattle, assessment, etc., may be worked out. To find out how much spare-time the inhabitants have diaries of the families selected may be maintained.

Comparison of such surveys will supply material for suggesting adjustment of population and for suggesting subsidiary industries. Such survey will supply data for comparing economic conditions of the different tracts.

---

* Not printed.

APPENDIX.

A Note on Colonisation of new lands and some of my thoughts about Colonisation in India.

Probably one may doubt that as to how the question of acquiring new lands for agriculture and colonisation arises in an old old country like India. In fact colonisation of India was accomplished long ago in the times of *Vedas* by the Aryans who poured in from the North-West long before America, Austria and Africa were colonised by the Europeans. A question may be raised as to how the problem of colonisation arises at this stage in India.

In a way there are plenty of grounds for such a question. In fact at this stage there are very few new countries and lands available for cultivation on the face of the earth. Most of the good parts of the world are colonised and settled. In fact in many countries there is excess of population. In India we have now 177 souls for every square mile. The population in France is still greater. In Germany the density of population is twice while in England and Belgium is three or four times as that of India. The economic conditions of the European countries are much better as compared with those of India. The industries, commerce in European countries are established and the rainfall assured and well distributed. Besides there is a good scope for the white people to send out excess population to other countries like Canada, America, South Africa, Australia, New Zealand and others.

Unlike the Aryans of Vedic times the people of India to-day have absolutely no scope and facilities to migrate to other countries. Under such circumstances the problem of utilizing to the best advantage all the available lands of the country itself, is very very important.

To think of the Bombay Presidency alone we find that even with a good and certain rainfall the inhabitants of the Konkan and the Mawal do not get enough even for their subsistence, because of the over population. Gujarat also is crowded for her land. In the East Deccan the holding of the farmer is larger, but the vagaries of rainfall, its ill-distribution coupled with uncertainty, do not allow the people there to eke out bare subsistence. Naturally therefore thousands of people have to run to the business centres of Bombay, Karachi, Ahmedabad, Sholapur, etc. Unending worries which harass the mill-hands at such centres can easily be imagined if we remember the recent labour conditions and strikes in the mills.

Besides this, the question of vital importance, which faces equally the rich and the poor as also the rural and the urban people is how to support such an enormous population of the country. Starvation has brought in an increased death-rate among children and the average age limit of people is shorter as compared with that of people in other countries.

Under these conditions, along with improvement in agriculture—

(1) new land must be brought under cultivation,

(2) the number of canals, wells, *bandharas*, etc., be increased,

(3) spoiled salt lands in the canal areas and marshy tracts must be improved by draining and care taken to see that no further damage is caused to good lands,

(4) vigorous attempts may be made to reclaim lands on the sea coast,

(5) *tals* and embankments may be put in at suitable alignments and distances so that washing and scouring of land is reduced to minimum.

All these points may be carefully and thoroughly attended to with a view to increase the land-supply.

I will try here to deal only with the first point, namely, the possibility of bringing new lands under cultivation and the precaution to be taken in colonising such lands.

At present, in Gwalior, Indore and Dhar States of Malwa, in the Nizam's Dominions and in the Mysore States, there are vast tracts of lands which can be brought under plough. The Government of these States also seem to be anxious to get these lands colonised. When compared with the lands of the Deccan, the land in these tracts are certainly better and the rainfall there is better and more certain. In fact the Malwa lands should have been colonised long ago. But the land policy of the Malwa States is not or at least was not sufficiently attractive and so these tracts have not yet been well settled. The causes of the failure in colonisation have by now been appreciated by the Rulers of these States and they have been trying to improve and amend the land policies and to give more facilities to the colonisers; with the help of my friend Shrimant Khase Saheb Pawar, Home Member, Gwalior Government, I have got the Gwalior Durbar to organise a colonisation court on the show grounds at Poona which I am sure will interest the visitors of the show. There the visitors will be able to know as to where and how much land is available, the quality of these lands, the crops they can grow, the amount of rainfall and its distribution, the facilities given by the Durbar for colonisation and such other useful information in that connection. The visitors will be able to know the system of tenancies and land policies now adopted by Durbar. They will also get handbills giving the detailed information about Gwalior lands. We are expecting similar information from Dhar and Indore.

Lands in Sind.—It has also become possible now to get new land for cultivation even in British districts of the Bombay Presidency. The population in Sind is very sparse, so much so that the system of settlement and tenancy adopted there by the Government is quite different from that adopted in the rest of the Presidency. In Sind land is plentiful and the cultivator is allowed to retain a number of fields on his name and he is charged assessment only for those fields actually cultivated by him, retaining a lien on the remaining fields. Moreover lakhs of acres of nice land will be added to this land-supply on the Sukkur Barrage. People of the Presidency must now be very alert and active to their interests and try to capture all these lands in Sind. Indifference either on the parts of the leaders and of the cultivators or of the Bombay Government will mean the loss of valuable lands from the hands of the needy peasants of Bombay.

I am sure a number of financially better placed and hardy cultivators of the Presidency, like the shrewd *patidars* of Gujarat, the enterprising *malis* of Poona and roundabout, the clever Brahmins of the Konkan and the Jains and Lingayats of Karnatic will not hesitate to leave their present homes for better ones. The hardy but less enterprising Maratha cultivators of the Deccan may not like to go as far as Sind, yet many of them are going to Maratha States in Malwa.

Usual errors which have been and are being committed in colonisation.

(1) It cannot be said that the system of holding lands in many parts of India is very satisfactory. Except ryotwari most of the systems like *jamindari*, the *talukdari*, the *malguzari*, the *khoti*, etc., are not favourable to the actual tillers of the soil. The tiller has to pay heavy rent and yet he has very little interest in the land and thus he gets very little or no incentive and encouragement either to toil hard or to effect any permanent improvement. And yet in the face of all this, whole villages and large tracts of lands are even this day given in Malwa with the rights of *malguzari* which encourages absentee landlordism. It should never be forgotten that the systems of holding land and tenancies have a far reaching effect on the economic well-being of the country.

(2) Though the actual tillers of the soil do not get enough land for cultivation, blocks of thousands of acres of land are being sold, in the Nizam's Dominions, Gwalior, and if the rumours are right, large blocks of land may be sold on the Sukkur Barrage to capitalists, instead of giving small blocks,

capable of being well managed, to small cultivators. These people (*viz.*, capitalists) not being actual tillers of the soil will either divide their large blocks into pieces which they may in turn sell or rent and enjoy without putting their hand to the plough.

The evils of absentee landlordism are not imaginary; the troubles in Malabar, Konkan, Bengal and United Provinces are standing examples of such troubles. The old Governments gave out the rights of *malgujari*, *khoti*, etc., without thinking of the future effects. We may say that it was an experiment. It is proved that it is not a success and yet with all the troubles and economic disadvantages of these systems, if the Malwa States or any other Government dispose of lands as described above, it will mean that they sow the seed of troubles and dissatisfaction for the future generation.

(3) A good selection must be made of the farmers intended for colonisation. They must be actual tillers of the soil, they must know well the business of agriculture and they must also have a little capital.

(4) Instead of giving lands here and there, principle of close colonisation must be followed. Land sufficient only to maintain a family, should be the usual unit. There is no harm in giving more land if the man has got the means of managing it himself. People from different localities and of different manners and customs should be grouped separate so that each group may have a community life. People with different customs and manners and languages having no community life soon get tired. And this is what actually happened in Gwalior. The people from the Punjab, Marwar, Berar, Deccan and others who went to Gwalior not being separately grouped, got tired and many of them left. Scattered colonisation does not allow people to live in an organised body. Scattered colonisation does not allow people to arrange for water, roads, markets, religious institutes and schools for their children.

In an unorganised colonisation people are harassed by robbers, thieves and cattle lifters. From the history of Gwalior colonisation we find that no serious attention was paid to such important considerations and that is why many people got tired and left the lands while the Durbar has lost lot of money. There is another defect often noticed is, that the colonisers are not allowed to shoot wild animals that destroy their crops. The Durbar has realised the difficulties of the colonisers and I am told that they have learnt the value of organised colonisation and have allowed better facilities to protect the property and crops of the new settlers.

(5) Before attempting colonisation, a separate colonisation department or at least a separate officer is very necessary.

The following are the important points to be remembered :—

(*a*) Close colonisation is essential.

(*b*) Maximum amount of land to be given to each man must be fixed.

(*c*) Detailed information about the soil, crops and cropping, rainfall and its distribution, etc., must be made available.

(*d*) There must be somebody to help and advise the people and to remove their difficulties.

(*e*) Their property must be protected from thieves.

(*f*) They must be allowed to destroy wild animals.

(*g*) Arrangement for the education of their children must be made. Roads, water and marketing facilities, religious institutions, temples, etc., must be provided for.

If all this done by the local Government for the people and with their help, and the colonies well arranged and organised from the very beginning the people will feel interest in the colonies and will be at home from the beginning.

Oral Evidence.

7868. *The Chairman:* Rao Bahadur Patil, you are Professor of Agricultural Economics and Acting Principal, Agricultural College, Poona?—Yes.

You have put in a very complete note for which the Commission is greatly obliged to you, especially having regard to the very strenuous time that you have been having in connection with the very successful Show at Poona.

7869. Do you wish to make a general statement before we pass to question and answer?—No.

7870. On page 509 you are concerned to recommend the study of agricultural costings generally?—Yes.

7871. Would that work fall to be done by you in the ordinary way?—I should recommend a separate section for agricultural economics, just as there are for agricultural chemistry, botany and so on. At present I am the only man there, with one assistant, and though I am trying to do something I have not sufficient staff.

7872. You would give the general direction, in any case?—Certainly.

7873. You are Professor of Agricultural Economics?—Yes, I am doing that work.

7874. Your idea is that you should give the direction, and have a bigger staff to carry out the work?—Yes.

7875. Where would you begin?—Marketing is more urgent than costings.

7876. You would begin by an analysis of the price structure?—If I have only one assistant I shall consider marketing as more urgent and tackle that first.

7877. Do you know of any complete systems of costings for agriculture or in agricultural marketing which have been carried out in this Presidency or anywhere else in India?—No.

7878. It is a virgin field?—Yes.

7879. Do you attach great importance to the examination and analysis of these matters?—I do.

7880. On page 511 you say: "Since in India rural interests predominate it seems necessary to create opinion in favour of rural life in all matters and to discourage luxuries, which are unnecessary and which we cannot afford to pay for. It is equally necessary to re-establish the old balance between the food and non-food crops." Taking the first point first, would you deprecate a rise in the standard of living?—I would welcome a rise, but if we cannot afford to maintain it, it is no use trying to do so. That applies to India as well as to other countries.

7881. The point I am concerned with is that obviously the luxury of to-day is the necessity of to-morrow, and if you harden opinion against all luxuries you are going to make an advance in the standard of living almost impossible. It is by adopting what appear to-day to be luxuries that the standard of living is raised?—I do not exactly agree. Probably the way of thinking in the West is different from that in the East. I should personally prefer a plainer life. If we had sufficient money it would be another thing, but when we are hard up it is no use going in for luxuries.

7882. If you are content to say you do not wish to see any rise in the standard of living which could not be maintained I do not wish to ask you any further questions on the point. Is that really your meaning?—Probably my note may sound rather pessimistic, but we are circumscribed by very difficult circumstances, especially in the Deccan, and for the masses it is no use going in for tea and sugar and things which are not necessary, when masses cannot get sufficient food.

7883. These things cut very deep. After all, if there is no ambition on the part of the cultivator to raise his standard of living and enjoy certain luxuries he does not now enjoy, you are not likely to get from him the energy and attention required for better cultivation. It is the desire for better things which makes people experiment and adventure is it not?—I quite agree, but we are spending what little we have got on certain things which are not necessary, and so do not get nourishing food.

7884. That is bad spending, is it not?—That is what I mean. If we can afford to buy luxuries that is quite all right.

7885. You say, "It is equally necessary to re-establish the old balance between the food and non-food crops." What exactly do you mean by that?—I will take one example. If for 60 years the proportion of food crops to non-food crops in Khandesh was 60/40, and if now it is reversed; the food crops are less than the others, so that we not only lose food but also fodder. I should therefore not go in for more non-food crops if possible.

7886. You do not think the tendency is for a slight increase in variety of diet?—Variety we have always had; there is probably less now than before, because we are specialising in certain crops.

7887. If you are going to have variety in diet, you must have increased purchasing power, unless you are prepared to confine your variety entirely to what you can grow on your holding. It needs an extension of purchasing power to buy food from other parts of India and of the world to get variety in diet?—I agree there is a good deal in that, but to my mind the purchasing power has not increased by specialisation.

7888. You do not think that by increasing the commercial at the expense of the food crops there has been any increase in the aggregate purchasing power?—I do not think so.

7889. Does what you say apply to irrigated land?—For irrigated land we will have of necessity to arrange special crops. It does not pay to grow *juar* or *bajri* on irrigated land.

7890. In a good many cases there has been an increase of sugarcane at the expense of food crops?—Farmers have to go in for that crop, because the rent is heavy. The water and everything else is costly, so they have to grow a costly crop.

7891. If you happen to have land on which you have to pay irrigation charges you are forced to grow a money crop?—Yes.

7892. And you deplore that?—Under the circumstances nothing better can be done, but in a dry tract I do not like the food crops to be sacrificed.

7893. I should have thought it was a matter of comparing the value of what you could grow on your holding to consume with the value of a crop grown for sale?—I agree that if a special crop brought more money into my pockets I should grow it and buy from outside.

7894. On page 514 you say: "In Japan the Government have created a department for such adjustments." That is, adjustments in sub-division, is it not?—They do not mind sub-division, but they insist on rational division. If I have three fields here and three brothers, each brother will have a piece of each field. In Japan they persuade the people to take one piece each, and then adjust matters according to value. Similarly, if the boundary between two pieces of land is crooked, they straighten it out by adjustment between the two owners.

7895. Consolidation proceeds step by step with sub-division and fragmentation is avoided?—Yes. I would like to avoid sub-division, but I do not see my way to advocate that.

7896. Do you know all about this Japanese adjustment department?—Yes. On my way back from America I spent about a month in Japan.

7897. Do you know whether the department in question attempts to effect consolidation of fragmented holdings where fragmentation has already taken

place?—Yes, that is attempted if both parties are agreeable, but they insist more on preventing future fragmentation.

7898. Are their rules against future fragmentation compulsory?—I am not sure.

7899. It is a very important point, in view of certain proposals which are in the air?—If I get any literature on that I will look into it.

7900. On the same page you discuss the number of days a cultivator and his family will work, and you fix on an average of 180 a year for each person. Of course, on the evidence already given (some of it at Poona) before this Commission, there is an immense disparity between district and district in that respect, is there not?— I agree, and I think I have mentioned that.

7901. I wanted to emphasise that, as it does not appear in the context here?—Yes.

7902. You are against the introduction of power machinery?—Yes, in the existing industries.

7903. It is a very big and difficult question?—I am against it, because it will displace man-power. I will try to justify my view if you like.

7904. The general wealth of the community must depend on the aggregate output of all the workers, must it not?—Yes.

7905. And a country is rich in proportion to the capacity of its citizens to produce?—If all the population is usefully employed it is all right, but power machinery is displacing a large number of people. It is no use creating unemployment, is it?

7906. But that period of adjustment has had to be faced and overcome in every country where labour-aiding machinery (as I prefer to call it) has been introduced, has it not?—Other countries, though they may not be hard pressed, are yet getting into difficulties. Shall we invite such difficulties here?

7907. They complain a good deal, but I do not think they complain as much of their difficulties as they would about the standard of living of a cultivator in an Indian village, if they had themselves to accept it! Turning to page 517, have you experience of colonisation?—Not first-hand experience, but I was and am very much interested in it. When I was in America for a year I studied two colonisation schemes, one in California and one in the State where I was reading, and on coming here I concluded we were very much congested in the Deccan, and I thought similar schemes could be applied here.

7908. Have you any particular land in your mind's eye?—Yes.

7909. Where?—Most of the Malwa States are not yet well settled. Lakhs of acres are still available in Gwalior and the Nizam's dominions, and in British territory I think there will be a lot of land on the new barrage.

7910. I should have thought the development of colonisation schemes initiated and administered by British India Government within the territories of Indian States would present considerable difficulty?—They are inviting people to come, and we are congested here.

7911. Has an experiment of this sort been attempted in Mysore, do you know?—In Gwalior they have attempted it, but owing to defects which I have pointed out they failed. Since they remedied those defects they are getting more agricultural labour.

7912. Do you think there is a shortage of agricultural labour in the Presidency?—I have explained that point. People think they are short of labour, but only because they cannot pay the market rate of wages. Apart from that there is no reason why there should be a shortage of agricultural labour in India.

7913. Do you think a statute protecting the cultivator against the adulteration of manures would be an advantage?—Yes.

7914. Do you think there is much adulteration of manures?—It has been going on for some years. We drew up a leaflet and distributed it, and since

then people purchase on guarantee and send samples to the Agricultural College.

7915. *Sir Henry Lawrence:* How did you bring this about?—I drew up a leaflet in 1922 and broadcasted it everywhere, and offered to analyse the stuff if sent to me, and I told them they should not purchase by bags but by weight and on guarantee.

7916. This leaflet checked the evil?—I think it has had its effect.

7917. *The Chairman:* One other question with regard to the introduction of labour-aiding machinery. If you look forward to a really substantial development of industry in India in, say, 100 years, which will attract large numbers of the rural population to a better standard of living in urban, industrialised areas, that would to some extent depopulate the rural areas unless there was concurrently an equivalent rise in the total population. Under those conditions, do you not envisage a time when the introduction of power machinery in agriculture would be an immense benefit?—My difficulty is this. One man with a piece of power machinery will displace 10 or 12. If 10 or 12 are displaced they have no work, and so no purchasing power. If we could reach good markets outside I would not complain about power machinery.

7918. What do you mean by good markets?—10 or 15 years ago our cloth was purchased by Japan, China and other countries. Those countries have now become manufacturing countries and we have lost those markets. When every country becomes a manufacturing country in turn, who is going to purchase?

7919. *Dr. Hyder:* Suppose that by making greater use of machinery in agriculture you can reduce the price of cotton, and by improved machinery in the cotton mill save still more labour, you say no one would be able to buy the stuff outside?—Yes.

7920. But do you not think the cost would go down, and you would be able to place the manufactured article in China, Japan and other places at a lower price and so find a market?—I do not think so. It is like people living by taking in each other's washing. If every country becomes a manufacturing country no one will be able to buy.

7921. *Sir James MacKenna:* You said there was no shortage of labour, but that the cultivator cannot employ it because the rate of wages is high?—Yes.

7922. Why is it high?—Because in the urban areas and non-rural industries they can afford to pay the market wages, but in a marginal industry like agriculture the cultivator feels if he pays the market rate he will be giving the labourer more than he gets himself.

7923. So agricultural labour is swallowed up by industrialism?—Not quite swallowed.

7924. Very nearly?—People employed in urban industries get more.

7925. That being so, there is a shortage of labour available for agriculture. Is not that an argument for the introduction of machinery to take the place of labour? It will not in fact be replacing it?—Urban industry has brought about our shortage of agricultural labour.

7926. What was your training before you became Professor of Economics here?—I am from necessity Professor of Agricultural Economics. I am more of an agriculturist, but there was a gap here. I first farmed myself for some years, and then at the age of 29 I became a graduate. I was first Superintendent of a farm and then Lecturer, and then after six years I thought agriculture was not paying, and that we had not much to teach to our agriculturists here. I therefore took a trip to Europe and spent a year seeing most of the European countries. After coming back I continued my business as Agricultural Inspector and acted as Professor of Agriculture for a year, and then again took leave. I was anxious about the business side of agriculture. I was already in the higher service, so there was no incentive for me to get a higher job. I spent 18 months in America and took a trip round the world.

7927. You took your degree of M.Sc. in Agricultural Economics in America?—Yes.

7928. At what College?—Wisconsin. Then I became a Deputy Director again, but since there was a vacancy for someone to teach agricultural economics and someone had to make a beginning, I did so.

7929. *Professor Gangulee:* How long have you been teaching agricultural economics?—18 months.

7930. With the help of the text-books, and data you have collected yourself?—I am collecting data. I do not simply depend on books.

7931. What do you mean by "simply depend on books"? Have you sufficient data for your teaching rural economics?—It is difficult to get data in a day, but I have the experience of 20 years at my back.

7932. For instance, when studying marketing of farm produce do you take your students to the markets?—Yes, and more than that. I not only take them to see how, for instance, *gul* marketing is carried on, but how a sale society should be formed for it and how they work.

7933. Your M.Sc. degree was in agricultural economics from the University of Wisconsin?—Yes.

7934. Have you studied most of the standard books on agricultural economics?—I think so. Before going to America I spent two years in preparatory work.

7935. You say the cultivator buys luxuries at the expense of necessary food. Could you define what you mean by "utility"?—That which gives you satisfaction.

7936. "Marginal utility"?—It is more like a University examination here!

7937. I will not take you into economic questions, but I want to deal with the human aspect of the question. Would you buy luxuries at the expense of necessary food?—They are doing it. Poor women bring fuel here for sale, which will fetch about three annas, yet the woman will stop to purchase tea for half anna. I think it is at the expense of food.

7938. You have travelled a lot, have you not?—Yes.

7939. You have studied the agricultural development of other countries as well?—Yes.

7940. Do you recognise that the agricultural industry is passing into a stage known as commercialisation?—Yes.

7941. From its self-sufficient basis it is passing to another basis?—Yes.

7942. And you say the balance between food and non-food crops is disturbed?—Yes.

7943. Do you not think that is simply a phenomenon of modern times?—I quite agree we cannot stop the times, but if possible we should not go in for non-food crops when more food crops are required in this country.

7944. You cannot isolate yourself from these forces?—I agree, but is it not better to give one's own honest view?

7945. *Mr. Calvert:* There is an examination in agricultural economics, is there?—Yes.

7946. Do you set the paper?—In Bombay University, yes.

7947. Have you a co-examiner also?—Yes.

7948. Who is he?—Mr. Gokhale was my co-examiner.

7949. You say the Indian farmer has shown keenness to adopt improvements. What proportion of the acreage in Bombay has been covered by improvements?—When I was district officer, good improvements brought to the notice of the farmer were adopted by him. In 1908, I first took up the distribution of ammonium sulphate. For one year we gave it to the farmers free, and for the next two years at half cost. Immediately there arose a demand, and we had to have a large number of depôts to satisfy them.

Thousands of tons are now used. In the same way, in 1906 there were perhaps 10 iron ploughs in each district; now we can count them by thousands. I think, therefore, that whenever a good thing has been offered to the farmer he has readily responded.

7950. Have you any idea what proportion of the total cultivated area has now come under the influence of the department?—I could not say.

7951. About 4 per cent?—I think it may be up to 10 per cent. It is difficult to say, because we may not have gone very deeply into the interior, which has not got good communications.

7952. You say the land available for cultivation per family is insufficient?—Yes.

7953. Insufficient for what?—Insufficient to maintain the family.

7954. That means you have too many cultivators for the land?—Yes.

7955. Is that because there is no alternative employment?—There is no scope outside agriculture here.

7956. You have practically got the conditions of a sweated industry?—Yes; we have got to stagnant stage.

7957. People are cultivating not for profit or return, but for food?—Yes, just to maintain themselves.

7958. You say the amount of capital available is small?—Yes.

7959. Have you ever made any estimate of the amount of rural debt in Bombay?—I have not made that estimate, but when we go into the talukas to see the work of the co-operative societies we find that the debt is not much lighter now; there is quite a large burden of debt upon the people.

7960. The gross total may be quite large?—It may be.

7961. Fifty or 60 crores?—I have no idea.

7962. The Punjab estimate is 60 or 70 crores; would you call that small?—I cannot say whether it is less or more in this Presidency. I am just beginning my study in it.

7963. How do you reconcile the existence of a heavy debt with the amount of capital being small?—When a co-operative society is to be organised, the capital is not forthcoming. It is production on the margin; the people are not making profits and naturally capital cannot accumulate.

7964. *Mr. Kamat:* You said there is plenty of labour?—Yes.

7965. And that power machinery will create unemployment by displacing men?—Yes.

7966. You are in favour of sending out men to Indian States for colonisation?—Yes.

7967. You said high wages are not due to scarcity of labour?—No.

7968. The high wages have nothing to do with scarcity of labour?—No.

7969. Have you got any data as to the shortage of labour?—I do not admit that there is a shortage of labour.

7970. Is that based on any investigations or any figures which you have collected?—I have a farm myself; when I cannot make any profit I still have to pay wages; I cannot afford it; at market rates I find it very difficult to employ labour. It is in that sense that I say labour is short.

7971. I am asking you because Government have made certain very close investigations into agricultural wages, and the conclusion has been reached, based on facts and figures, that in the decade from 1911 to 1921, 14 per cent of the people who were engaged in agriculture before had left that industry, that so far as agricultural field labour was concerned, there was a deficit of 37 per cent as compared with 1911. So that the number of field labourers was reduced, and yet you say there is no shortage of labour?—When the village handicrafts decayed the workers fell back on agriculture. When the railway and public works contracts were being carried out, no doubt for a

time there must have been a drain on the agricultural labour; but on the whole there is no reason why there should be a shortage of agricultural labour.

7972. And yet we were told that people were giving up agriculture owing to its uneconomic character and the poverty amongst agriculturists?—I did not say so; I admit that it does not pay, but they cannot give it up.

7973. Then, with regard to the relation of commercial crops to food crops, I definitely asked Mr. Jenkins yesterday whether in Khandesh the stage had been reached in which there was a serious shortage of food crops, and he replied that that was not so at all. You maintain there is a disproportionate increase in commercial crops?—I do not say that is so in Khandesh, because that is a rich tract, but it is true with regard to the whole of India if you calculate how much grain is produced as compared with the needs of the population. In my book I think I have said that with regard to this Presidency.

7974. *Sir Ganga Ram:* What about the other Provinces?—I do not profess to know the whole of India.

7975. *Mr. Kamat:* I asked Dr. Mann the same question with regard to the Bombay Presidency, and I think he also replied that there was no serious cause for apprehension as to the decrease of food crops. Do you hold the same view?—No, I do not. Do we not bring a lot of rice and *juar* from other tracts?

7976. *Dewan Bahadur Malji:* In your written evidence you refer to your activities at Wadgaon in the Kolhapur State. Is that in connection with some lands owned by you?—Not owned by me, no.

7977. It is merely financed by you?—Yes.

7978. How does the partnership come in?—The sugarcane is grown on lift water; the water is raised on five shifts. We have to combine in partnership to grow sugarcane.

7979. Do you mean that you are a partner?—Yes, I am one of the partners.

7980. Does it leave a sufficient margin of profits?—No, it does not.

7981. Has it paid so far?—No.

7982. Have you studied the results carefully?—Yes, but we have to do something as farmers.

7983. Have you advised the cultivators?—I do not see my way to advising them; they are very good cultivators; they are very economical and very hard-working.

7984. Perhaps you have nothing to teach them? If this state of things continues, what of the future?—The future is bad.

7985. The future prospect is that they will have to part with their property?—Slowly.

7986. And clear the debts in that way?—I do not know; it may not be the same everywhere in the Presidency.

7987. Are you not sufficiently optimistic to hope that if you resort to extensive and intensive cultivation you may be able to make it a business proposition?—As I have said, here and there we have improvements to offer and the cultivator can no doubt pick up something from us. On the whole, in certain parts there is great difficulty, while in other parts there are possibilities of improvement.

7988. Am I to take it then that most of your observations apply only to the Deccan?—Yes, I think so.

7989. With regard to indebtedness, you said that the agriculturists to whom the co-operative societies advanced money on loan were not able to return the money?—Yes.

7990. And, therefore, by way of insurance, you insist upon their requirements being carefully rationed, to use your own language?—Yes.

7991. You mean that their requirements must be carefully checked and no more than is necessary should be advanced on loan?—Yes. I think the rate of interest should be low if possible.

7992. The present rate does not enable them to make agriculture a paying proposition, you think?—No, it does not.

7993. *Sir Ganga Ram:* You are a Professor of Agriculture?—Yes, I was for sometime.

7994. What are you now?—I am a Professor of Agricultural Economics.

7995. You are very fond of agriculture. Do you not know that oil-seeds replenish the soil?—I know leguminous crops do.

7996. Then why do you advocate food crops?—But a large part of the oil-seed crops is not crushed here.

7997. If you grow castor you take the fruit and plough in the stalks; would not that replenish the soil?—Not much.

7998. Then what does replenish the soil?—Certain leguminous crops.

7999. Are not all food crops leguminous crops?—Not all; castor, for instance, is not a leguminous crop.

8000. But you can plough in the stalks?—The castor stalk is wood.

8001. In reply to the Chairman you said you are not in favour of labour-saving machinery. Did you mean all machinery?—I am not in favour of machinery that will displace man-power. Of course, we cannot stop it, I have admitted that.

8002. If there were no machinery for ginning, how much cotton do you suppose would be grown in the Presidency?—Less cotton.

8003. There would not be a hundredth part?—What would it matter?

8004. I will prove to you from your book that you are not producing sufficient food crops to feed your population and that you are actually living on the price of your cotton?—I agree to some extent. You pointed out in a letter that if the grain grown in this Presidency is divided by the population there is not sufficient to feed the people, according to you, and yet we have exported cotton and produced unemployment here.

8005. But that cotton would never have been produced if it had not been for the ginning machinery. Are you not buying food now? Is there not an import of food into the Bombay Presidency?—There is.

8006. Then what would be your purchasing power if you did not obtain money by the sale of cotton?—Then we should not have grown so much cotton; we should have grown grain.

8007. But your grain will not grow unless you replenish the lost properties of the soil, and that can only be done by growing leguminous crops?—All the oil-seeds are not leguminous.

8008. But those that are not have other properties of replenishing the soil. You say on page 22 of your book that you are producing sufficient food for the whole population?—I did not say that. I have only published in a little book information for the public about the possible allotment of grain; that is all.

8009. *Dr. Hyder:* You say the Indian peasant works hard where nature responds?—He works hard where nature responds.

8010. And you say in your evidence that where nature is made to respond he becomes lazy, as, for instance, on the canals?—Yes, on the canals he is not found hard-working.

8011. So that apparently for the moral welfare of the nation it would be a good thing to blow up all these magnificent dams?—No, I did not say that. I have advocated irrigation works.

8012. But you say that the Indian peasant works hard where nature does not respond, but becomes lazy where nature is made to respond. After all, a canal is merely a conquest of nature?—Where nature does not respond the peasant becomes fatalistic. I am an agriculturist and I agree you can conquer nature in a sense.

8013. In the Deccan you have overcome the shortage of rain by constructing those magnificent dams—Yes.

8014. And you grow crops?—Yes.

8015. But you say in your evidence that where you have irrigation by means of those canals the cultivator becomes lazy and does not want to produce more?—No, I think you are confusing two things. There are two statements, where nature responds, as in the Konkan, he works very hard; in the East Deccan where nature does not respond, the man works for one or two years, but then, finding that nature does not respond, he says, "What is the use of working hard; last year I worked at a loss; let nature do what she likes"; he becomes a fatalist. The third proposition I have stated is that on the canals the people work hard, but some of them sometimes are lazy. That is because there the cultivator thinks he is a big man, he is well pleased, and so he employs labour.

8016. So that you do not think it would be conducive to the moral health of the nation to blow up these magnificent dams into the air?—No. If you read my note on colonisation you will find I have emphasised that point.

8017. *Sir Ganga Ram:* In your book *The Crops of the Bombay Presidency*, on page 22, you say, "If we take the Bombay Presidency as a whole, without taking any account of the special conditions of each district, we find that taking cereals and pulses alone, which form almost the whole of the food of the population, it will be seen that the Province produces enough food to supply about 713 lbs. a year per head, or about 2 lbs. of grain per day for each member of the community." Are you quite sure of these figures?—I think they are right because I got those figures from the Government records.

8018. When was this book published?—In 1922.

8019. Then these figures can be taken as being absolutely correct?—For the year 1913-14, I have taken a normal year.

8020. That is with regard to food for human beings. What about the food you give to the cattle?—That also I have worked out.

8021. I do not find it in this book?—It is in some other chapter, if you will allow me to find it for you.

8022. I work it out that you require 3·31 lbs. per head of food for the population and for the cattle which must be kept. If that figure is correct, there is a deficiency of 33⅓ per cent. I can also prove the correctness of my figure by the fact that you import 33⅓ per cent. of the food you consume; you sell your cotton and with the money realised in that way you buy 33⅓ per cent of your food from other Provinces?—I do not claim to have stated anything new; I merely worked out official figures.

8023. You underestimate the value to you of the cotton crop which I say has become a necessity to you. In other parts, in my own Province, for instance, cotton is never touched by the tenants; they produce their own food; but I can prove to you from the imports that you buy 33⅓ per cent of your food by selling cotton?—That is why I say, "Do not grow more cotton; grow more food."

If you do not grow cotton your people will starve.

8024. *Sir Chunilal Mehta:* On page 509 of your written evidence you say, "Except in one case where the man has purchased additional land all others either lost part of their land or have had their debts increased." Why did that one man succeed?—He has two or three brothers. Agricultural wages are not low. Where a man has a family the members of which are all working hard, he can succeed on good land. On that land nature responds.

(The witness withdrew.)

Mr. B. S. PATEL, N.D D., N.D.A., C.D.A.D., Professor of Agriculture, Agricultural College, Poona.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—(*a*) Research workers should be given travelling facilities for seeing and studying on spot the research work being done on similar problems in different Provinces of India and should be also required to go abroad to suitable research centres on study leave once or twice during first 15 years of their service so as to keep themselves up-to-date on the methods of work. I think money spent in this would be well spent and may broaden the outlook of the workers who are otherwise likely to be self-satisfied in their own little sphere of work.

The research work as well as the administration work in the Presidency has developed so much that it would be better if divisions of work may be made by leaving the administration work to the Director and research work to a suitable Joint Director. Research work will then receive due attention and help from such a Director.

Attempts may be made to raise a special research fund from the public as it is done in cases of hospitals. If the State would come forward to contribute an equal amount within a certain limit it may be possible to raise good permanent fund from which various researches can be financed.

Such a fund may be controlled by a suitable provincial board of trustees representing the Government and the Public.

(*b*) The central institute like the College of Agriculture should have provision of studying the factors of crop production as a whole. If we know quantitatively the effect of various factors on crop production, we can work for getting the best result possible under given soil and climatic conditions. The question of studying the digestibility of local feeds by various breeds of cattle in Western India, their assimilation by them for production of milk, and other animal products and for growth are left untouched. Their study may throw good light on the subject of economic management of work and milch cattle.

QUESTION 2.—AGRICULTURAL EDUCATION.—Agriculture being the mainstay and profession of 80 per cent of population of India the education given in the schools (Primary, Middle and High schools) should be such as will create sympathy and taste for agricultural pursuits and will acquaint the youth of the country with the theory and practice of agriculture. At present some 49 primary schools are teaching elementary agriculture in higher classes. These schools are known as agricultural bias schools.

Then there are six special middle schools of agriculture where the students get vocational training in agriculture. Thirdly, there is the College of Agriculture at Poona for higher education.

But these institutions are not enough to spread general knowledge amongst the masses and therefore I would suggest the following scheme for improving the education of the country.

(*a*) *Elementary School.*—The general atmosphere even of primary schools should be agricultural, *i.e.*, the school equipment should consist of pots or plots for living plants to be grown by the staff and the pupils in the lower classes should be made to observe the different processes of plant growth in the school compound, besides they should be taken out at least once a week to the surrounding fields to acquaint them with the agricultural environment. This will form a part of the practical course of nature study in the lower primary classes.

For the upper primary classes or middle schools the elementary knowledge of agriculture, both theoretical and practical, should be imparted corresponding with the agricultural bias courses given in some selected primary schools

in the Bombay Presidency. For this purpose a plot of an acre or two with the necessary equipment should be provided wherein the work of growing crops from the beginning to the end should be done by the teachers and the students.

(*b*) *Secondary Schools or High Schools.*—The teaching of agriculture, theoretical and practical, should be continued in the first two classes of the High School by devoting at least two hours a week.

In the last two classes of the High School the subject of Agriculture should be added in the groups of optional subjects assigned to Science courses for the school leaving certificate of the Bombay University so that the students wishing to have advanced knowledge of agriculture may have the choice of this group. Farm of 10 to 15 acres should be attached to all the rural High Schools for teaching theory and practice of agriculture. Irrigation facilities may be of advantage.

The students selecting the agricultural group in the last two classes of the High School shall be eligible for admission into the Agricultural College.

To make the practical course in the Primary, Middle and Secondary Schools really efficient the schools should work six hours a day, four of which should be devoted to mental work such as lectures and laboratory exercises and two hours a day should be solely set apart for manual work including Agriculture, Carpentry, Spinning, Weaving, etc.

(*c*) *Collegiate or Higher education.*—As the subject of Agriculture has been proposed to be introduced in the curricula of the primary, middle and high schools, the college course now given shall have to be readjusted and a three years' course will suit the purpose.

I would add the subject of Rural Economics to the present course. As the students come direct from the High School to the College of Agriculture, English may have to be taught in the first year.

Administration of the educational system.—I would suggest that there ought to be a Board of Education to settle the course of various schools and such a board should have an adequate representation from the Agricultural Department.

Secondly, there ought to be proper provision for training the teachers of primary schools as the success of the course depends upon the type of the teacher available.

I would suggest that the Loni type of schools should be converted into training schools to provide teachers of agriculture in primary schools. During the transition period three-year trained teachers should be trained in agriculture for a year and examined and only successful candidates should be appointed as teachers in agriculture. These Loni type schools will function as training schools until the first batch of students come out with the school leaving certificates. These certificate holders then may be employed as teachers in primary and middle schools and should be trained in pedagogy for a year in the present training colleges.

Technical training in agriculture.—There ought to be continuation evening classes in agriculture for those who take to farming after leaving the primary school.

The training schools like Loni will not be required and may be converted into vocational schools giving two years' courses in agriculture and secondary occupations for those who leave the middle schools or those who have attended evening agricultural classes.

The students leaving high school and wishing to follow farming may get a year's vocational course in agriculture at the college as it is given at present.

The teaching in agriculture and nature study at the high schools, training schools and training colleges should be recruited from agricultural graduates. In selecting the teachers for all schools preference should be given to agricultural classes provided they are otherwise equally qualified.

I have suggested the agricultural course of high schools and college for the transitory period but I would suggest that our aim should be to have special agricultural high schools wherein three-fourths of the time may be devoted to agriculture, theoretical and practical, and the college course may then be readjusted.

Adult Education.—(*a*) Visual instructions to the illiterate people can be given through magic lanterns, cinemas, sterioscopes, popular demonstrations of simple scientific experiments on various subjects concerning the welfare of the population. This should form a part of the duty of the primary school teachers and members of various technical departments. Night schools should also be organised.

(*b*) For others over and above the method of visual instructions libraries and reading rooms, reading circles and continuation evening classes should be organised.

Finance.—Primary education up to the age of 14 should be compulsory and free. This may be provided by the *gramya* panchayets or local boards subsidised liberally by the State. Cost of other institutions may be met by raising a rural development loan to be liquidated over a long period by any small tax that may be conveniently put on the export trade. This development fund should be used as a grant to the local organisation or educational societies for educational work. This is the only way of getting the best result with the least expenses.

Careers of the Agricultural Students.—Most of the students seek Government service. We cannot expect any other result when we find that the education given in primary and secondary schools is entirely non-agricultural, besides it is such that it creates aversion to any sort of manual work and particularly agricultural work.

Secondly, the school and college educations are so costly and the standard of living acquired at these institutions is so high that it is impossible for an educated man to earn a living from a majority of the holdings prevailing in the Bombay Presidency.

The only scope for such an educated man for following farming is to procure a big-sized farm and a required capital at the reasonable rate; none of these are possessed by a majority of the college graduates. Even if any graduate possessed a large area and capital the difference between the income earned by farming one's own land and the rental income by renting out the land to the tenant is so small that the landowner would not consider it worthwhile to farm his own land.

A good Khandesh farmer of Pachora taluka employing hired labour and farming on his own land for the last 10 years has had the following results:—

Area cultivated was 85 acres.

Area for grazing was 15 acres.

For 10 years from 1915-16 to 1925-26 excluding one year the total farm expenditure amounted to Rs. 24,318 and the total farm receipts during that period was Rs. 33,593, leaving a net return of Rs. 9,275 over 85 acres which averages at Rs. 11 per acre per year. If this land was rented out the farmer could have earned more than this.

Another farmer of Ankleshwar in Broach district, employing hired labour and farming part of the land of his own and part of the land on lease for a period of eight years has had the following results:—

Average area cultivated was 48 acres out of which the average area leased was 12 acres, the rest being his own land.

For eight years from 1917-18 to 1925-26 excluding one year when the land was flooded by the river, the total farm expenditure amounted to Rs. 17,292 and the total receipt of the farm was Rs. 27,059, thus giving a net return of Rs. 25 per acre per year.

During the flood year the expense was Rs. 2,530 and the receipts amounted to Rs. 1,643 and if we calculated the average net return over nine years we find the net return per acre per year is Rs. 23.

The lease charges of the land actually paid were Rs. 20 per acre. In this second case the land is situated in a cotton tract and though the season was irregular and the yield varied widely from year to year the receipts always covered expenditure except in a flood year. This case shows very favourable situation. Yet the owner of the land would realise a difference of Rs. 3 per acre by farming his own land instead of renting it out. Such small remuneration for management is not attractive and at any rate cannot give a living to a graduate who has to hire or purchase his land and has to raise capital.

This uneconomic condition of farming is really the chief cause of farming being not attractive to college graduates or even to high school men unless they are content with a very low standard of living or working as peasants.

This means that most of the agricultural graduates can only be expected to be leaders in the field of public service or as farmers on a large scale or as farm managers on large estates by further practical training in business farming on some large business farms run by the State or private men.

QUESTION 5.—FINANCE.—(*a*) The cultivators cannot afford to pay higher interest than 4 or 5 per cent on their outlay and therefore steps should be taken to provide capital to the co-operative banks or land mortgage banks loaning money to the cultivators at a rate that will enable them to loan it to the farmer at not more than 5 per cent interest.

The Postal Savings Banks and the Imperial Bank of India receive large amount of money as deposit at a rate of 3 to 3½ per cent and as these departments are Government or semi-Government, they should be made to set apart at least 50 per cent of such deposits for loaning out to the farmers' banks at ½ per cent extra rate. If I mistake not State Banks are doing this in France. However, I would provide greater control over the expenditure of the loans given to the farmers so that no money may be invested in non-productive items.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) (*i*) *Main causes of borrowing.*—Small holdings which give the farmer work only for a part of the year and do not give him enough income to supply his minimum standard of living for a year, besides leaving him nothing for a bad year which is very frequent.

The general and technical education of the farmer is so low that he is inefficient in his work, unorganised, injudicious in his personal and social expenses besides he has not been trained to be industrious nor any steps are taken to provide him with a subsidiary occupation to supplement his income or to provide his needs by working in spare times.

The causes given in (*a*) (*i*) are responsible for non-payment of his debt.

Besides, the interest charges he has to pay for his capital are too high for the profession to bear and thus his debt accumulates.

(*b*) I would suggest that a good, general and technical education that will make him more efficient as a farmer, more industrious to work in his spare time on subsidiary occupation and will make him more judicious in his expenditure, will help him a good deal later on.

But to start with to reduce the existing debt the application of the Usurious Loans Act would be necessary, side by side facilities of long-term chean credit may be provided for redemption of mortgages.

(*c*) I would suggest no other restriction on the credit excepting that of limiting the loan for productive purposes.

QUESTION 12.—CULTIVATION.—(*i*) On the college farm we have worked out a system of growing crops under irrigation called "broad ridge method" in which irrigation is given in channels five feet apart and water is allowed to percolate through the raised broad ridge between two channels.

This system keeps the soil in good physical condition for the development of the underground parts of the plant and we obtained the following results:—

	Green turmeric in lbs. per acre.	
	1925-1926.	1924-1925.
(*a*) Broad ridge method	33,552	24,000
(*b*) Ridge and furrow method	26,380	21.000
(*c*) Bed method	18,824	14,000

The increase of yield in broad ridge method over the Satara ridge and furrow method was 14 to 27 per cent and the increase of yield in broad ridge method over the bed method which is followed in some places in Deccan is 71 to 77 per cent. This shows the possibilities of improvement in irrigated crops in Deccan are very great. The extra expense involved in the method is comparatively small and the net extra return per acre in (*a*) method is Rs. 70 to Rs. 110 over (*b*) method and Rs. 260 over (*c*) method.

QUESTION 14.—IMPLEMENTS.—If it is possible I would suggest that we should induce some of the best foreign manufacturers as International Harvesting Company and others to establish their factories in India so that they would be able to study the requirements of India and modify the implements to suit our conditions.

QUESTION 16.—ANIMAL HUSBANDRY.—(*a*) (*i*) At present the general policy of cattle-breeding is to maintain different kinds of existing breeds on a farm in the locality and select from them according to the requirements of the public. Excepting on one farm at Surat and on Gorakshan farm at Kandvalli there is no material good enough to produce dual purpose animals (for milk and work). The big herd maintained at Chharodi for Kankrej cattle has very poor milk record and unless best animals for dual purposes available in the district are purchased, for sometime there will be very little chance of getting dual purpose breeds.

Selection and elimination can then be made after studying the record for sufficient period.

The question of training the professional breeders in farming and cattle-breeding may be taken up with a view to settle them up on land and utilise their traditional experience for the improvement of breeds. These people would not take to farming and are depending upon grazing areas practically free and unless their children are encouraged to go to schools teaching agriculture I am afraid the race will have to be extinct or live as pest on farmers.

The work of cattle improvement is slow but most important and good deal more of intensive work is demanded. The Presidency should be divided into two divisions and two livestock officers should be on the intensive work in breeding, each having about two or three breeding farms under his charge so that he can do more intensive work on cattle-breeding like the work of breeding on crops.

Buffalo, the most important milch animal, has been left to itself and the system of city milk supply is slowly but surely sending the selected animals to slaughter houses particularly in Bombay and a farm for improving breeds of buffalo should be started without further delay. I understand some believe in neglecting buffalo as milk animal simply because we would like to have a dual purpose cow but if we are to go on at the present rate of improvement of cows it will take 100 years or more before we can get good dual purpose cows. The best way is to improve the buffalo as well as the cow and allow them to compete with one another until we get the cow which is so economical that she drives out the buffalo.

We need buffalo for milk and butter and *ghi* for years yet. Besides suggestion given in the note on the co-operative development of the dairy industry I would suggest that a dairy school should be started in northern part of the Bombay Presidency in the heart of dairy tract where vocational course in animal husbandry and dairying should be given. This may be attached to a cattle farm for improving milch buffalo of the tract.

If cattle of higher milking capacity be bred to make them economic producers there will be no difficulty in inducing the farmer to grow fodder crops instead of cash crops.

(*a*) (*ii*) *Possibilities of developing co-operative dairying.*—Before we consider this let us see the importance of dairy industry in the Bombay Presidency.

Milch buffalo is our chief dairy animal, cow playing a minor part as dairy animal. So the study of the number and distribution of milch buffaloes in some centres of the Bombay Presidency would be useful.

Name of district.	Number of milch buffalo.	Number of cultivated acres per milch buffalo.
Kaira	113,000	7·3
Ahmedabad	100,000	14·0
Surat	54,000	14·0
Thana	32,400	18·0
Bombay Suburban area	5,500	6·0
East Khandesh	75,000	26·5
Satara	88,000	22·5
Belgaum	83,000	20·0
Dharwar	83,000	26·5
Larkana	77,000	10·5
Hyderabad	76,000	8·5
Karachi	56,000	7·3

This shows that in point of number and distribution Kaira and Ahmedabad are most important dairy centres. Other important centres are Surat district, Bombay Suburban area, Karachi, Hyderabad and Larkana.

Some of these centres compare quite favourably with Denmark which has one cow for every six acres. The concentration of trade in Kaira, Ahmedabad, Bombay Suburb and Karachi is well suited for organisation and management of the industry on co-operative lines.

Kaira and Ahmedabad have a good butter trade and cities like Bombay, Ahmedabad, Karachi, Surat, Poona, etc., have important trade in city milk supply.

Value of the dairy produce.—Value may be estimated by knowing the average production per animal and the market value of the product.

Gujarat and Sind cattle may be taken to produce about 2,000 lbs. of milk per head per year. Deccan and Karnatak may be taken to average about 1,000 lbs. of milk per head per year. The total number of milch cattle in Gujarat and Sind centres including Bombay and Thana comes to 5,10,000 and for Deccan and Karnatak to 3,30,000.

Valuing milk at nine pies per pound on an average (this value is realised for *ghi* and butter but milk sold to cities realises double the value) 5,10,000 buffaloes will produce at Rs. 94 per buffalo 4·8 crores worth of milk and 3,30,000 buffaloes will produce at Rs. 47 per buffalo 1½ crores worth of milk, total coming to more than Rs. 7 crores which is not a negligible figure.

If we estimate the value of the milk trade estimated in 1913 by a special committee for six cities of the Bombay Presidency, the value of milk per day comes to Rs. 40,000 at a rate of 10 lbs. per rupee. This amounts to Rs. 1 crore 46 lakhs per year. If other cities are included, the value will be easily two crores a year. Thus the cities are the important centres of milk trade.

Now, as far as butter trade of Northern Gujarat is concerned, I find that as many as 500 cans of cream, equivalent to 12,500 lbs. of butter per day are exported to Bombay, Ahmedabad and other cities. The farmer realises about 10 annas per pound of butter, and valuing at that the total value comes to Rs. 7,800 for butter and Rs. 200 for casein. This will amount to Rs. 27 lakhs per year. So Northern Gujarat is an important centre for butter trade.

Our work lies near cities and in Northern Gujarat.

Let us now see the quality, supply and prices of dairy produce.

Dairy produce consists of 3 main products:—

1. Milk for our local cities and towns.
2. Butter for export to distant places in India and out of India.
3. *Ghi* for local towns and cities and export to different cities of India.

Milk-supply.—(*a*) A supply of milk in our cities comes to 13 to 27 lbs. per head of population as against ½ to 1½ lbs. in other civilised countries.

(*b*) The price of milk in our cities varies from 2 annas a pound to 4 annas a pound for pure milk as against 2 to 3 annas per pound in England and America though the spending capacity of our people is far too low compared with people of those countries.

(*c*) Milk-supply is mostly adulterated in big cities and insanitary.

Most of the milk in cities is produced under costly artificial conditions. The *Gowli* producer is under the clutches of the moneylender and unless he retails he does not get a fair price for his product. His cattle too are unprofitable as a result of no organisation for improving cattle amongst the farmers of up-country who supply these cattle. So there is plenty of scope for organising the *Gowli* to help him with cheap money, better purchasing of his requirements and better sale of his produce. Such work is done in Nagpur with advantage to the producer and the consumer.

Some cities have a large proportion of their milk drawn from the farmers of adjoining villages. These producers too are under the clutches of the milk dealers who advance money to them. The producers are ignorant and do not study the requirements of the market. There is good scope for organising these producers for supplying the milk to the city as is done very successfully near Calcutta. It will not be out of place to give some idea of this successful organisation.

In 1917 only one society was formed in a village near Calcutta supplying 20 seers of milk. In 1925 there were 64 village societies supplying 100 maunds of milk a day.

The first society made only Rs. 3 as profit. The present union of societies makes Rs. 40,000 as annual profit.

The first society borrowed Rs. 330 for its use; later on the societies borrowed Rs. 50,000 and now they have capital of their own of Rs. 75,000. This is very good progress in 8 years and shows the possibilities elsewhere. These societies paid Re. 1 a maund more than the ordinary rate in village and sold pure milk in the city at a cheaper rate than that by *Gowlies*, thus benefiting the producer as well as the consumer.

This has a stimulated milk production, cattle improvement and keeping of better cattle. Milking is supervised by the societies to produce pure milk.

Near Agra milk produced from villagers' cows has been collected at a central dairy in the village and has been delivered in the city market of Agra and Hathras which are 8 and 6 miles distant respectively from the villages producing the milk. This scheme has proved remunerative to the middlemen and has been in operation for more than 3 years and supplies 12 maunds of milk daily to the Agra market. So there is no reason why co-operative organisation should not succeed on similar lines.

If the milk-supply of villages round about cities on the railway line leading to big cities could be organised on co-operative lines, it would offer a great stimulus to increased production as the producers would realise a good deal more than they do at present for their milk; besides the organisation if properly directed could be the means to improve cattle and increase the fertility of the tract. The question of cattle improvement through dairy societies will be dealt with a little later.

I would, however, like to make it clear that the question of organising the producer and selling of milk in the city is by no means so simple as it looks; but if a serious attempt is made we may succeed.

In connection with the organisation of the producer of milk to supply any city; we should not lay too much stress on the sanitary side of milk production but rather try to organise the business first and then educate the producer to follow clean methods of handling milk without making it too costly. Cleanliness will follow the business organisation as soon as the producer learns that it pays to produce clean milk.

Butter.—Another important dairy product is butter particularly in Northern Gujarat.

It has been fully organised in the Western countries like Denmark, Holland and Ireland that the dairy farmer must be a manufacturer if he is to get the best returns. The farmer should not be content with selling his milk to a middleman who in turn supplies his cream to a distant butter manufacturer. Farmer's interest demands that the final product of his milk should be uniform and of a high quality. Unless the butter produced is of uniform and high quality, it would not fetch the best price just as in case of cotton or any other product, perhaps, more so in case of dairy product. There are many dairies handling butter in Western India and there are as many qualities as there are middlemen and butter manufacturers. This state of affairs cannot be economic for production nor fetch the best price for the product and the result is that the producer realises a small price as annas ten per pound of butter.

In the organisation of the trade as at present the farmer has no say and does not know how he suffers for his leaving manufacture of butter to a middleman.

Our butter trade depends on the outside market and if we are to realise the highest price, we must put the best and uniform quality of butter into market as our competitors do. History tells us that towards the end of nineteenth century Denmark producing superior quality of butter through its co-operative societies displaced quickly the Dutch as well as the Irish butter in English market. At present Danish and Australian butter is replacing our butter in Ceylon, Burma and Strait Settlements. It is high time we should do something to improve our product. The producer cannot achieve this single-handed nor by leaving it to others. Once he is well organised he can see to raising the standard of his product and improving the reputation of his produce as has been done in Holland and Ireland.

I have stressed this point a bit more as success of co-operative dairying in butter business centres round the production of first class butter which can secure the market and realise higher price by establishing name for the produce.

Northern Gujarat has a big trade; all the cream goes to Bombay or Ahmedabad where it is made into butter. Thus there is great wastage in transport and conditions are not favourable for the production of best quality.

If the cream be made into butter locally, at a central place like Anand, there can be big saving in cost besides helping to produce first class quality.

To do this a central factory is necessary. In Denmark and Holland such central creameries were started by the farmers by borrowing money from banks on the guarantee of their supplies of milk for a number of years. Fortunately we do not need this. At Anand there is a fully equipped creamery of the Military Department and which is just now being used as teaching centre and may be made available for five years for organising the dairy industry on co-operative lines.

What is required is that the Government of Bombay may have to undertake in the first instance to start manufacturing about 1,000 lbs. of best butter a day and sell it into best market and realise higher price for the best quality. Once this is done there will be no difficulty in organising the co-operative milk societies one by one. Our butter sells at Re. 1 to Re. 1-2-0 per lb. whilst the producer realises annas 10 to 12 per pound. The best butter in the market realises Re. 1/6 to 1/10 per pound. If we produce the best butter, we can realise much higher price. The milk or dairy society may be allowed to share the profit of the creamery in proportion to the supply of milk or rather butter fat. The creamery will be in a better position to pay something more for the milk to these societies. Thus in a few years' time the creamery may be supplied with milk by co-operative societies only and the central creamery may be organised entirely on co-operative basis.

I am afraid an ordinary society separating the milk and selling cream to a middleman does not show enough surplus to induce people to go in for it. The disposal of first class butter at a higher price is a far easier thing to do than the disposal of milk in a city. Edward Keventer of Aligarh gets always 4 to 6 annas more per pound for his butter. Besides there are enough Military Stations that may consume all the butter such a creamery can produce in the first few years.

Later on a possibility of exporting butter to Europe may be investigated with great advantage as we are producing lot of butter at a time when there is shortage in European market.

Ghi.—In the case of *ghi* production too if good *ghi* can be produced and quality guaranteed, perhaps higher price could be obtained; but apart from the better sale of milk or milk products, one very great advantage would be that cattle improvement for milk production would be possible and would give definite results in a shorter time.

Improvement of Milch Cattle.—The root cause of scarcity and dearness of milk is that our milch cattle are not profitable. Unless we improve these and make them more profitable, the whole industry may die out.

The only remedy for this is to organise the producer who keeps one or two buffaloes as a rule to keep a fortnightly or three weekly record of milk production, fat content and feeding.

Individual farmer cannot test the milk, though he can record the quantity; so it is necessary that the farmers of a village should organise and engage a milk tester for the purpose. Once this work is undertaken we will be in a position to find out how many buffaloes are causing actual loss to the owner and which buffaloes are the highest producers. With this knowledge we can breed from the best and improve the yield of milch cattle to a very great extent in a short time. My experience of actual record of a herd of 53 buffaloes at the college dairy is that the average yield is about 2,400 to 2,500 lbs. per year whilst some individual animals have given 4,000 and 5,200 lbs. a year. This variation is bound to be very big with our cattle in the district and it is easy to grade the herd with best bulls to improve the average yield. This shows big possibilities of improvement.

Our cattle as milk producers are far behind those of other countries. One of the Canadian bulletins gives the following information on yield of milk of cows of various countries: —

In Holland a cow produces on an average 7,585 lbs. of milk per year.

In Switzerland a cow produces on an average 6,950 lbs. of milk per year.

In Great Britain a cow produces on an average 5,934 lbs. of milk per year.

In Denmark a cow produces on an average 5,660 lbs. of milk per year.

In Germany a cow produces on an average 4,350 lbs. of milk per year.

In Ontario, Canada, a cow produces on an average 4,000 lbs. of milk per year.

Kaira and Ahmedabad, our best centres, would not average more than 2,000 lbs. of milk per head per year.

Now I will show what improvement has been brought about by means of Milk Record or Control Societies in Denmark:—

Year.	Yield of milk per day per cow.	Yield of milk per year per cow.	Amount of butter fat per year per cow.
	Lbs.	Lbs.	Lbs.
1864	10	...	88
1886	...	...	128
1908	...	...	242
1912 (of good cow)	27¾	8,064	260
1912 (best cow)	53½	15,816	500

This shows Denmark increased the yield of butter fat by 50 per cent in 22 years and 300 per cent in 44 years.

Let us see what Holland has to teach us in this matter.

"Note on Agricultural Co-operation in Netherland" by Adams and Fant makes the following remarks on the question of Milk Control (Record) Societies of Holland:—

"One of the most valuable forms of co-operation in the country (Holland) as in Denmark, is the milk testing associations, which have been the means of very considerably increasing the yield of milk and also of butter fat from cows where the system is properly carried out."

The records of 1906 of 60 cows forming part of one of the Milk Control Societies of Holland show the following variations in a herd:—

10 best cows averaged 1,313½ gallons each per year showing 3·36 per cent fat.

10 worst cows averaged 684½ gallons each per year testing 2·90 per cent fat.

It may be remembered that such a variation between good and bad cattle was there in Holland in 1906, *i.e.*, 20 years after they started to pay attention to their dairy industry. Holland was one of the countries known for good milch cattle.

Perhaps if we start a milk control society in the Bombay Presidency we may find our cattle worse. The sooner we know this the better it is for our farmers and the dairy industry.

The cost of organising such a society would not be more than Rs. 400 per year for a village having 200 cattle, so it will come to Rs. 2 per cattle. This is the cheapest and surest method of improving cattle and ought to be introduced at once in our dairying tract. In Holland this is the only form of society

which gets the biggest help from the State. The scope of improvement is 50 to 300 per cent over the present yield and can give in 20 years as much as Rs. 100 or more increase per milch animal which is far more than what can be achieved in any other kind of farm produce. The industry besides is quite well centralised to facilitate organisation and perhaps the only main industry of Northern Gujarat where unfortunately least amount of agricultural improvement has been possible.

The improvement of dairy cattle will have a far-reaching effect on the production of crops as it is the chief source of manure. Baroda State has a village called Nar near Cambay which is a living example of what dairy industry means for fertility of land and crop yield. The soil of this village gives much higher yield of crops per acre than surrounding area.

If we are organising dairy societies for butter trade or city milk trade, the milk record work can be carried on along with it and can be used for paying for the milk on butter fat test once in four days. This will remove our difficulty of getting pure milk from the dairy society. Paying for milk on fat test is one of the most equitable and scientific way of paying for the milk. Perhaps testing once in four days will cost more but just to help the organisation of dairy societies and milk control societies in the beginning Government may bear this expense in the interest of cattle.

If the trade is organised on these lines, the industry will change the whole outlook of the tract and would ultimately help our cities and our public by supplying cheaper and more dairy products.

I would now put the following resolutions for the consideration of the Conference :—

1. Northern Gujarat being a most important dairy centre an extra Assistant Registrar Expert in Dairying should be appointed to organise the dairy industry of the tract.
2. The cattle improvement and milk record associations should be started immediately in the villages with a view to improve the milch cattle of the tract and Government should bear full expense for five years.
3. That the Government of Bombay may be requested to approach the Government of India for a free loan of Anand Central Creamery for five years to organise the production and sale of best butter on commercial lines in the first instance, with a view to organise the dairy societies in the different villages to supply the milk or cream to the central creamery, the dairy societies sharing the profit of the creamery in proportion to their supply.

(This note was written for Co-operative Conference.)

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*a*) A pair of bullocks can cultivate 20 acres of land in cotton tract. The cultivator with such a holding will have work for a total period of about 225 days for himself and for 95 days for his wife and a child in a year. This is equal to one man's work over 320 days in a year. Bullocks will have work for 140 days.

Farmers of intensive crops on well or canal irrigation will have more work for all.

The average holding of the Presidency proper is little more than 13 acres. But holdings of 5 acres are found to the extent of from 38 to 64 per cent in different divisions and holdings of 5 to 15 acres are found to the extent of from 24 to 30 per cent. Thus 60 to 90 per cent of the holdings are below 15 acres.

This shows clearly that the majority of farmers would have work enough to employ one man of the family for 150 to 200 days in a year depending upon the size of the holding and the type and intensity of farming. In the slack season some farmers would be doing some carting work on hire particularly

near big towns and cities. Some are engaged in collecting fodder from trees, etc., for dairy cattle. Some classes of farmers take up the work of gathering fruits of mango trees and others and marketing them.

(*b*) I would suggest a subsidiary occupation like spinning and weaving for cloth required by the farmer and his family.

1. The spinning and weaving industry requires very little investment, *viz.*, Rs. 30 to Rs. 40 only for a set of tools required.
2. The art of spinning can be easily learnt and can be practised in spare time by any farmer.
3. The yarn can be woven into rough cloth by the farmer and can be used with advantage to supply his simple needs which would thus save large expenditure on clothing.
4. This is the only industry which can be taken up by farmers of any tract.
5. If the farmer has no other more lucrative work and if he is not getting enough income from his holding the work of spinning and weaving would be very suitable and would save for a family of 5 at least Rs. 30 per year.

   It is estimated that about an hour's work per day is enough to clothe himself.
6. No elaborate organisation is necessary for purchase of raw products and sale of finished product in this case.

A good propaganda to explain the advantages of the industry and provision for training the farmer and his family in the work would certainly revive the industry which is yet in existence in many parts of India. It used to be very common even in Gujarat some 40 years ago and is still in existence in Kathiawar where the farmers are in poor conditions.

(*c*) Poultry rearing is followed by certain farmers who have no religious objections. But the industry is in a poor state for want of proper education regarding the better breeds, their care, prevention of diseases and absence of proper organisation for marketing the product in the interest of the producer.

Fruit growing is limited by irrigation facilities and perhaps by want of educational propaganda and marketing organisation.

Rope making is done by the farmers themselves in Gujarat and is left to a certain cast people in the Deccan and is not much of an industry for farmers.

Basket making too will have a limited market and would have scope in certain localities only. Others too are of local interest and cannot be universally employed.

Vegetable drying and canning may give some industry in a certain season.

(*e*) If any suitable cottage industries can be developed they can be introduced in villages and can help a large population but ordinary industry say of cotton mill would not be able to provide employment for any large portion of rural population.

(*f*) I would certainly recommend that the whole question of finding rural industry suitable to rural population and able to employ a good proportion of them, should be thoroughly studied as I consider it essential to find some secondary occupation or industry if we are to improve the lot of the farmer.

(*g*) Increase of irrigation farming, intensive crop farming as vegetable or fruit growing, keeping dairy cattle and goat keeping all these are sure to give more work and supply valuable product for home use or for sale.

I believe the whole Khandesh can be turned into dairying tract like Northern Gujarat by a suitable propaganda and introduction of good cattle and this will benefit the cotton land and can maintain the production of cotton.

(*h*) Organisation of young men's unions in villages to carry out necessary educational propaganda for such work will help a lot. There are long vacations in schools and colleges and if these institutions start organisation for

such social works in villages it will have good results. Such attempts are being made in Northern Gujarat (Charotar) but it is too early to say how they would succeed. Much depends upon the leader.

QUESTION 23.—GENERAL EDUCATION.—(*a*) The present system of education makes young men unfit for agricultural work as explained under the heading of Agricultural Education.

(*b*) (*i*) I have already proposed the introduction of agriculture in the schools. But I would now suggest that the following subjects be included in the curricula for general training:—

Manual training to give practical work.

Physical training and games.

Elementary Rural Economics.

Rural Hygiene.

These coupled with the introduction of agriculture will improve the ability and culture of the agriculturist while retaining their interest in land.

(*ii*) On the whole the percentage of literates has decidedly increased in the Baroda State where compulsory education has been introduced some 20 years ago, and the percentage would have been more if there were the agency of social workers explaining the aims and objects of compulsory education and the facilities given by the State to meet the needs and requirements of poorer classes in matters of adjusting the school hours and vacations to working season and provision of free distribution of slates, etc.

The schools themselves are not working efficiently and satisfactorily because of the low calibre of teachers who fail to make schools inviting and instructive.

Ignorance of the parents regarding the usefulness of the knowledge imparted in schools.

Poverty of the parents that forces them to utilise the services of children for their occupation.

I would suggest that the working of the training colleges should be improved for training teachers who can make schools inviting and interesting.

Organisation of social workers in rural areas should be started to remove ignorance of the parents by proper propaganda.

School hours should be adjusted to the needs of the rural population. School hours may be reduced and schools may be held in the morning and afternoons to enable the farmers' children to devote themselves to farm work to help their parents.

There should be a system of free libraries for a village or groups of villages to enable the farmer to retain and develop the knowledge already gained in the schools.

Continuation evening classes for general culture should be organised.

QUESTION 25.—WELFARE OF RURAL POPULATION.—I would suggest that district non-official organisation for all sorts of social service in villages may be encouraged and the State may give grant in proportion to the sum raised by them to carry out schemes affecting the socio-economics of rural life.

Good leadership and sympathetic treatment from Government would not fail to give enthusiastic and good servants to such organisation.

GENERAL SUGGESTIONS.—It is not enough that competent research officers and the administrators should be content with simply turning out useful work themselves but it should be their duty to train other workers under them in their lines. I am afraid there is the usual complaint particularly regarding many well-known experts in India that when experienced officers leave the services for joining duties elsewhere or retire, they leave no one trained to continue their work efficiently. If this is true, there is something wrong with the experts or the system somewhere.

It is very important for the future development of Indian Agriculture that the State institutions and officers should train future workers, and I would

suggest that the efficiency of the experts should be judged not only by the amount of and quality of work they turn out themselves but to an increased extent by the number of men trained under them. If this point is kept in view I think we can supply the country with as many competent indigenous workers as we need. The original work done by the Indian officers in Bombay Presidency is marvellous considering that they have had nothing but general training.

If we are to bring about quick results and at a reasonable cost over a vast country like India it is absolutely necessary that the indigenous agency should be well trained by experts working in India and by sending them regularly abroad to the best research and other institutions.

The main advantage of employing the indigenous agency is that they are not likely to be lost to the country in the latter part of their service after acquiring great experience at the cost of State. Now as the country is going to be developed on democratic line more opportunities are thrown open to Indians for public service and retired experienced workers in agriculture and allied lines will be indispensable. Wherever such Indian officers are available their services are in demand by the State as well as semi-Government institutions.

Indian officers should also be given increasing opportunities for influencing the administration of various Provincial Departments and the Central Departments. It is unfortunate that differences in pay and prospects have been created in the Indian Agricultural Service on basis of nationality as it puts Indian officers at a disadvantage particularly in matter of going abroad and keeping up-to-date in matters of progress and I would strongly recommend that free passages once in five years should be given to all workers in agriculture to encourage or rather to make them go abroad like their European colleagues.

As far as I know in the Board of Agriculture for India not a single Indian member from the Bombay Presidency has been nominated as a member so long and only few officers have been visitors. It is necessary to take advantage of the more intimate knowledge and experience of the rural conditions possessed by the Indian officers in the discussion of the Central Board.

सत्यमेव जयते

Oral Evidence.

8025. *The Chairman:* Mr. Patel, you are Professor of Agriculture at the Poona Agriculture College?—Yes.

8026. We have your note, and we are very much obliged to you for it, particularly in view of the very strenuous time you have been having in connection with the successful Agricultural Show. Do you wish to say anything in addition to what you have written in your note of evidence, or shall I proceed to ask you questions?—I have only two points to add, which I had left out in my statement. There is first of all the question of saving expenditure on litigation by the farmers. There is a lot of money wasted in litigation. If some means can be found to save that, it will be a great help.

8027. Have you any practical proposals to make?—I would suggest that some local panchayet or some body may be established for deciding suits. Anything like that which will not entail much expense to litigators will be helpful.

8028. Do you know whether legislation would be required?—Legislation would be required.

8029. Without such legislation, do you say the cultivator will not be able to contract out by arbitration?—No. I want a body to settle matters which are local. The next point is cattle-breeding and development of the dairy industry. The military dairy farms may be utilised. I would suggest that the Civil Department is capable enough to undertake the supplies of the military, and if these farms are managed by the Civil Department they can be used both as dairy farms and cattle-breeding centres.

8030. Do you think that these military farms which are stocked by half-breds would make any contribution towards the improvement of the local breeds?—No. The question of crossing is a separate problem. I want to use those farms also for production of milk for the city.

8031. Are you an expert in cattle-breeding?—I have studied cattle-breeding.

8032. You are aware that these military farms are stocked by half-breds? Do you think so long as they are stocked by half-breds they are likely to make any substantial contribution to the improvement of the indigenous breeds?—Through that medium, as it is at present, nothing can be done.

8033. In other words, you want to use the buildings and establishments of the military farms in order to improve local breeds?—Yes.

Those are the two points.

8034. Under Research, you advise that research workers should go abroad. At what stage of a research worker's career should he go abroad?—After he has put in some work on a particular line here.

8035. Do you believe in training Indians for research work in India before sending them abroad?—I believe in their first getting acquainted with their local problems and doing some work before going abroad to get up-to-date information.

8036. You do not contemplate training Indians in Europe for their degree?—No.

8037. Nor for their immediate post-graduate work?—No.

8038. You want them to begin work here and then go abroad?—Yes.

8039. At what age would you have them go abroad? Would it be at the age of 27?—It may be 27 or 30. It all depends on the educational system, which now keeps them up to an age of 25 or 30 or even longer in certain cases.

8040. Do you recruit them at 30?—They are not recruited at 30, but many of them are from 25 to 30 or it may be above 30 when they get into the work. They are recruited directly into the subordinate service, and after they have worked there for a certain time they get on to research work, and afterwards it may be desirable to send them abroad.

8041. Then in your opinion, research work as well as administrative work in the Presidency has developed so much that it would be better if division of work was made possible by leaving the administrative work to the Director and research work to a suitable Joint Director. Does that suggestion spring from your view that administrative work is crowding out research work?—Yes. They are two kinds of work; a man must do either the one or the other. It is not always possible to have an administrator as well as a research worker in one man.

8042. Have you contemplated setting up a Secretary and a small Secretariat?—Nothing of that kind.

8043. You see, your suggestion here is to take research work out of the hands of the Director altogether?—No. The Research Director may be Joint Director.

8044. You have made a suggestion that research may be financed partly by public contributions. Have you any indication that public subscriptions would be forthcoming?—A lot of subscriptions have been raised by the influence of important officers for other purposes. If an attempt is made I think many will come forward to subscribe.

8045. Then, further down, you say that the question of studying the digestibility of local fodder by various breeds of cattle in Western India is an important one. Are you aware of any animal nutrition work being carried on in India?—Yes, they do that at Bangalore.

8046. Do you suggest that this Presidency should have an animal nutrition section?—Yes. The difficulty here is that we have local breeds of cattle. I understand that at Bangalore they have found that much depends on the type of breed. As we have different breeds, we must have a centre for this Presidency.

8047. On page 527, you have given your views on Agricultural Education, and as with most people who have considered this problem, your ambition is to educate without unsettling the cultivator and driving him from his land?—Yes.

8048. I see that you would carry your agricultural flavour into even elementary education?—Yes.

8049. Do you think that there is any danger that might prejudice literacy as such?—I do not think so. I am not suggesting making it technical at that stage. I should use it as a means of general education.

8050. You will probably agree that anything in the technical line which might have the effect of taking up some of the very precious time which the child has before it in its elementary stage might be prejudicial to the requirements of the maximum degree of literacy and might be a waste of time?—Yes, I do.

8051. Have you followed foreign educational systems in relation to this rural problem?—No, I have only a very little knowledge of it.

8052. You have probably gathered from such attention as you have found time to give to the problem that it has a world incidence and it is not an Indian problem especially?—Yes. But I would say that in India, where there is such a large population which is agricultural, it will be a great mistake to divorce agriculture from education altogether. I personally believe that a great mistake was made in India when education was given without any relation to agricultural life, that is, the line that the majority of the people follow in their life.

8053. That is no doubt true up to a point. But do you not think that whatever education you give must have the effect of widening the horizon, quickening ambition, and to a certain extent must have the effect of unsettling agricultural children?—I should think that agriculture provides just as good a basis for general education or cultural education as any other subject. My idea is to give agricultural education to all so that the majority that have to go back to land will make use of it.

8054. I do not know how far you have carried in your own mind the details of your plan to form a board of education to control and administer the educational system. Have you considered the constitution of any particular board of that sort?—I would suggest that about one-third of the members should be from the Agricultural Department.

8055. That body would have to lay down the course?—Yes.

8056. To frame the curriculum, and not to administer the schools?—Not to administer. Under Administration, in answer to one of the questions, I have suggested that some inspectors and the higher staff may be agricultural graduates.

8057. *Dr. Hyder:* Would your board of education be on the same lines as the boards for high school and intermediate education in other Provinces?—It would be something like that, but I would have a board for primary and secondary education. At present I understand that primary education will go to the local boards, but there is some departmental control over the curriculum.

8058. In the other Provinces the high school and intermediate education is under such a board?—Yes.

8059. *The Chairman:* Have you any views about the Loni type of school other than those you have set down in your note?—As I have stated I do not think it is enough, they will not take to farming because the elementary education given to them has changed the whole atmosphere.

8060. Have you had any experience of the boys who have been through the Loni school?—Yes, I know some of them, many of them seek service.

8061. What service?—Government service or service under institutions like the local bodies.

8062. They take to any service rather than return to their parental occupation?—Yes.

8063. Do you know anything about the cost of education at the Loni school?—They spend about Rs. 12,000 a year for the course of two years for 50 boys.

8064. Do you suggest that the Loni type of schools should form any part in the structure of rural education as a whole?—I have suggested that they should be training schools only in the beginning. Later on they will be technical schools.

8065. I observe on page 529 that in your view compulsory education should be made general?—Yes.

8066. Do you think that public opinion is ripe for that movement?—In fact vocal public opinion is ripe. The non-vocal public perhaps know nothing about it. It is a question of giving a lead rather than their demanding a thing and then giving it to them.

8067. I see you propose to finance primary education by an export tax?—No, any tax may be levied. I would suggest a big loan even to finance that, because I find that unless we do that all our activities are hampered. I would put it before anything else for purposes of development.

8068. If the interest and amortisation are to be borne by the export trade, your loan is really only a smoke screen if I may say so; what you are going to do is to put the charge on the export tax?—Of course, it would be a very small tax. Somebody has to pay for it. If we can cut down expenses elsewhere and pay for it in that way, so much the better for the taxpayer.

8069. Can you suggest any reason why those cultivators who happen to be producing raw materials for export should pay for the education of the children of cultivators who are producing for the internal market?—It is true; it is not equalised, but this is a question of exigency. If we can find a better method, we should by all means adopt it.

On that point I will leave you to Dr. Hyder who was on the Taxation Committee. He will ask you questions about it.

8070. On the same page you say that the standard of living acquired at these educational institutions is very high. Do I understand you to mean that without a drop in a man's standard of living he cannot return to cultivation?—That is quite true. These people are accustomed to spend from Rs. 30 to Rs. 50 a month at the college; when they get out there is no means of their earning a living to keep them at that standard from an average farm.

8071. How do they acquire that standard during the period of education? - I think the life of a student at college is quite different from the life that his parents live at home. This difference is not found in any other part of the world to the same extent as in India. It is a big factor.

8072. *Dr. Hyder:* How much do your students at the Poona Agricultural College spend?—They spend not less than Rs. 30 as boarding charges per month. Total expense is Rs. 50 a month.

8073. What is the tuition fee?—Rs. 60 a year.

8074. *The Chairman:* Are you talking of the average scholar?—I am talking of the average student.

8075. Who gives them the allowance?—There are scholarships; otherwise the parents supply the money.

8076. What I want to get from you is, how can parents afford to raise the standard of living while the boy is at the college though they cannot afford to maintain the standard of living when he returns home?- -If the parents have landed property they will mortgage it; if any one lends money they will take loans. They want their boys to have this education simply to get a job afterwards. They cannot afford it, but the student spends at the college as much as the whole family spends at home.

8077. Have you any methods in mind to reduce the standard of living?—I would not put it that way. I should say unless the expenditure is reduced and unless we give agricultural education to the men who are not going up to the college, we will not get the average educated man to take to farming.

8078. You give some interesting figures of the business of a Khandesh farmer of Pachora taluka employing hired labour and farming on his own land for the last ten years. How did you get those figures? -I got them from the farmer, who has kept all the accounts. He is one of the leading farmers there and an Arts graduate. I asked for the figures and the averages are as given by me.

8079. Do you accept his figures?—I have every reason to accept them, though I would like to examine them myself. In the second case I have given I have gone into the figures myself.

8080. You did not go into them in the case of the first case?—No.

8081. What about the quality of the land?—The land is of good quality. Pachora has good land and the rainfall there is steady.

8082. Is it dry farming?—It is dry farming, but the land is of good quality.

8083. Have you seen the land?—I have seen the land, and his farm is good.

8084. Do you happen to know whether this man is in debt?—He is probably not in debt. He owns lands about 100 acres in extent, and his personal expenses are not high.

8085. Where does he live?—He lives near Pachora.

8086. Is he living in his own holding?—Yes. He left the service and took to farming; he is a good worker on co-operative and social lines.

8087. Then, in the case of the farmer of the Broach district you have examined the figures yourself?—Yes.

8088. And do you happen to know the land?- -Yes.

8089. What is its quality?- It is of fairly good quality; it is a cotton land. Some of his lands are on the river-side and subject to floods at times, but it is fairly good average quality.

8090. How do you account for the difference between Rs. 11 per acre net in the case of the Pachora farmer and Rs. 25 net in the case of the Broach district farmer?—The Broach district land is of higher quality and the rainfall is also more assured. Although certain seasons are bad, the soil is better.

8091. Do you really suggest that that difference accounts for the difference between Rs. 11 and Rs. 25?—Yes; the conditions are much better in Broach, and in the Broach land Broach cotton is grown which fetches a higher price in the market.

8092. Can you give the Commission any idea of the crops grown by these two men?—Yes. The Broach man had on an average for ten years 28 acres under cotton, 10 acres under *juar*, 6 acres under wheat, and 4 acres under other crops, total 48 acres. The other farmer had 30 acres under cotton, 11 acres under ground-nut, 23 acres under *juar* and 21 acres under *bajri*. In this case I could not get the figures for ten years. The figures I have given are for one year. I have his figures only for two years.

8093. Do you think that is typical?—Yes; he is getting more ground-nut grown now than before.

8094. When did you get these figures?—I got the Pachora farmer's figures about a month ago. The Broach district farmer's figures I got about four or five months ago.

8095. How do they compare with the average for that class of land?—The Ankleshwar figures will be better than the average, because the farmer is an agricultural graduate and there is no difficulty from the point of view of capital in his case.

8096. Were you surprised at these figures when you got them out?—I was, and the farmer himself was surprised. He had figures for ten years, but he had never worked out the average. There are very great differences in the figures from year to year, and that is due to the seasons.

8097. Have you consulted your colleagues of the Agricultural College at all on these figures?—No. The article on this is not yet prepared. I am going to prepare an article for the College Magazine on the Ankleshwar farmer. I may say one thing in this connection. Part of the land was purchased by him and he has paid 9 per cent. interest on the capital. If that interest is not taken into consideration, it will be Rs. 38 per acre in his case that is assuming he does not pay anything for the land.

8098. *Dr. Hyder:* Are these figures arrived at after taking into account all the incomings and the outgoings?—Yes.

8099. But he has himself been managing, has he not?—Everything that is produced on the land is valued. If he sells 10 maunds of wheat and takes 2 maunds for his personal use, he takes the average he got for the 10 maunds and values the 2 maunds on the basis of that average. It is not a matter of estimates.

8100. Does he employ labour?—Yes. All his labour is employed.

8101. Has he deducted wages for himself?—He has deducted no wages for himself.

8102. *Mr. H. Calvert:* Has he deducted expenses of land revenue?—Land revenue is included wherever it is his own land that he cultivates.

8103. He has included it in his expenditure?—Yes.

8104. *Sir Henry Lawrence:* The figures are arrived at after deducting land revenue?—Yes.

8105. This is the net return after paying all the expenses and all taxes?—Yes, the net farm return per acre.

8106. *The Chairman:* Do you happen to know what the land revenue was?—That is the only point I omitted to get.

8107. I hope you can get those figures for the Commission?—I can send them.

8108. On page 530 in answer to Question 5 (*a*) on Finance you say, "The cultivators cannot afford to pay higher interest than 4 or 5 per cent. on their outlay and therefore steps should be taken to provide capital to the co-operative banks or land mortgage banks loaning money to the cultivators at a rate that will enable them to loan it to the farmer at not more than 5 per cent. interest." Can you suggest a method by which that operation can be financed?—I would suggest through the co-operative banks.

8109. Do you think it is possible for the Provincial Government or the Government of India to find the money for this?—I have suggested two things. The Government of India are getting loans from the rural population, and the Imperial Bank is getting loans from the rural population at about 3 to 3½ per cent.

8110. Yes, I am coming to that in a moment. What will be the position of borrowing money at the present rate?—There will be loss.

8111. Now let us come to the 3 or 3½ per cent. loan from the rural depositors. Do you suggest that punctual payment of interest and punctual repayment of the principal should be insisted upon in every case?—Yes.

8112. Otherwise of course the financing at these low rates of interest becomes impossible, does it not?—Yes, I agree.

8113. Do you know what the cultivators think of any rigid regulation in that respect?—Yes. But I would not give them full liberty for misusing the credit in any way. I would control that very strictly through the co-operative banks or through the agency that lends the money.

8114. But again you are going to insist upon productive expenditure?—I would.

8115. What are you going to do in famine years?—In famine years, there are the famine funds to help them and funds should be made available from that fund.

8116. Discounting the famine funds, is it the case that *sowcars* usually forego interest in famine years?—They do not forego interest, but postpone the collection of it.

8117. Which, from the cultivator's point of view, attracts him almost as much as if the *sowcar* did forego, does it not? From the cultivator's point of view it is almost as satisfactory if he can persuade the *sowcar* to forego his interest even though it is set against principal and charged at compound interest rates as it would be if the *sowcar* did in fact forego? The cultivator does not worry about the remote future, does he?—He does worry about his debts.

8118. Do you suggest if money was lent at, say, 5 per cent., that punctual and complete repayment could be secured in a famine year?—In a famine year we may have to give special facilities.

8119. Because the depositors who have placed their sums at 3 or 3½ per cent. would have to be repaid. Would they not?—Yes. I do not suggest that the Imperial Bank which takes the deposits should lend directly to the cultivators. Part of the money they get from the rural population would be placed at the disposal of the institutions which lend money to the cultivators on secured guarantee.

8120. Of course the charges incidental to administering loans under those conditions would be substantial?—Yes; they would have to be. If we have the co-operative banks, they will perhaps have to add one per cent. to the rate at which they get the money.

8121. Do you know at what call the depositors' money which lies at 3 or 3½ per cent. is lent? Immediate call, I suppose in the savings bank?—Yes, at immediate call.

8122. Are you going to sink money at immediate call on land improvements?—Well, it is indirect and not direct.

8123. I follow your idea, but I think it is financially unsound. The loan will possibly have to be met by the general taxpayer?—Yes.

system.

8124. Under Animal Husbandry, in connection with your answer at page 531, I want to ask you a specific question, which my colleague Sir Thomas Middleton would have asked you if he were present. Do you associate in your mind enclosure of land by fencing with improvement of the breeds of cattle?—So far as Northern Gujarat is concerned, there is fencing all over the fields.

8125. How do the cattle there compare with the cattle in other parts of the Presidency?—They are better cattle, although there is not so much grazing. I do not think extensive grazing is absolutely necessary for better cattle.

8126. Is fencing in Gujarat due to the fact that they have got good cattle, or is it the fact that they have got good cattle because they fence?—I do not know to what extent we can say it is due to fencing, but the farming as a whole is more intensive and more careful.

8127. Can you suggest any means by which breeding can be controlled unless cattle are fenced?—Ordinary village grazing is not suitable. Fencing will be necessary wherever they have good cattle.

8128. On page 530, dealing with the question of indebtedness you say, "But to start with to reduce the existing debt the application of the Usurious Loans Act would be necessary. Side by side with that facilities of long-term cheap credit may be provided for redemption of mortgages." Have you studied the working of the Usurious Loans Act?—No; I have not studied it in detail.

8129. Have you ever known of a case of its being operative in this Presidency?—They have the same sort of Act in the Deccan Agriculturists Relief Act. It has the disadvantage of reducing the credit of the farmer, but I would not mind that.

8130. Are you familiar with the terms of the Usurious Loans Act?—As I understand it nobody can be charged beyond 9 per cent. or 12 per cent., and if he produces his accounts, the moneylender will have to limit his interest to that.

8131. Do you know with whom the initiative lies as regards the putting into force of this Act?—Unless he goes to the Court, it is not effective.

8132. On page 531 with regard to agricultural implements, I see you suggest that foreign manufacturers and others might be persuaded to establish factories in India. Would you not rather see Indian commercial initiative step into this breach?—The difficulty there is that these people have not got the expert knowledge required and it will take years to come before they can acquire any expert knowledge.

8133. Do you suggest any practical means whereby experienced manufacturers might be induced to step in and start factories in the Presidency?—They would like to have a certain market, before they could undertake anything.

8134. Would you suggest giving certain firms a monopoly? Is that your idea?—I do not think that will help them very much; some facilities must be given; I cannot say what they should be.

8135. You have not thought that out?—I discussed the matter with some of the firms in America, when I visited that country. Those people expected such a big market at home that they were not keen on starting factories in India. They wanted to see if there was a market, and if there was they would undertake it any time. Once we have got a market for these implements, the rest will not be so difficult.

8136. May I know what you mean by 'certain facilities'?—Do you mean capital or some other inducement to come and establish themselves here?—You are not thinking of the deposit of money again, are you?—No.

8137. How about this figure on page 533 about the supply of milk in cities? You say it comes to 13 to 27 lbs. per head of population?—It should be 13 to 27 lb. per head of population.

8138. What prospect do you think there is of developing a sound dual purpose animal in this part of India?—We have about two or three breeds which have got certain dual purpose qualities. One is the Kankrej breed in Surat; then we have got the Gir breed which is the Kathiawar breed, and in North India they have got a suitable breed, the Central India has Nimari breed; I do not know how far the last two have milking qualities. If the best animals are purchased for a certain number of years and a selection made, we may get certain material for dual purpose animals.

8139. Is any attention paid to the cow in the way of proper feeding and attention?—Attention is paid in the case of the Gir cattle.

8140. Do you think the she-buffalo is more and more taking the place of the cow as a milk animal?—It has already taken the place of the cow in that respect.

8141. Completely?—Yes, completely.

8142. Would you reverse that if you could?—I would, but we must consider the period within which we could do it.

8143. You do not think it can be done?—It will take time. I think I have put it at 100 years, but I believe at the present rate, if we do not do any intensive work, it will take 200 years. I doubt whether even in 200 years, we could get enough good animals to supply to the farmer for dual purposes.

8144. How about the demand in that respect? Is the consumer distinguishing between buffalo's milk and cow's milk?—Yes; there again, we have to educate public opinion to take cow's milk.

8145. *Sir Henry Lawrence:* At present they will not take it?—No, excepting in cities; and even in the cities people prefer buffalo's milk, because it is rich in cream. It has more than 7 per cent. fat.

8146. *The Chairman:* Do you attach any importance to the difference in the melting points of the two facts?—Yes; from the point of view of *ghi* production or marketing this product.

8147. But, in relation to *ghi*, it is a question of convenience in cooking, I understand. Is it not?—Yes. The point is that people prefer the cooking convenience and the appearance. Cow's *ghi* is yellow, and also it boils up quicker.

8148. Do you think it is the case that the difference in the melting point of the two classes of *ghi* is important to the market?—To certain people; not on a large scale.

8149. I see that on page 534 you stress the unwisdom of attempting to insist upon too high a standard of hygiene in the earlier stages of the development of the dairying industry?—Yes; they cannot go ahead, because they want a lot of money to start co-operative depôts; that is the handicap. Unless people pay more for it, it will not be feasible; the producer will not follow it.

8150. Do you think that the standards which you are thinking of might be relaxed to some extent, without endangering the public health?—I would not go beyond what is done at present.

8151. You would not aim too high in the earlier stages of the development of the dairying industry in India?—No.

8152. Now is your opinion as to the loss which farmers incur who are not manufacturing their butter founded on a close study of the economics of the dairying industry?—Yes.

8153. How many cows does the average farmer, of whom you are writing here, possess?—The average farmer keeps one or two buffaloes and no cows at all. The yield is about 2,500 lbs. per milking buffalo.

8154. Do you suggest that it is good business for the owner of two or three buffaloes to use the milk himself to make the butter?—He cannot make it at all; and the temperatures and other things will not allow him to make it. He is making *ghi* at present or selling the milk to middlemen who separate it and then send cream to the cities.

8155. I did not quite understand these words on the same page, "In the organisation of the trade as at present the farmer has no say"?—I mean he simply sells his milk.

8156. He does not know how much he suffers, by leaving the manufacture of butter to the middlemen?—No.

8157. But, if the middleman did not make the butter do you suggest the farmer could make it himself?—He can only do so if he organises himself in a co-operative way.

8158. He would have to get enough cultivators together and have a small creamery and bulk the milk?—Yes.

8159. Does such an organisation exist anywhere in the Presidency at present?—No; no co-operative concern exists but the creamery exists organised by the Military Department, and there are other separating stations organised by a number of other private merchants.

8160. Are the Military Department buying the cultivator's milk for these creameries?—They were doing so before, but now they have stopped it since the War was over, and the dairy at Anand has been handed over to the Dairy Department of the Government of India.

8161. Where do they get their milk from?—They get it from the farmers; and the cultivators do not sell direct, because they produce small lots. There are middlemen again who collect the milk from the farmers, and then sell it to the creamery.

8162. It is only a question of finance on their own part?—Yes.

8163. Do you suggest that the cultivator ought to be able to carry on his own milk to the creameries?—No, I think not individually, they are too small, It will have to be organised into groups.

8164. I still do not quite see why you hold on to the view that the cultivators are losing money owing to the sale of milk to middlemen for the purpose of making butter?—Because the butter produced is not of first class quality. There are as many qualities of butter as there are merchants in the trade, and so the ultimate loss comes on the farmer.

8165. Which, do you think, as a general rule pays best, the sale of milk by the producer as whole milk, the sale of milk by the producer as skimmed milk and cream, or the sale of the milk as cheese, butter or *ghi*—Whole milk will pay the best.

8166. On page 535 after an interesting survey of the difficulties of the industry, you cut the Gordian knot by again summoning the Government of Bombay, that is the general body of taxpayers?—Yes.

8167. I am sorry to reiterate the point, but it is very important?—That is all right.

8168. You suggest that the general body of taxpayers should come forward and start manufacturing about 1,000 lbs. of the best butter a day, sell it in the best market, and realise high prices for the better quality; once this can be done, there will be no difficulty in organising co-operative milk societies one by one. How do you connect these things together?—Because, unless we produce a better quality of butter and get better prices, we cannot induce the farmers to organise. Ordinarily, we will not be able to give a better price unless we organise for the production of better butter.

8169. You are going to make a market for the better quality?—There is a market already.

8170. You are going to extend it?—There is no quality. The material given is of inferior quality. There is a difference in price, as I have stated. Certain people get high prices for a higher quality.

8171. How are you going to build up the market for quality, by means of putting 1,000 lbs. of the best butter, at the expense of the Government of Bombay, on to the market?—The military stations are buying a lot of butter now at Rs. 1-3-0 to Rs. 1-4-0 per lb. and some of these military stations are selling to their customers at Rs. 1-8-0 per lb. If we can supply that market

with the best quality of butter, then we can organise these people, and instead of this money going to the middlemen, it can go to the cultivator.

8172. Is Re. 1-8-0 per lb. retail a fair price?—Yes.

8173. Do you think that the market is capable of substantial expansion?—Yes; the military stations in different parts of India are taking a lot of this butter.

8174. But you see you have got not merely to capture that market; they will still have their butter to put on the market; you have got to extend the demand until you have enough demand to buy the product of the military farms and of the dairy farms of the Government of Bombay, which is going to make 1,000 lbs. of butter a day, and then all the co-operative societies will come along?—I am misunderstood. This military dairy is buying from the market; they are not making their own butter from their own produce; they are buying from the manufacturers of butter, and there will be no loss in the working of this concern by the Government.

8175. How?—If the Government organise it, it will pay all the cost; it will be on business lines.

8176. I rather gathered that you contemplated by this means extending the retail market?—No extension; only change it from one to the other, producing butter of better quality, and giving it to the co-operative societies rather than to the middlemen.

8177. Do you advocate milk records being kept?—Yes.

8178. And you contemplate the possibility of these records showing an even worse state of affairs than that which you estimate as being the present state of affairs?—Yes.

8179. Is that your present estimate?—Yes.

8180. On page 537 you say, " If we are organising dairy societies for butter trade or city milk trade, the milk record work can be carried on along with it and can be used for paying for the milk on butter fat test once in four days?" In a hot climate, you have to test it once in four days; and pay on that test of quality as well as on weight basis?—Yes. They follow this practice in these dairies.

8181. Are there any societies in the Presidency at the moment paying on butter fat tests?—There is no such society at all.

8182. Do you know of any other producers or manufacturers of butter and other products who are paying for their milk or cream on a butter fat basis? —The Anand concern and one or two private separating stations are paying on the fat percentage.

8183. Which stations?—There is one private station, which has a dairy here and which buys milk from Gujarat, not directly from the cultivators but from the middlemen. The middlemen buy only on a rough lactometer test and sell to the creamery or separating station on test taken on every four days.

8184. And that transaction is carried out on a butter test basis?—Yes.

8185. It is a far cry from paying on a butter test basis or a fat test basis for bulk to paying on a fat test basis to the producer?—Yes. That is why I suggested there would be cost, but that cost will pay for itself in the interest of the improvement of cattle. In this way we shall know also the butter fat content of the animals for milk records which we may take once in three weeks, and the butter fat test may be guaranteed, once in four days, if there is business.

8186. Your ambition is that the owner of two or three milch buffaloes should receive payment on the basis of butter fat content?—Yes. That involves some more expense; but there is no other way to make them sell pure milk, unless we have enforcement of a legal standard, which has not come into existence here. Of course, that will have to be coupled up with any such

8187. Your ambition is to improve the milk yielding capacity of the local cow, and not of the buffalo?—Here I refer to the buffalo, and I would side by side improve the milk yield of the cow.

8188. On page 539, you are talking about general education, physical training, games, etc. Are not games played in these schools at the moment?—Some games are played, but they are not on an organised basis. I would make it a compulsory part of the curriculum.

8189. I do not much like the sound of compulsory football myself?—Yes, that is right; but there is a stage when we have to do something that we do not like.

8190. Have you any views about adult education as a means of decreasing the illiteracy of the rural population?—Ordinary visual cinemas and stereoscopes, or by means of magic lanterns and demonstrations. Then there are night schools, but they have not been very successful yet. But the cinema, the magic lantern and demonstrations may be successful.

8191. What do you think about the cinema as a means of propaganda?—It will be a very useful means.

8192. Enough by itself, do you think?—It will not be enough by itself, but part of the general propaganda. Of course, there is no other way to educate the illiterate public.

8193. You admitted just now that you thought that the sale of whole milk was the most profitable market?—Yes.

8194. How do you reconcile that statement with the one that you make somewhere in your written statement that it is easier to sell butter to the urban population than to sell them milk?—I was referring to co-operative organisation. I was referring to only two types of co-operation, an organisation to sell milk in cities and an organisation to make butter. These markets are existing at two different centres.

8195. Is it a question of the relative perishability of the two articles?—Yes.

8196. *Sir Henry Lawrence:* You are a *Pattidar* of Gujarat?—Yes.

8197. Are your remarks based on your experience of the dairy work in the neighbourhood of Anand?—Yes.

8198. Centred on Anand?—I was in Ahmedabad for three years; I know that district. I was also connected with the Anand work for nearly three years. Then I started a dairy company in Ahmedabad.

8199. Are creameries established around Ahmedabad as well as around Anand?—At Ahmedabad they have got a separating station, and also at Anand and at Nadiad there are creameries.

8200. Are they private concerns?—One was a Government concern, the Anand Military Dairy; the other was an Indian Dairy Co., Ltd., of which Messrs. Duncan Stratton were the managers during the War.

8201. Has it gone into liquidation?—It was sold out. They made a lot of money in the War time. They sold out as soon as the War was over.

8202. Is it still continuing?—Now it has gone into liquidation.

8203. They sold out to some people?—Yes.

8204. Do they carry on now?—They have liquidated and dissolved.

8205. Because it failed to pay?—Yes.

8206. Has any other company started there?—No.

8207. There is now no private company working a dairy; the only institution of the kind is the military dairy?—Yes. It is now a civil dairy under the Dairy Department of the Government of India.

8208. Are there any similar institutions in Baroda territory, adjoining Anand?—No. They have got only separating stations, run by middlemen who sell the cream to Bombay and Ahmedabad.

8209. No assistance has been given in the Baroda territory to similar institutions?—I do not follow.

8210. You have suggested that the Bombay Government should give certain assistance to run the thing. I want to know whether any such progress has been made in the adjoining villages of the Baroda Government?—Nowhere. I only suggest that the trade should be organised, if we want to improve the conditions of the farmers there.

8211. *Sir Ganga Ram :* You are Professor of Agriculture?—Yes.

8212. What subject do you teach?—Agriculture and dairying.

8213. Do you teach them how to analyse the soil?—That comes under the Agricultural Chemist.

8214. I thought you were educated in America?—No.

8215. Do you not know it yourself?—We teach the physical analysis of soils under the agricultural section.

8216. Can you say what are the elements which make a soil more suitable for growing wheat than for growing *rabi juar*?—I can tell from practical experience.

8217. What is your practical experience?—By seeing the soil. If I want to grow a winter crop of wheat, I can see the retentiveness of the soil by appearance, as well as by physical test.

8218. What is the difference between the scientific analysis of the soil suited for *rabi juar*, as compared with wheat?—I would not base my conclusion only on the scientific analysis.

8219. I want scientific analysis. Do you know it?—Analysis alone will not give us enough basis to say whether it will grow this crop or that crop.

8220. Do you know scientific analysis?—Yes.

8221. Of soil suited for wheat as compared with *rabi juar*?—Yes.

8222. Can you give me that scientific analysis?—Clay soil in certain conditions will grow wheat as far as the Bombay Presidency is concerned, if it is sufficiently retentive of moisture. The nature of the soil coupled with the rainfall or irrigation will tell me whether it can grow wheat or *bajri*.

8223. Do you teach them also such engineering as will enable them to stimate what will be the cost of lifting water?—Yes.

8224. How much would it come to per foot of depth?—We work it out for different systems. There is the *mhote*, the oil-engine, and other means. It is different for each.

8225. Could you give us your past experience?—I cannot give you these figures off-hand.

8226. With regard to these figures that you have collected, what do you think was the value of the crops per acre?—I have given the total.

8227. What was the value of the crops per year per acre over the 48 acres?—I can tell you. It is Rs. 33,000.....

8228. That is for 10 years?—Yes. If I divide it by 10 and 48, I can give you the figures.

8229. What is it? That does not suffice to pay the interest on the land? What was the value of the land?—The value of the land that was purchased by him was between Rs. 200 and Rs. 250 per acre.

8230. How much was realised? What percentage?—After he paid 9 per cent. interest, he realised Rs. 23 per acre.

8231. And after paying all the wages?—Yes, and the interest on the purchase value of part of the land.

8232. You cannot say what was the figure as regards the value of the crops?—I can.

8233. You say that the river was near by the land. Did you not advise them to lift the water from the river?—Was this area irrigated or not?—No. It is dry cultivation.

8234. At what level was the river?—It is not very high land, but he has got land which will not stand irrigation. It will get salty. It is heavy cotton land, which will turn salty if you irrigate it.

8235. By irrigation the land becomes salty?—Yes. The salts will come up; it will not stand irrigation.

8236. Not if the spring level is far away?—There is no good drainage underneath.

8237. You advocate the zamindars selling the whole milk?—Yes, if there is a market for it.

8238. All your schemes are for the benefit of the urban population. What is the poor man to get for himself?—If he sells milk, he will get some money; if he sells *ghi*, he will get nothing. If he sells milk, he will get a better price and be able to keep something for his own use. If he sells *ghi*, he will have a loss.

8239. With *ghee* he will have the curds?—That is not enough. He gets much less money for it. It is a question of educating them to the utility of the food value of the different things he produces.

8240. Do you think it is of economic advantage to him to sell milk and produce butter at the rate of Re. 1 per lb.?—Yes. It pays a little better than *ghi* making.

8241. What is the rate for *ghi*?—In the market it is 14 annas a lb. If you purchase butter and boil it, 1 lb. of butter will give ¾ lb. of *ghi*.

8242. *Dr. Hyder:* With regard to your suggestion of an export tax, are you aware whether such taxes are levied in other countries?—No. I have not studied the question from that point of view.

8243. What is your view of the incidence of such taxes?—If it is a big tax it will fall on the farmer. But my point of view is that if you want to make progress somebody must pay for it.

8244. I agree somebody must pay for it, but the question is whether the measure you are advocating is the right kind of measure. What effect would such taxes have on the area cultivated and the profitableness of farming?—If you put one anna or two annas per maund on the grain produced and if an individual farmer is producing 100 maunds, it will affect him to that extent; but it will not come wholly from his pocket.

8245. Somebody else will pay?—The middleman will pay to some extent, but 50 to 60 per cent. may fall on the farmer. Local bodies find difficulty in taxes for education. If you ask him to pay a direct tax he will not do so. It is a question of taking money from him without his knowing it.

8246. That may be so, but I was concerned more with the area cultivated and the profitableness of farming?—If he is farming 15 or 16 acres he will have to pay Rs. 5 to Rs. 10.

8247. Do you think he could bear it?—I would prefer the State to bear it, because the landlord taxpayer and the farmer taxpayer have paid more than enough for the last hundred years. They have paid the major part of the revenue.

8248. Who?—The farmer.

8249. The cultivator?—Yes. I would prefer him not to be taxed, but there is no other way to help him. If no money is raised, nothing can be done to help him. We have till now developed our roads, the educational system, hospitals, etc., without doing much for rural development. Now it is a question of how to get money to help the farmer.

8250. You would like to heap more taxes on the cultivator?—I would not if I could help it.

8251. But you tax only one kind of produce, the produce that is exported, and not produce in general?—I have suggested that because it is simple to collect.

8252. Would you tax all agricultural exports, or only such things as wheat and rice?—No. Only the major exports.

8253. If you tax some of the chief agricultural products, do you not think there will be a tendency to substitute other crops in their stead?—That will operate only to a small extent, because our farmers are slow to move, and even if a crop does not pay them they keep on cultivating it. For instance, they have been losing money on sugarcane for the last four or five years, and yet they stick to it.

8254. Have you any idea of the total amount that would be necessary for the Bombay Presidency?—I have no idea. I have had no time to look into it.

8255. Would you keep this money for the Bombay Presidency only?—That is also a point on which I cannot give an opinion.

8256. How many ports have you got in the Bombay Presidency? Only two, I suppose, Bombay and Karachi?—Yes.

8257. And the exports from those ports do not come entirely from your Presidency. You will be taxing other parts of India if you levy an export duty at those ports?—I would not like to appropriate money belonging to other Provinces.

8258. But how will you arrange for its distribution?—I expect its apportionment can be arranged quite easily. It should not be difficult to ascertain what amount has been transported by rail from other Provinces to Bombay.

8259. Would enlightened Bombay opinion be on your side in this matter? You are probably aware that in this controversy that is going on they are very much against the mulcting of the farmer to the extent of 12½ per cent.?—But the agitation has not stopped it; the action proposed will be taken, perhaps.

8260. You say something about Agra and Hathras, two places which I know myself, being in my constituency. What is the source of your information?—I got it from the report of the Boards of Agriculture at Pusa. The figures are in their last year's report.

8261. Do the villages near Agra and Hathras supply the milk to these two towns?—One agricultural graduate has organised the supply on his own account. It is only a small quantity.

8262. Have you been to Denmark?—No. I was in Ireland. I did not go to Denmark.

8263. *Sir Ganga Ram:* You said you were educated in America?—No, in England, but I spent four months in America.

8264. *Sir Henry Lawrence:* You were educated in India?—In India first and then in Scotland. I spent three years as a student at the Kilmarnock and West of Scotland Agricultural College.

8265. *Dr. Hyder:* What are the chief products of Danish agriculture?—Butter and bacon.

8266. And would you like to follow that example here and put the whole of Khandesh under dairy farms? -We can introduce milch cattle; we may not be able to make butter, but that does not matter, we can make *ghi*.

8267. Would cotton pay more than butter?—If you combine dairying with cotton, the yield will be increased 100 per cent. There is a village called Nar near Cambay, where there are more cattle than men, and they have been doing this there for the last 30 years.

8268. What are they growing?—They are growing cotton as well as fodder crops, and growing them in rotation, cotton and fodder crops like *bajri*. And there they have increased the yield of cotton by manuring. I would point out the importance to the land of the manure derived from the cattle. That aspect of the problem we have neglected so far.

8269. They do not burn their cowdung?—No. They are very careful to keep the manure in good condition.

8270. They have not given up cotton?—No. They are growing cotton.

8271. You say something about these teachers in primary schools in the rural areas. You say that they are men of very low mental capacity. What is the initial salary of these teachers?—Rs. 15 to Rs. 25.

8272. What does a porter or a taxi-driver get in Bombay or Poona?—Rs. 40 to Rs. 50, but a man who is educated has no desire for physical work.

8273. Has it ever struck the public of the Bombay Presidency that if they do not pay their teachers more they will not get good ones?—The teacher is getting a better living than the farmer. Unless you help the farmer you cannot help the teacher. The average farmer gets less than the teacher; he prefers to go as a teacher at Rs. 15 a month. That in itself is a proof.

8274. But a low-paid teacher turns out very bad farmers? He gives the boys a distaste for their ancestral occupation, does he not?—Yes.

8275. *Sir Ganga Ram :* Does the teacher get his food for nothing from the farmers?—I do not mean that. I am only saying that the standard is low. It is all a question of how much we can afford to pay.

8276. *Sir Chunilal Mehta :* Have you any experience of the use of cinemas for agricultural propaganda?—I have not.

8277. You suggest that they are useful, but you are not speaking from experience?—I am not speaking from personal experience.

8278. You consider that the dual purpose animal, *i.e.*, the cow, will take a long time to evolve?—Yes.

8279. Would you deal with indigenous cattle only, or would you have crossing?—I would have the indigenous cattle only for general purposes. The cross has only a limited scope near the cities. But there will be this difficulty. People do not care for the milk of Indian cow, even though its fat content is 5 to 5½ per cent.

8280. What milk do they want in cities?—In cities, I think, very few people demand cow's milk.

8281. Is that the case in the rural areas?—I think it is the same there. Only people like the Rabaris drink cow's milk in preference to any other.

8282. The Indian *vaids* always recommend cow's milk?—It is a physiological question, but I personally believe that cow's milk may be better than buffalo's milk. I do not know whether there is any relation between the food of the Rabaris and their characteristics, but the Rabaris as a race are very intelligent and good-looking. They take a lot of milk and simple food.

8283. And also cow's ghi?—Yes.

8284. *Sir Henry Lawrence:* The milk of camels is better still?—Not from the point of view of developing intelligence; at least, that is the common belief.

8285. *Sir Chunilal Mehta :* Have you any knowledge of what is being done by the department in connection with *gorakshans* and *pinjrapoles*?—There is at least one *gorakshan* in Bombay which I know. The department have given them help and technical assistance to look after their work, and also some cattle for breeding purposes.

8286. Do you consider that that line of advance could be taken for the purpose of improving cattle breeds?—Yes. They have got a lot of money and if we can persuade them to take to that, it would help us tremendously.

8287. You will buy bulls from them and give them out on the premium system?—Yes.

8288. There is no other method of getting premium bulls now, is there?—The only other method is having Government farms, which are costly to maintain. We have to maintain them for at least one breed. The other method, which has not been successful in my opinion, is the system of giving help to private people or societies. But the private people, including the co-operative cattle-breeding societies, who have been getting this help, have not done much.

8289. Would you mind making your answer in regard to fencing in Gujarat more clear? Is fencing in Gujarat for cattle taken up because it leads to better breeding, or is fencing the result of the better animals that they possess?—I do not think they took to fencing for the cattle because they look after cattle individually. A good farmer sends his boy, or goes himself, and tethers his cattle on the border line of his field. I cannot say definitely what

it was due to, unless I go into the history in the past to see whether it was related in any way to that.

8290. Do the cultivators in Gujarat themselves look after their cattle?—Most of the cultivators do it themselves.

8291. How many cattle on the average does a cultivator possess, speaking from your knowledge of the tracts that you come from, say, Anand?—One or two buffaloes ordinarily, and where there is big holding they keep three buffaloes. On a small holding there may be one buffalo, one or two young stock; and one bullock or a pair of bullocks.

8292. Have they no cows?—No cows. The general idea with the people there is that the cows require grazing and freedom to move about. That is because we have not shown them anything better. We have not shown them that cows can be reared and fed in stalls and improved.

8293. You think the trouble is due to the wrong notion that cows require grazing?—Yes. Of course grazing will help, but it is not absolutely necessary.

8294. What are the causes of the failure of dairying and butter-making in Gujarat?—There are so many small merchants who do not care to produce in the best way possible. These people collect the produce in small centres and then they send it to Bombay. They use very bad transport vessels. Then they allow it to remain stale for a number of days to get more yield, and then it comes to Bombay or Ahmedabad, and here it is tinned and sold. No steps are taken to improve the quality. It is not possible to do so, because these merchants are most of them small men, and on account of competition they want to sell at as low a price as possible.

8295. Did I hear you say that the military farms are buying butter from the market?—They are not buying butter, but they are buying cream from some people.

8296. And turning it into butter of very good quality?—Yes.

8297. At page 537 you quote the example of a village near Cambay, and you say, "The improvement of dairy cattle will have a far-reaching effect on the production of crops, as it is the chief source of manure." What do you mean by that?—There are two points there. Dairy cattle are the only cattle that are fed intensively with concentrates, and these concentrates return most of the minerals to the soil. The cattle take only 25 per cent. of the potash and phosphates, and the rest goes back to the land in the form of manure.

8298. So that the better the breed, the more powerful will be the manure?—Yes. One cart-load of manure from well-fed cattle is equal to two or three cart-loads of manure from ordinary cattle.

8299. On page 529 you have quoted the example of the Pachora farmer, and you say that he gets Rs. 11 per acre. And you say, "If this land was rented out the farmer would have earned more than this." What would have been the rent of these 100 acres?—I think it will be Rs. 12 to Rs. 13 per acre for that kind of land. That is because the tenant farmer has no option but to take the farm; he has to find land somehow, and as there is keen competition he has to pay a high rent.

8300. Did this gentleman purchase his own land?—No; he has inherited the land.

8301. Has he calculated any interest on capital?—No, none.

8302. If he were to rent the land, the tenant who takes the land on lease from him will have to calculate the rent as one of his expenses?—Yes. The point is the tenant farmer gets only the wages for his labour.

8303. The average return is, say, Rs. 11 to the owner. He does not calculate anything at all for the capital value of his land. You say, if he rents it out he will get more, that is to say, the rent would be Rs. 12 or Rs. 13. That rent of Rs. 12 or Rs. 13 will have to be paid by the tenant, and therefore unless he (the tenant) makes more than that amount, he cannot afford to keep that land?—He does not make a profit, but he employs himself and he gets the wages that the landlord would pay to his labourer if he cultivated the land himself.

8304. The landlord does not work himself, but only supervises?—Yes.

8305. Does he calculate anything for his supervision?—No. The tenant gets employment for himself. Let us assume that a farm labourer is paid 8 annas per day as wages. If he leases land at the market rate he will simply get his wages for the days he employs himself and his family, and not get it at the market rate, but say 25 per cent. less than the market rate.

8306. When you submit the details to the Commission on both these items, as you are going to do, will you explain all these matters?—I shall.

8307. I think it would be very desirable because we want to get at the real facts in this case?—I would be able to give the figures for the second farmer, the figures for first are not available.

8308. Take the second case. You say that the price of the land was Rs. 200 to Rs. 250 an acre?—He purchased earlier when it was cheap. Now that land will cost about Rs. 300 to Rs. 400 an acre.

8309. It will give a return of about Rs. 25?—Yes. If the land was purchased and no interest was charged on the capital his income would be Rs. 38 per acre. I have taken the interest at 9 per cent. on the purchase value he has paid for part of the land. Part of the land is leased, and he has paid Rs. 20 per acre as the lease value.

8310. Did this gentleman have any agricultural knowledge before?—Yes. He is an agricultural graduate.

8311. Did I not hear you say that he had general education up to B.A.?—No, it is the first farmer who is an Arts graduate. The second is an agricultural graduate. After passing out from the College he purchased some land, and leased some land, and slowly built up his farm.

8312. Would he be an example of the average Ankleshwar farmer?—I have said that his income would be a little better. He has managed the farm in a better way than the ordinary cultivator. I have seen the farm.

8313. Would the ordinary cultivator possess 48 acres of land?—No. His average is, I think, in Broach, 17 acres. The average of the Bombay Presidency, including Sind, is 13 acres.

8314. *Dr. Hyder:* On that estate were any experiments made?—No. It was under ordinary cultivation.

8315. *Sir Ganga Ram:* Interest at 9 per cent. on Rs. 400 will be Rs. 36?—He has not to consider that; he has to consider only what he paid.

8316. *Sir Chunilal Mehta:* At page 531, you have shown the advantage of broad ridging. It seems to me to be a profitable thing to do. Has it been copied by the people?—No. We are just ready for it.

8317. You have not had any propaganda about that yet?—No. This has been applied only to two crops, turmeric and ginger, and it is followed to a certain extent for sugarcane. But it could be applied to other crops.

8318. Then, about implements, you want manufacturers like the International Harvesting Company to come and start factories in this country. Would they have then to pay any duty on the steel they used?—I did not look at it from that point of view. My only point was to attract the expert knowledge for the work. How to do that is left to the statesmen.

8319. Do you know what Kirloskars are doing in this matter at present?—They are doing something, but they have only a poor copy of these western implements. They are making ploughs and all sorts of implements. They have sent two or three men to Germany for training. If I may say so, even some of the English firms are not producing the type of implements which are made in America, so I do not think the Kirloskars will get their training or technical knowledge for years to come.

8320. But they have applied themselves to it?—They have sent two or three men abroad and they have studied engineering.

8321. Do you know that Kirloskars have such an amount of demand for their present implements that they have not cared to study the conditions of the market?—I do not know that. It may be because of the cheapness of their implements; but not on account of the quality.

8322. They are considerably cheaper. Their ploughs cost Rs. 30 as against Rs. 60? Rs. 30 against Rs. 65?—The Krupp Factory Agent gave me to understand the other day that he would be able to put his implements into the market at the same rate. I do not know how far he will be able to do it, but they make separators much cheaper than any other firm.

8323. Are there any competitors of Kirloskars?—One factory has been started, and only after that competition did they reduce their prices.

8324. Is that quite correct?—I think it is.

8325. What was the price of the Kirloskar ploughs the year before last?—The price was higher before there was competition.

8326. Have you got the data, the prices during the past years?—I think I can give them* because on the college farms we used to purchase them.

Sir Ganga Ram : It is true, he told me himself he had reduced the rates since there was competition.

Sir Chunilal Mehta : I was only trying to get from you what you really meant when you recommended that foreign firms should be induced to come here and start factories.

8327. On page 536, you say " Perhaps, if we start a milk control society in the Bombay Presidency we may find our cattle worse." Will you please explain that?—Ordinarily, I have taken it that there will be a yield of 2,000 lbs. per animal per year, but actually if we go into the investigation, perhaps there may be some of our cows which would give less than that; it may come to 1,500 or 1,800 lbs.

8328. What is your point there?—The point is that the cattle are actually causing loss to the farmers, and unless we improve them we will not be able to help these farmers.

8329. What is a milk control society?—It is a milk recording association; a milk control society is the same. Different names are used in different countries.

8330. On page 538, you speak about what you call subsidiary occupations. You have combined spinning and weaving there together. Is that your intention?—Yes.

8331. How would you have it worked? Would you have both hand-spinning and hand-weaving?—Yes.

8332. Would you say that the hand-weavers must only use hand-spun yarn?—There are advantages in that; it gives more employment. If we can find better employment than spinning, by all means do it.

8333. I was trying to separate the spinning from the weaving. Have you examined it from that point of view, or are you here talking of hand-weaving necessarily using hand-spun yarn?—Here I take it up from the point of view of giving maximum employment and spinning, of course, does give more employment, of course, at a lower rate of wages. But if a man does only weaving, he will produce a large quantity, more than he wants, and then the question of marketing and the purchase of yarn will come in, which will complicate the question. The question of supplying yarn at a certain time and disposing of the produce will be more complicated.

8334. Do you know if the cultivators do weaving themselves?—I do not know. In some places they do.

8335. For instance, in Gujarat?—On the Kathiawar side it is a new introduction.

---

* *Vide* Appendix.

8336. I am speaking of Gujarat, in the parts that you are acquainted with?—Some people will not do it. The Charotar people will not do it. They have got perhaps a higher standard of living, and as long as they get enough to live upon, they will not do it.

8337. Have they got the time to spare?—Plenty.

8338. How do they utilise it? Doing nothing?—Perhaps creating mischief in the villages.

8339. You have not really studied this question of hand-weaving as a spare-time occupation for the cultivators?—Not from that point of view, because there will be an organisation required.

8340. This is a suggestion that you make?—Yes.

8341. I see that on the next page you suggest that this is a line of enquiry which might very suitably be taken up?—Yes.

8342. That is all the extent of your experience and that is what your knowledge leads you to say?—Yes.

8343. On page 539, with regard to the welfare of the rural population, you say, "I would suggest that district non-official organisations for all sorts of social service in villages may be encouraged." Will you please amplify that a little?—If there is any local organisation which is employing workers who are qualified and enthusiastic and who are prepared to stand the rural life, and sacrifice their time even at the cost of their earnings elsewhere, or take only small wages, I would help them from the State coffers.

8344. In what way?—If they spend say Rs. 1,000, I would suggest a grant of Rs. 2,000.

8345. To whom would you pay the grant?—To the constituted authority of the society.

8346. How are they to spend the money?—They will lay down a programme, and they will employ organisers who will go round and take up co-operative work and better farming, and they will warn the farmers against litigation, and do what they can in improving their health, etc. We are contemplating an organisation in Charotar. We have got Young Men's Unions in about 100 villages, and we are trying now to work this up and see what work can be done by these people. There has been some collection of funds locally. They have got one day in the year when they get Rs. 400 to Rs. 800. They have got physical training classes and so on.

8347. Has this society been working at all so far?—There is no society as such started. This is just informal work.

8348. Will the young men be prepared to live in the villages?—Yes. Now there are a lot of people who have a desire to work in the villages: but they want guidance, training and perhaps help.

8349. You think such men could be found?—I think so. It is a question of leadership. If I am drawing a big salary, and were to talk to them, they may not listen to me. But another man, who has done some self-sacrifice and who has a very good personality, may get the men.

8350. You consider some organisation of this character necessary for general rural uplift?—I think so, and this method will be the cheapest for the State.

8351. *Sir James MacKenna:* You are Professor of Agriculture in the Poona Agricultural College, Mr. Patel, a post of very considerable responsibility. I wonder if you would be good enough to tell the Commission what your educational training has been. It has a bearing on the training of Indians for these higher posts?—I graduated at the Poona Agricultural College. I then got a University scholarship, and I went to Scotland. I studied at the West of Scotland Agricultural College for two years, and got my Diplomas in Agriculture and Dairying. Then I put in about five months in Ireland, studying the co-operative movement there, and then I put in about three or four months in England studying the question of milk supply. I then spent some months in America studying the question of milk supply. Then I returned to India and took up a job with the military dairies as cheese

expert for 16 months, and made cheese for the troops. Then I started a joint stock concern to supply milk to Ahmedabad city. There I was almost promised the land for which I had applied to the Bombay Government. I did not get the land and so I had to give that up, and took to some business for a year or so in Manchester, in other line than agriculture. Then I accepted this offer which was made to me.

8352. You came back as Professor of Agriculture?—No. Originally I was meant for the post of Deputy Director of a district. Then I came here, and as they had no post to offer me, they offered me dairying work at the College, and then when the vacancy arose, I was appointed Professor of Agriculture.

8353. *Sir Ganga Ram:* What pay do you get now?—Rs. 700.

8354. *Sir James MacKenna:* You are in the Imperial Agricultural Service?—Yes.

8355. Judging by your own experience, would you say it has been a very good training for the post except for the interval at Manchester?—Yes.

8356. What do you think would be the best training for an Indian gentleman who proposes to get to a post like yours?—He must have training in one of the Indian Colleges to begin with. Then, if you want a man for research or demonstration work, it will be better to put him on practical work for a couple of years and get him into touch with local conditions, and then send him to any place where he can take up a special line to his best advantage.

8357. To England, Scotland or Denmark?—Or America.

8358. Anywhere abroad?—Yes.

8359. For two or three years?—For at least two years.

8360. You emphasise the desirability, after having his degree here, of his putting in a couple of years in practical work before going anywhere else?—Yes.

8361. What do you think about the training of Indians for the service generally? You know that the Indianisation of the services is progressing rapidly. What about a Central College training for post-graduates in India?—I personally think that post-graduate training should be in actual practical work.

8362. Two years on a farm?—Yes.

8363. You prefer that, combined with training in a special subject in Europe, to special post-graduate training out here?—Yes.

8364. *Professor Gangulee:* Under the head of Research, you separate the administrative work from the research work, do you not?—To a certain extent, but I do not give separate powers to the two Directors.

8365. Administrative work, you suggest, ought to be in the hands of an entirely different man?—Yes.

8366. What rank of officer? Would you like to have an I. C. S. officer in charge of administration?—It is not necessary to have I. C. S. officers for this. Agricultural officers will be preferable.

8367. On page 539 you complain, if I understand it aright, that you do not get under-studies. Is that what you mean?—It is rather a general complaint of high authorities in India, that when these experts retire or leave the service for better jobs, they have nobody to take up their work and continue it.

8368. You have an Economic Botanist in your department?—Yes.

8369. How many men are trained under him?—There has been a number of men who have put in work in connection with grass and other researches.

8370. Any cotton-breeding experts?—As regards cotton-breeding, they got only general training in the beginning, but now they are being trained. These people are not put directly under the Economic Botanist; they are put outside in the districts where the cotton work is going on for training.

8371. But directly under your Economic Botanist you have no men being trained in Economic Botany?—There are three or four men, who are doing,

one grass work, another a study of weeds, and another some fruit work. These men are trained under him.

8372. So there are under-studies being trained?—Yes.

8373. You make a reference here that not a single Indian member from Bombay Presidency has been nominated to the Board of Agriculture. Did you bring this matter to the notice of the Director of Agriculture?—No. If you take the history of a number of years, there has not been a single member so nominated.

8374. Did you make a complaint of it, or bring the matter to the notice of Government?—No, I have not done so.

8375. What are the subjects that you teach in the Agricultural College?—On the whole, we teach Botany, Chemistry, and under Agriculture we have Geology for soil study and Soil Physics.

8376. Do you teach all these subjects?—No. I myself teach Dairying and Farm Management. Those are the chief subjects. I taught Agricultural Economics for a couple of years.

8377. *The Chairman :* You do not teach that now?—No.

8378. *Professor Gangulee :* Do you carry on any research?—We have got some research on implements and tillage under me. Personally, my work is so much of a routine type, that there is hardly any time left for other work.

8379. Your main subject is dairying?—Dairying and Agriculture.

8380. 'Agriculture' is a vague term; I want to know definitely the subject you teach?—Dairying and Farm Management.

8381. Is it the economic aspect of farm management or the tillage aspect of it?—It is the economic aspect.

8382. With regard to this dairying work, you are not carrying on any research on dairying?—No, except the question of running a dairy on commercial lines, to produce fodder in the cheapest way and to dispose of the milk in the best way possible, and the question of feeding and so on.

8383. You say that the digestibility of the local foods is a problem which has not been taken up. Has it not been taken up at all by the Provincial Government?—No.

8384. Have you taken up any work in that direction yourself?—No. There are no facilities and no staff.

8385. Are you in touch with the animal nutrition work going on in Bangalore?—No, I have not had the opportunity of seeing it.

8386. Do you send any of your feeding stuff there to be analysed?—I think the Livestock Expert has sent some feeding stuff, but it is a question of the particular type of animal.

8387. I quite follow that. Do you teach here Animal Husbandry?—Yes.

8388. So far as this question of nutrition is concerned, your teaching is based on text-books?—Yes.

8389. There is no practical work?—No, except that you deal with dairy management problems. That is practical.

8390. So the boys trained in your college will not get any idea of the digestion co-efficient of the feeding stuff of this Province?—They will not.

8391. Do you recognise the fact that the whole question of economic feeding of cattle depends on finding out the digestion co-efficients of Indian feeding stuffs?—Yes, it does.

8392. In answer to the question on agricultural education, you suggest the formation of a board of education. The matter has been already referred to. What would be the function of this board? Have you anything definite in your mind?—To fix the curricula; that is what I have kept in view here.

8393. No administrative direction?—No. I have not gone into the administration at all, but it will be necessary to have some arrangement to carry out this.

8394. Would you set up this board under the Minister of Agriculture or under the Minister of Education?—It will be the Minister of Education as it stands, the Education Department; but I should say that it should be a combination of both.

8395. You feel the necessity of the co-ordination of these two departments under central direction?—Yes.

8396. With regard to these figures that you have given about the Broach farm, what is the standard of cultivation? You do not say anything about it?—It is a little above the average. It is cultivated fairly well. In Broach district the farmers are farther advanced than in any other district in the Bombay Presidency.

8397. Could you give us any idea of the present value of this particular land?—Rs. 300 to Rs. 400 per acre.

8398. Could you estimate the percentage increase in value?—He paid about Rs. 200 to Rs. 250 per acre.

8399. And now the value will be Rs. 300 per acre?—Yes. The increased value is not due to improvement only; it may be due to the general rise in the market.

8400. Nothing to do with the land itself?—No.

8401. On page 530, you suggest greater control over the expenditure of loans. Could you tell me whether such control will lead to the development of the co-operative spirit?—It will be a handicap. But I do not want to give them a long rope to ruin themselves by giving them credit for non-productive purposes. The greatest complaint I make is that unless they know how to spend their money I do not think we can help them very materially.

8402. But control of the nature that you suggest would sterilise their co-operative spirit, would it not?—I do not think so. They have already control in the co-operative credit societies and banks.

8403. Of some sort, yes. With regard to animal husbandry, what is the basis of your selection in the cattle-breeding carried on at the Poona Agricultural College?—We have not got cattle-breeding as such on the farm.

8404. You have a livestock experiment?—Yes. On the farm, we have got Sindhi cows and Surti buffaloes, and we have got milk records, and from milk records we select the best animals and serve them with the best bulls and I am going to try in-breeding to get those characteristics fixed.

8405. Have you developed a system of recording?—We have.

8406. And of grading the stock?—Grading the stock by keeping the better bulls. We are selecting from our own.

8407. You consider grading and recording are fundamental requisites to the intensive work on breeding that you want to propose here?—Yes.

8408. Then, on the question of the city milk supply, you say that the system of city milk supply is slowly but surely sending the animals to the slaughter house. Could you develop this?—In Bombay, they bring the milch cattle from outside. They purchase them from Delhi as well as from Northern Gujarat, and these animals are kept for about ten months for milking. When they get to the stage when the animal produces about 5 lbs. to 6 lbs. of milk daily it does not pay them to keep it, and they sell it to be sent to the slaughter house.

8409. *Mr. Calvert:* What price does the animal fetch?—It fetches about Rs. 60 to 70.

8410. Are they not covered to this period at all?—No. If they cover them, they have to maintain them for five or six months, and it does not pay to maintain them in Bombay conditions. They have a method by which they do not allow them to dry up. They want the maximum amount of milk from them. They do not cover them. They are sold for slaughter as there

is no better customer for them. Under the conditions in Bombay the keeping of cattle is so costly, that they must keep the best animals, and they get the best animals from the district to meet this fate.

8411. *Professor Gangulee:* This system, you consider, is a drain on the selected animals?—Yes. In foreign countries they select the best animals for breeding; here they select them for killing. It comes to that.

8412. Have you brought this matter to the notice of the authorities?—It is a well-known fact.

8413. Have you gone into the system in detail?—I cannot go into it, because the Livestock Expert has gone into it.

8414. Has the matter been placed before Government?—I cannot say, but he put up proposals for an experiment to put these cattle back. But that was all. It has been very closely studied from the milk-supply point of view by the municipality and by Dr. Mann also. All these people know what is happening.

8415. What remedy would you recommend? Have you any suggestions to offer?—Yes. The milk must come from outside. There must be an organisation for supply of milk by railway. That is the only remedy as far as this is concerned, and then all the benefit of cattle-keeping can be given to the tract, right up from Bombay to North Gujarat.

8416. In what you say on page 538 you were inspired, I suppose, by literature from Japan? You suggest here the organisation of Young Men's Unions in villages. The problem is to find the young men, is it not?—Yes.

8417. Do you know of any students of your Agricultural College who have spent their vacations in educational propaganda of this nature?—I know a graduate who is doing this work.

8418. One graduate?—Yes. But, as I pointed out, unless I give up my salary, I cannot create that spirit. But we are going to create it in a separate institute. Some of these students have come in contact with self-sacrificing people and have been inspired by this enthusiasm, and we have a couple of men ready to undertake this work.

8419. Do you think mere enthusiasm will carry them far?—Yes. They are going to be trained for the job they are going to do.

8420. Where?—For agricultural purposes, we propose training them at the college and very likely sending them abroad.

8421. *Mr. Calvert:* With regard to exports, have you any idea what proportion of the total gross production of Bombay is exported?—I do not know anything about it. I only threw out a suggestion; I have not studied the thing.

8422. You talk about the students of the Poona College not having large farms. We were told that 22,000 holdings in this Presidency are over 100 acres. Do you not get the sons of those owners?—We had about five or ten of them. As I have pointed out, renting pays them better than working themselves. The little difference that is there is not enough to induce the man to go in for private farming.

8423. Renting pays better than management by a graduate?—Yes. I have given the figures. Even with practical men it is the same. It will be the same for graduates.

8424. Does not that point to a defect in the college training? No. The defect is that we have not been able to improve agriculture by 100 per cent. over the farmer's methods. I may call it a defect of the whole science of agriculture. They have not yet been able to produce more than 20 per cent. or 30 per cent. more, and that is very little when you take a small holding, and even for a fairly big holding of 100 acres. We take it that a graduate expects Rs. 100 a month or Rs. 1,200 a year at least, and if he can make only Rs. 5 per acre by doing his own farming, he must have at least 240 acres of land.

8425. In England, that is not a very large farm?—No. We are not living in England. At present, here, we have to deal with farms of 13 acres.

8426. Do you know if you have in Bombay any middlemen who take land on lease from big owners and sub-let it to smaller men?—Not ordinarily. They may do it perhaps on a large scale, but I do not know of it.

8427. This postal savings bank proposal is a fairly old idea. Do you not think that cheap money like that would rather stifle self-help?—If we can keep control, which is possible through the co-operative banking organisations, every item of loan should be gone into in detail, and unless we do that any kind of credit, whether cheap or otherwise, will have the same bad effect. I do not think a little cheapness will have a great effect. But this cheapness will help in this way. My study shows that the farmer only gets labouring wages, and if he has to pay interest at 12 or 15 per cent. or even 9 per cent. then he must lose and he must pile up his debt. If we can give cheaper money, it will help him to develop his agriculture.

8428. Do you not think that the best way to get cheaper money is to save it up?—Certainly; I lay very great stress on the fact that they should cut down their expenses.

8429. On this question of milch cattle not being profitable, I gather that ordinarily the birth-rate of cattle exceeds the death-rate?—Yes.

8430. Therefore, if you are slowly introducing a better milk-yielding animal, when that animal reaches the milking period it must displace the poor one, and the great problem is to eliminate the poor animal?—Yes.

8431. Can you suggest any means which would be acceptable?—I think the only means is that we must improve the productive capacity of the animal, and then it will look after itself. I studied some data with regard to cattle in times of famine, and I found that the greatest care is given to the bullocks first, and the milch buffalo comes second in importance, the cow comes third and last come the young stock; they die most and the bullocks die least. This shows that the farmers realise that bullocks are absolutely necessary to look after; next comes the buffalo if she is in milk, and he looks after her. Unless, therefore, we improve the productive capacity of this animal, I do not think we can persuade them to look after the animals or select the animals.

8432. The point is that if you are breeding the better milk-producing animal that animal will require more food?—Yes.

8433. We are told that the grazing grounds are already over-stocked?—Yes, but over-stocked with useless animals.

8434. The difficulty is that you cannot eliminate the useless animals without giving offence?—Automatically they are eliminated; people do not send them to slaughter houses, but indirectly they do go to slaughter houses. Of course the people have religious objections, and they do not realise that they are wasting a large amount of money to no purpose in famine and other times. Ultimately these animals have to go to the slaughter house. It is a question of the education of the public. Free grazing is in a way helping the cultivator to keep as many cattle as he likes. People should realise that better feeding is necessary.

8435. It is a difficult question. You say the average holding is little more than 13 acres; but holdings of 5 acres comprise from 38 to 64 per cent.?—Yes.

8436. Does not that point to a great waste of bullock power?—These people do not keep bullocks; a man with a small holding will keep one bullock and co-operate with another farmer; that is the ordinary thing except where the bullocks are so cheap or are too small. Ordinarily they do not keep a pair of bullocks for every type of holding.

8437. You say a pair of bullocks will control 20 acres?—Yes.

8438. Will that be so with regard to these petty holdings?—No; that is the average; where people have got 20 acres, they keep a pair of bullocks. Many of the petty holders do not keep any bullocks, but depend on hiring.

8439. What class of people object to poultry rearing?—If you take the whole of Northern Gujarat or even Southern Gujarat, the Hindu population will not keep poultry; all the farmers are Hindus. The Mahommedan farmers will keep them, but others will not. In the Deccan all the Maratha farmers will keep them, so that the Deccan is a good place for poultry-rearing.

8440. The objection really is to eating them?—Yes, and to keep them for sale for killing; they will not keep them because they know they are going to be sold for killing.

8441. They will not even keep them?—No.

8442. *Mr. Kamat:* With regard to the suggestion which you make as to an export duty on grain, do you really mean that there should be a fund of this character for each Province or an All-India fund?—I meant for each Province. Perhaps it might be better to have an All-India fund.

8443. You were asked whether if you levied an export duty on wheat going out of Karachi or Bombay you would not be taxing people other than the Bombay people. Were you thinking of an All-India export duty or an export duty with regard to a particular Province?—I was thinking of a provincial duty.

8444. *Dr. Hyder:* But can you separate the provincial exports from the exports of other Provinces?—The money made from the wheat control during the War was distributed to the different Provinces, and there are ways if it is desired to do so.

8445. *Mr. Kamat:* Probably you have not thought out this question from the All-India point of view at this stage?—No.

8446. With regard to your general conclusions as to the education of agricultural graduates, you say that the uneconomic condition of farming is really the chief cause of farming not being attractive to agricultural graduates?—Yes.

8447. And you have given certain instances; that is to say instances where agricultural graduates have not been able to do any successful farming. Do you know of any positive instances of men who have been successful in certain parts of the Presidency?—No; I have not got the data; you see the difficulty is that many people do not keep the data that we want.

8448. Therefore you are now generalising on insufficient data?—No; I will not say that. It is true that it is an individual case, but it coincides with our experience and practical knowledge. Personally, seeing these things and knowing the people and their capacity, I can fairly say that it is not owing to mismanagement that these people have failed.

8449. Do you mean that given all facilities, land, water and capital, an agricultural graduate cannot make farming any more successful than an ordinary farmer can, except for the small margin of rent?—You see farming is not merely science; farming demands a great deal more practical knowledge. I do not think the Agricultural College professes to train farmers; it trains men who with further practical training may be capable of farming.

8450. Is it your view that these men have the scientific training but have not the practical experience?—I say that if you put the best man on to the job he will never get Rs. 1,200 unless you give him a size of holding proportionate to the economic conditions. There is another aspect of the matter; if a man has so many acres of vegetable farming or sugar he has a chance of making Rs. 1,200 or Rs. 1,000. If he has to buy his land it will never pay him.

8451. Then, apparently, your view is that farming is hopeless even when done by a man who has the scientific knowledge of an agricultural undergraduate; it therefore follows that the ordinary farmer cannot be blamed for

his improvidence or his waste to which his failure is sometimes attributed?—No; there is a vast difference; the farmer has one great asset and that is his labour. That asset counterbalances every asset which the educated man has. The farmer has another asset, that is his standard of living is low, while the educated man's standard of living is high. If we put an educated man into farming I would suggest that he should be educated up to the 5th or 6th standard of the Anglo-Vernacular School, and then if up to the Matriculation you give him good agricultural education, he will be able to work physically as well as be able to make use of his greater knowledge.

8452. Apparently the sum total of all the advantages and disadvantages is this, an agricultural graduate is not able in your opinion to make even Rs. 100 a month?—He cannot make it because of the physical factor; it is not due to his lack of knowledge.

8453. If that is the condition of things, why are you recommending secondary agricultural education? Will that attract pupils?—Yes; there is no difficulty in attracting pupils; 80 per cent. of them go back to the land; they have no other means of living; whether they wish it or not they have to return to the land. The man of the high school standard is content with Rs. 40 a month, but the agricultural graduate who has spent Rs. 4,000 or Rs. 5,000 on his education and who has been living on Rs. 50 a month in the college for five years requires that money in his after-life

8454. Do you mean he should be content with Rs. 40 a month?—I do not mean that at all. If a man has no means of living he will not undertake this study and he will not go to an agricultural college, just as an ordinary man will not go to an arts college when he finds that it does not pay.

8455. I understand you want to convert these middle schools of the Loni type into training schools?—Yes.

8456. Is that because vocational agricultural training, in your opinion, is not sufficiently attractive?—No; I have suggested a new scheme, and these schools can be fitted into that scheme as training schools. In the new schools we are giving the type of education which will give the pupils a taste for agricultural work. We are giving them practical work as well as knowledge about agricultural problems; they will be able to farm successfully, because their standard of life will not be so high as that of these other people.

8457. From your experience of the Deccan, do you think dairying can be made a fairly successful business in the Deccan?—I have no experience of the Deccan dairy districts, and as far as my statistics go there are only one or two places where they have got enough cattle from the dairy point of view. The Deccan farmer does not understand the care of animals at all.

8458. You say in Khandesh it could be made a profitable industry?—Yes.

8459. That applies only to Khandesh?—Khandesh has the particular advantage that the soil is lighter and cotton and fodder crops are grown. In the Deccan it will be very difficult unless they learn how to look after cattle and associate dairy farming with general farming.

8460. So that all your remarks with regard to co-operative dairying so far as Gujarat is concerned do not apply to the Deccan except the district of Khandesh; is that right?—Co-operative dairying does not apply even to Khandesh, because the material does not exist at present.

8461. We were told that cattle-breeding was not a subject upon which one could be optimistic; you are now telling us that we cannot be optimistic with regard to the future of dairying in the Deccan; is that correct?—It has a future, but the point is it cannot succeed unless we produce economic cattle.

8462. I understand that out of this competition between the cow and the buffalo you hope to evolve a type of cow which will really be an economic animal?—Yes; it is possible.

8463. How long, in your opinion, will it take to evolve such a type of cow?—It will take a long time; it is therefore all the more desirable that we should start early.

8464. What do you mean by a long time?—If we go on at this rate it may take 200 years before every farmer replaces the ordinary animal with a better animal.

8465. And until that event you think dairying is not a very hopeful occupation?—It is a cottage industry. As in the case of the poultry, dairying gives more work; it provides milk for the use of the cultivator and his family; it utilises all the fodder that otherwise would have no market; but the manure is the greatest item; the manure will add to the production of every crop.

8466. You think it will be a purely cottage industry?—Yes.

8467. On the last page of your memorandum you complain that so far as the Indian officers of the Agricultural Services are concerned they are not treated well in the matter of free passages for leave abroad for study purposes?—Yes.

8468. Will you just indicate to us what you have at the back of your mind?—I am not putting this forward as a complaint, but if the State wants to get the best service from these officers I feel that it would be preferable to compel them to go, because many of them are not willing to go. If the State facilitates their going it will increase their efficiency. Other classes of officers have the chance of going abroad.

8469. Do you mean that at the present moment if these officers want to go abroad, they are not allowed to go?—That may be because funds are not available.

8470. Do you mean that on the ground of finance they are not given sufficient opportunities to go?—That is true.

8471. And you desire to establish a system by which Indian officers should be made to go every five years?—Yes.

8472. *Dewan Bahadur Malji:* You have only given two instances; one was from Pachora, and another from the Broach district, as to the size of the holdings?—Yes.

8473. Are you satisfied that the results show a sufficient margin of produce?—No.

8474. In those circumstances do you think agriculture is a paying proposition?—Yes. The peasant farmer earns his wages, not at the market rate but 25 per cent. less; that is my personal experience. It is only in that way that you can call it successful.

8475. *Mr. Calvert:* Do you mean 25 per cent. less for the days he works, or 25 per cent. less for the whole year?—No; for the days he works. I am not taking the whole year. The ordinary holding is so small that he must have a secondary industry if he is to earn the minimum for his family.

8476. Otherwise he only earns a day's wage?—Less than that, because according to my estimate a twenty acres farm will employ a man fully for the whole year round, 320 days.

8477. *Dewan Bahadur Malji:* The instance from the Broach district is from Sajod?—Sajod, yes.

8478. In that village did you find that the cultivator had his own bullocks?—He had his own bullocks.

8479. Did you deduct the charges for that?—The cost of keeping the bullocks has been taken into account.

8480. The only thing you have not deducted is his own supervision charges?—I have allowed nothing for that; all other expenditure has been allowed for

8481. Have you made any deductions for the implements of husbandry and their upkeep?—Whatever he normally spends has been taken into account, and we have allowed for interest and depreciation of the implements at 10 per cent.

8482. On page 530 you refer to the rate of interest on loans given to agriculturists and you suggest that *taccavi* loans and loans through societies should be at a lower rate of interest than at present?—Yes.

8483. Do you advocate the investment of a part of the premium levied by the various insurance societies from abroad?—I have not made a study of it, but I would suggest that the State should make use of any sources. There may be a stage later on when it may not be necessary for the State to help, but at this stage a certain amount of help is necessary.

8484. The premia received are very large; are they not?—I cannot say.

8485. Do you know that in America and elsewhere they are as a matter of fact compelled to invest a part of such premia in co-operative and agricultural business?—I do not know.

8486. Would you be in favour of that idea?—If it is possible, it certainly should be done.

8487. How many breeding farms are at present run by Government in this Presidency?—About three farms belong to the Government.

8488. I understand you want many more?—Every breed must have a farm; I think we have got that at present; but my point is that we have not decided whether our ideal is to be the dual purpose animal or merely multiplying the best animal that we have got.

8489. What means would you suggest for demonstrating to the people the results of good breeding?—I think we should aim at dual purpose animals because in certain tracts I find that the cows multiply, and the same amount of fodder is used to keep the increased number of cattle. The result is they are not fed properly. That is because the cows give no milk; even if they were given away free no one would take them.

8490. Are there proper arrangements for grazing?—There is grazing, but they do not depend altogether on grazing. Grazing alone will not suffice. If we are to give the land to grazing it would be uneconomic, because cultivated land gives twice or thrice as much fodder as the same land left to grazing. If an acre of land is left to grazing it will give about 2,000 lbs. of fodder, whereas if you sow it with *juari* you may get 5,000 or 6,000 lbs. of fodder.

8491. You have seen the military farm at Dharwar?—Yes.

8492. Do you not think that people would soon take up dairy industry if they were satisfied of its success?—Yes. It is very difficult to start; if we had an assured market for three or four years, there would be no difficulty.

8493. Do you not think the results of the Anand dairy ought to be published far and wide if the dairy industry is to be introduced in that part of the country?—It is not work done on business lines so far as I can see at present.

8494. With a view to developing this industry, would you suggest that military dairy farms, if not entirely required for Government purpose, should be worked on some such lines?—Yes.

8495. To be held out as a model?—Yes. I think that would be desirable. If it were worked properly and we get the co-operation of the Military Department, I do not think the State would lose a single pie.

8496. As at present carried on, practically the whole of the work is done privately?—There is not much secret about it.

8497. Are people admitted to the farm?—Anybody who wants to see it is allowed to come in.

8498. Do you not think it is necessary that a record should be kept of the future careers of the graduates of the Agricultural College?—Yes; we have some sort of record.

8499. Is a regular register kept?—It is now, but not from the beginning.

8500. Is it studied from time to time?—Yes, it is; but it is very difficult to keep in touch with the students.

8501. Is it not possible by correspondence?—They may not answer our letters.

8502. *Sir Ganga Ram:* You are getting Rs. 700 a month now. Supposing land of the quality of which you have been speaking was offered to you, you had to pay Rs. 5 an acre as rent, and all the capital were lent to you at 6 per cent. interest, for how many acres would you exchange your present position?—I wanted to do that; that was why I started a dairy at Ahmednagar; there were 1,300 acres of land there; I wanted to develop the dairy industry and milk supply of the city, but I could not get the land. I asked for the land as a concession.

8503. As a matter of business, for how many acres would you exchange your present position?—Land in the Surat district?

8504. No; land in the same position and of the same character as that of which you have given details?—That is in Broach.

8505. Yes; wherever it is?—Do you mean if I get Rs. 23 margin per acre?

8506. Do you mean you get Rs. 23 an acre by intensive cultivation?—It can perhaps be increased to Rs. 35.

8507. Have you any objection to teach these matters to your students?—No; I am teaching them these things.

8508. Are you teaching them how they can make Rs. 23 an acre?—I am teaching irrigation farming at the college by which more money than that can be made.

8509. You advocate dairying. Will Hindus do the dairying?—Yes; it is only Hindus who are doing it in the Bombay Presidency.

8510. Do they sell to the butchers?—No; they do not.

8511. Then, what do they do with the cattle?—Buffalo bulls die a natural death, possibly by starvation.

8512. What happens to the cows?—The cows are not kept here by ordinary farmers.

8513. They only keep buffaloes?—Yes.

8514. The calves are disposed of by starving?—No, the buffalo bull calves that are of no use for farming die a natural death by starvation.

8515. *Sir Henry Lawrence:* You said the Hindus in Gujarat would not take up poultry-farming?—Yes.

8516. Does that apply to the Dharalas?—No.

8517. Does it apply to the Bhils and the Kolis?—It does not apply to the Bhils. The Dharalas are lazy as a class in my opinion.

8518. There is an objection to keeping poultry for slaughter?—The Dharalas would have no objection.

8519. What proportion of the population are Dharalas?—I could not say.

8520. Are they 30 per cent.?—I do not know.

8521. Would the Dharalas, Bhils, Kolis, and Mussalmans, all told, comprise 30 per cent. of the population?—Yes; it would be a large proportion of the population.

8522. *The Chairman:* Is there a shortage of agricultural labour in this Presidency?—I would not call it a shortage; the farmers experience a shortage simply because they do not work themselves; as soon as their position becomes a little improved they want hired labourers. That is the difficulty; they want to avoid working themselves.

8523. What is your opinion of the introduction of labour-saving machinery as a general principle?—Labour-saving machinery as such would be in the interest of a certain type of farmer; by that means he would get cheaper labour. But I would not consider it to be to the advantage of the majority of the farmers. On the other hand, if it increases efficiency from the productive point of view, then it will help every type of farmer.

8524. You distinguish between labour-saving as one factor in efficiency and other factors in efficiency?—Yes.

(The witness withdrew.)

APPENDIX.

Statement showing the prices of the Kirloskar Ploughs Nos. 9 and 100 for the last 11 years.

Year.	K. P. No. 100.	K. P. No. 9.
	Rs. A. P.	Rs. A. P.
1915-16	33 6 6	40 11 3
1916-17	43 12 0	46 14 3
1917-18	43 12 0	52 0 0
1918-19	43 12 0	52 0 0
1919-20	70 6 0	74 0 0
1920-21	70 6 0	74 0 0
1921-22	59 0 0	64 0 0
1922-23	30 0 0	33 0 0
1923-24	34 0 0	37 0 0
1924-25	34 0 0	37 0 0
1925-26	30 0 0	33 0 0

Rao Sahib BHIMBHAI M. DESAI, Deputy Director of Agriculture, Gujarat, Surat, Bombay Presidency.

Replies to the Questionnaire.

QUESTION 2.—AGRICULTURAL EDUCATION—(*i*) The number of vernacular agricultural schools is insufficient. There should be at least one such school in each district.

(*iii*) Yes, as far as possible.

(*iv*) Yes.

(*v*) (1) if the education is perfect and interesting;

(2) if the lad after going through the course can earn his livelihood independently or is able to secure some employment.

(*vi*) Yes, to a greater extent.

(*vii*) The present courses do not suit the wants of rural population. On the contrary, they have induced the farmer to leave his farm and go seeking other occupations in towns and cities. In short, the rural education should have agricultural bias in all elementary schools; that agriculture should be one of the compulsory subjects in all middle and high schools; that agriculture and rural economics should be kept as optional subjects in all the arts, engineering and forest colleges, and that post-graduate teaching in agriculture should be introduced in the agricultural colleges of each Province.

(*viii*) They are all important adjuncts for creating interest in agriculture to growing children, if funds allow.

(*ix*) The majority of students have taken to service in agriculture. Only 3 to 5 per cent. have actually taken to farming, and a very negligible percentage to other occupations.

(*x*) (1) Agriculture can be made attractive to middle class youths, by offering them lucrative posts both in the Agricultural and Revenue Departments, and especially so in the latter where at least 25 per cent. of the posts should only be filled with agricultural graduates.

(2) That a guaranteed post should be given to the student who passes first class first every year.

(3) Facilities and encouragement should be given to those who go in for farming in the shape of (1) special training for a couple of years in the technique of commercial farming by keeping them on Central Government Farms as well as on specially selected private farms, by giving them a special stipend for the period for their maintenance while under training; (2) suitable lands if available in our territory on easy terms or securing them such lands from Indian States; and (3) long-term loans on easy interest to start their concerns.

(4) By treating agriculture as an honourable profession in the eyes of the public; and lastly

(5) by starting agricultural colleges in representative tracts of the Presidency, *e.g.*, Sind, Gujarat and Karnatak, in addition to the one at Poona, as many people do not seem to favour the idea of sending their youths to Poona where soils, climate and crops differ very widely from their own and where the expenses are enormously greater than those in the localities mentioned above.

(*xi*) No. Not in my knowledge.

(*xii*) By starting night schools as in Pardi taluka of the Surat district where some 20 are recently started with good attendance. These could be popularised if (*a*) good, sympathetic teachers are selected for this job, (*b*) if of backward classes, by supplying them with slates, books, etc., and also by giving them prizes. These may be only aided schools.

(*xiii*) The question of rural education is a big one, but it must be faced, if agriculture—the *basic industry of India*—is to be improved; by introducing compulsory primary education in all the rural areas in addition to the foregoing.

(*a*) The administration should be left to the Local Boards as at present arranged; but the Director of Agriculture might have his say in arranging the curriculum for the same.

(*b*) As regards finance, Government may assist the Local Boards with substantial contributions, but if that is not possible, they may empower the Local Boards to levy special cess for the purpose.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) The most successful measures in modelling the practices of cultivators have been:

1. The departmental demonstration farms or plots. These should be one in each district or at least one for a similar tract. Now-a-days, in some quarters it is argued to effect economy that these demonstrations should be conducted on cultivators' fields with a view (1) to lessen the cost of maintaining such farms, (2) to convince the cultivator on the spot as he seems to doubt about the correctness or costs of the results obtained on Government farms and (3) to attract the attention of more cultivators on the spot as most of them will not take the trouble of going to visit the farms. This is mostly true in case of introducing new crops or better crops than their own, but is not so in cases where improvement or change in their existing cultivation practices is desired as it is very difficult for the propaganda officer to exactly copy the farm practices on a cultivator's field with untrained men and bullocks taken on hire or on loan from the cultivator and also due to want of knowledge of the environmental conditions of the plots he selects. It actually takes several years before the cultivator is induced to accept the new methods of tillage shown to him year after year on a demonstration farm. Once they are convinced, the method spreads like anything without any further propaganda.
2. Small demonstrations and shows in central places or in places where big fairs are held or where large numbers collect for pilgrimage on certain days in a year.
3. By bringing parties of selected cultivators to demonstration farms.
4. By issuing literature in the form of leaflets, bulletins, etc.
5. By lectures with magic lantern.

The above measures are all in the order of merit. Perhaps a moving cinematograph will be better than many of the foregoing and requires to be tried if finances permit.

(*b*) (1) If the propaganda officer is supplied with trained men and bullocks for conducting field demonstrations and, if they are found to be successful, to collect parties of cultivators of the surrounding villages and show them the results in their own midst.

(2) The present propaganda staff is too inadequate for carrying on any effective propaganda and should be extended to a very large extent, *i.e.*, up to nearly 3 to 4 times the present strength..

(3) A greater co-ordination of the Revenue Department in this respect is a sheer necessity.

(*c*) (1) The cultivators must have full confidence in the expert selected for giving them advice; (2) the expert must be able both by arguments and actual demonstrations to convince the cultivators he has to handle; and lastly, (3) he must guarantee any losses sustained by cultivators in following his advice.

QUESTION 5.—FINANCE.—(*a*) Government as supreme landowner of the soil should finance all such operations tending to improve the soil. It should also arrange for long-term credit to cultivators. The short-term credit may be left to be managed by the co-operative societies or the village *sowcar*.

(*b*) The rate of interest charged on *taccavi* should not be more than that which Government has to pay for borrowing money *plus* the establishment cost; the *taccavi* rules should be made more elastic and lastly it should be made available within a very short period after application and it should be distributed directly by a responsible Revenue Officer not below the rank of an Assistant Collector.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) (*i*) (1) High charges of litigation and several other indirect taxes falling on the cultivators, (2) no good banking facilities, (3) absence of suitable facilities for safe borrowing, (4) poor and precarious harvests, (5) to some extent excess expenditure incurred after social customs, (6) illiteracy and last but the most important is (7) absence of keeping accounts.

(*ii*) The sources of credits are mostly from village *sowcars*, to a very small extent from the co-operative societies and still less from Government in the form of *taccavi* loans.

(*iii*) (1) Precarious harvest; (2) precarious rainfall; in some years the cultivators for the sake of one last rainfall lose almost the whole crop and in addition their labour, seeds, manure, etc.; (3) high rate of interest.

(*b*) By showing better method of farming, by introducing compulsory and adult education and by keeping a sympathetic eye on the cultivator's wants such as grazing facilities, fuel, in doing away with the middlemen's profits in marketing their produce, in providing good roads and transport concessions on railway freights and in customs on their manures and machinery. They are not in favour of rural insolvency. They are more sensitive to pay up their debts than to declare themselves insolvent. The Acts *viz.* the Agriculturists Insolvency Act or the Usurious Loans Act or an Act to facilitate the redemption of mortgages will not help the cultivator to any large extent unless and until Government is prepared to finance them by opening agricultural banks in the rural areas, as the cultivators will lose almost all their credit and they will not be able to finance their needs without help from Government. We have already an example of the Agriculturists' Relief Act which, instead of giving the desired relief, has done some mischief.

(*c*) I do not think it will be a wise policy to control the credit of cultivators by restricting sales or mortgages of their lands. Such practices exist in several Indian States where the cultivators instead of being better off than ours are in a worst condition as compared to our cultivators or to those in whose States the right of sale or mortgage is not restricted. Not only that but some of our departments such as the Registration, Stamps, Revenue and Civil will suffer a good deal in their revenue. On the contrary, if the loss in revenue to be thus sustained is used in the improvements of the cultivators' needs, they would be well benefited. Not only that, but as stated above, no capital will be attracted to this business nor any capitalists with capital and money will ever try to enter the profession.

Answer to the 2nd question under the same item is also in the negative, because it will have the same effect as stated above. Not only that but the cultivators will be obliged to make the conditional sales without any written guarantee or actual sales at low prices.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(*a*) No. They are adjusting themselves though slowly. The speed could be accelerated by good education and by propaganda. They may be seen more where people are poor and not able to purchase the parts as in Ratnagiri or where the land is most valuable under very intensive farming such as in the Amalsad group of the Jalalpore taluka of the Surat district. In the former case it may partly be due to the fact that the cultivator may not all be living on their fields but might be migrating to Bombay and hence may not be feeling the pinch of this harmful

practice. If, however, owing to the present clamour about fragmentation, something should be done, I would suggest that Government might order that Survey Nos. both of Jirayat and Kiari lands may not be sub-divided below certain minima fixed separately for each tract. It is generally seen that a cultivator with a smaller holding attends to his land very carefully and tries to produce more in comparison with that of a man with bigger holding.

(*b*) Consolidation of holding is a very difficult problem to be dealt with. A Bill is being drafted from Mr. Keatinge's time. It is heard it is now ready for being introduced in the Legislative Council and even though it may be passed it is feared it will remain a dead letter as there are several difficulties in the way of its proper working. I do not know the contents of the present Bill, but if they be on the lines of those of Mr. Keatinge's in principle, then I think there will be some of the difficulties in the way of its successful working, as under:—

(1) I doubt very much whether any one has tried to collect any data for economic holdings in different tracts of the Presidency proper on which to base the calculations.

(2) Hindu and Mahommedan law of inheritance will have to be changed much against the sentiment of both the communities.

(3) Even if they be changed the elder brother or brothers will find it most difficult to pay cash to youngsters for their share and the burden of debt will be so heavy on the elders so that they will not be free from the debt for several years and hence very little improvements can be expected from the elders when they are heavily involved in debt.

If it be decided to share the produce the elders will not work with honesty and zeal (in whose charge the holding may be) while the youngsters will have very little faith in the honesty of the elders.

(4) This enactment will throw out nearly 50 to 60 per cent. of the present cultivators into regular labourers without giving them any training for any sort of skilled labour.

(5) To finance the scheme will be a very difficult business for the elder brother to pay the value of the share to the younger brother or to pay the excess amount for exchanging good land with poor land or to pay the price of land of an uneconomic holder.

(6) The present arrangements of holding in a village are *kiari* and grazing lands or garden lands situated just in the vicinity of the village and they are the most valuable and very cared for lands.

Now according to consolidation scheme the *kiari* lands and other lands mentioned above only form a small portion of the whole village area and will only accommodate very few cultivators. The rest will be without such areas. Not only that but those getting their holdings at the extreme ends of the village areas will be at the greatest disadvantage of going to and returning from their holding or they will have to stay on their plots which is impossible looking to their social ties and also in the absence of arms through danger of being robbed.

The money difficulty can be overcome if Government tries to finance them by opening rural agricultural banks but the other difficulties will remain and hence I doubt very much if the scheme will work successfully.

(*c*) No. No legislation is necessary in the matter. But I shall be too glad if disputes could be kept out of court by any other means, *e.g.*, instituting village panchayets on better lines.

QUESTION 8.—IRRIGATION.—(*a*) In Kaira and Ahmedabad districts the existing canals be so improved by providing more storage tanks that the water will be sufficient for rice and after crops. The new proposed canal be strongly recommended if a large storage area is reserved at its origin so that the water never fails for the *kharif* and *rabi* crops. If that is not possible, then extension of wells and tanks and the improvements of the present tanks be recommended to the utmost limit. In the case of wells all throughout Gujarat, a definite policy should be laid out and advances should

be made from the Famine Reserve Fund, because a greater part of the amount is being spent in Sind and Deccan after irrigation schemes.

The tanks will help irrigation and also help in increasing the underground supply of drinking water, so that the old ones be improved and new ones dug in several places. They will be very well done in the Panch Mahals.

In addition to the above, streams and nallas should be bunded as they will tend to increase the level of water in the wells for drinking and irrigation purposes.

(*i*) Perennial canals should as far as possible be aided by open drains; otherwise there is risk of salt coming up to the surface.

In order to see that the cropping and water on such perennial canals is conducted scientifically, an Agricultural Officer of the grade of Provincial Service should be attached to the Irrigation Department and that Department should be under the same Minister as for Agriculture.

(*b*) No. For distributing canal water adequately and regularly to cultivators, a committee consisting of an officer from each of the Revenue, Agriculture and Engineering Departments and an equal number of non-officials be appointed. It would be much better if canal water could be given by actual measurement and charged accordingly, instead of charging fixed rates for particular crops per acre, as this suggested method would compel cultivators to use water very sparingly and thus save a lot of waste caused by overflooding and percolation.

QUESTION 10.—FERTILISERS.—(*a*) Artificial manures do not pay when applied to dry crops due to their high costs. But *sann*-green manuring will do immense good if prepared and applied after the Chinese method as is done by Mr. Howard on his Indore Farm.

(*f*) (1) By propaganda. (2) By giving them facilities for obtaining cheaper fuel either from the forests near by or by giving concession rates on railway freights for taking fuel to localities feeling its want.

QUESTION 11.—CROPS.—(*a*) (*i*) The improvement of the existing crops could be effected by (1) selection of seed to a large extent; (2) by cross breeding; (3) by good cultivation and manuring, and lastly, (4) by judicious rotations.

(*ii*) The introduction of new early varieties of ground-nuts have done immense good to the cultivators in Khandesh where it has gone to more than two lakhs acres during the last 15 years or so, and to nearly 70 thousand acres in Gujarat during the last ten years or so, mainly through the departmental efforts. In fodder crops, Guinea grass, lucerne and *berseem* are the new introductions.

(*iii*) The distribution of seed is also a difficult problem. For the last 6 or 7 years I distributed between 17 to 20 lakhs pounds of improved cotton seed of 1027 A. L. F. type in the tract south of the Narbada, and several other seeds in other parts of my division, *e.g.*, improved strains of *juar*, ground-nut, improved strains of tobacco and several others. In the absence of any executive orders from the Government like those in the Rajpipla and Chota Udaipur States to sow a particular seed, it goes very hard with the staff to wholly replace an inferior variety by a superior one. Not only that, but it requires more staff and more time to carry on the work properly. In the case of proved seed, if the majority use that particular seed, the minority should be made to use it under executive orders. This will simplify the work of the department to a very great extent.

(*iv*) The prevention of damage by wild animals. I was one of the members of the committee appointed to consider and adopt measures for the protection of crops from wild animals and stray cattle. I have nothing more to add to the recommendations made in paragraph 49 (pages 34, 35 and 36) of the printed report of the committee in 1923.

(*c*) These are:—(1) The introduction of 1027 A. L. F. cotton in place of the Ghoghari mixture in the tract south of the Narbada; (2) the introduction of tabacco strain No. 0 in Kaira district in place of the ordinary local mixture.

(3) Successful introduction of early ground-nut varieties on a large scale, nearly 70,000 acres in the Panch Mahals and Ahmedabad districts where there were practically no areas under ground-nut.

QUESTION 12.—CULTIVATION.—(*i*) In South Narbada tract, sowing wider apart, sowing or dibbling seed in squares and introduction of ridge cultivation. When the Surat Farm was started in the year 1896 cultivators of the above tract were sowing both cotton and *juar* 18" apart between the rows. Now in several places people sow 5" to 7" apart and in some cases between 24" to 36" apart. Bulletin No. 123 of 1925 of the Bombay Agriculture Department may kindly be referred to about Ridge Cultivation.

In Jalalpore, Bardoli and part of Chorashi talukas of the Surat district, people have been induced to sow *sann* as green manure crop between the rows of cotton and *juar* to be unrooted and laid by the side of the rows of crop when it attains a height of 15 to 20 inches, and the idea is spreading.

(*ii*) The customary rotation of *juar* followed by cotton is changed to *juar*, *til* and *tur* and cotton; or *juar* or *bajra*, ground-nut and cotton or only ground-nut and cotton in alternate years.

QUESTION 14.—IMPLEMENTS.—The improved iron ploughs did not make any headway in North Gujarat, due to their shares being worn out in a short time at most a day and it became very costly to replace it daily and in South Gujarat, the draft became so heavy on the black soils that they could not be worked economically though there was a very keen desire of the cultivators to get their lands ploughed with such ploughs as could be evinced by the number of tractors namely about 125 now working in Gujarat alone. The only difficulty they find is in procuring some spare parts of some of the makes.

QUESTION 15.—VETERINARY.—(*a*) It should be under the Director of Agriculture and Engineering, under the same Minister as Agriculture, Veterinary, Forest and Co-operative.

QUESTION 16.—ANIMAL HUSBANDRY.—(*a*) I was a member of the committee appointed to consider the question of the maintenance and improvement of the existing breeds of the Bombay Presidency in 1923. The summary of the recommendations is given on page 14 (Part VII) of the committee's printed report of 1923.

QUESTION 18.—AGRICULTURAL LABOUR.—(*a*) (*i*) 1. By paying higher wages and giving them other facilities.

2. By allowing them to work on contract system instead of on daily wages, they could still earn more.

(*ii*) To induce labourers of fairly good means to take up lands for cultivation on easy terms of occupancy price of much better still to make them subtenants on share system or on fixed rent system.

(*b*) There is seasonal shortage of agricultural labour in Gujarat. The deficiency can be made good by indenting labour from Marwar and Kathiawar. The causes are good lucrative appointments in towns and cities as skilled labourers in mills, as ordinary labourers in railways, steamers, salt works and other private engagements and migration to big towns for domestic work. In most of these, cultivators are the greatest sufferers as the labourers take from them several hundred rupees up to Rs. 700 or so for marriage and other functions and within a very short time run away to any of the above places from which the cultivators are unable to dislodge them and bring them back to their respective homes. In this connection it will be very desirable to introduce card system in the interest of the cultivators.

(*c*) (1) By taking such labourers and supplying them with bullocks, seeds, implements, etc., to start with on easy terms and recovering the amount by small instalments; or (2) by giving them lands on share system; (3) or by employing them on labour by capitalists.

QUESTION 22.—CO-OPERATION.—(*b*) Almost all non-credit societies mentioned in items (ii) to (ix) may advantageously be placed under the control of the Director of Agriculture. If this is not feasible due to some technical objections an experienced agricultural officer of the rank of a Assistant Registrar

be appointed under the Registrar of Co-operative Societies to organise and supervise such societies.

(*c*) There will be no objection for introducing such a legislation in cases of co-operative irrigation and fencing schemes, but it would not be desirable in the case of consolidation of holdings.

QUESTION 23.—GENERAL EDUCATION.—(*a*) I do not want to make any fresh ones other than those made under "Question 2.—Agricultural Education."

(*b*) (*i*) To make the rural life more attractive and happy by improving the hygienic surroundings of the village, by creating suitable games and giving other facilities available in towns and taluka *kasbas*.

(*ii*) If you want to improve agriculture, compulsory education should be resorted to in all the rural areas and every cultivator taught to read and write irrespective of some short-comings.

(*iii*) It is the age at which many boys are detained by their parents to help them in their agricultural operations.

QUESTION 24.—ATTRACTING CAPITAL.—(*a*) I have already alluded to some of the causes which tend to discourage capitalists from taking to agriculture under Question 6.—Agricultural Indebtedness—and Question 7.—Fragmentation of Holdings. There are other causes also which do not induce capitalists to take to agriculture; *e.g.*,

(1) Uncertainty of rains and harvest.

(2) Dearth of agricultural labour.

(3) Want of thorough practical knowledge required to make the business a paying concern.

(4) The occupation is not looked upon as an honourable one.

(5) No definite policy is laid down by Government as regards the land tenure, and other prohibitive legislation which Government intend to take in the near future or at a distant date; so that they are always hesitative to invest large capital in land.

(*b*) (1) Uncertainty of securing definite returns due to precarious nature of crops and rainfall.

(2) No certainty about the increase in assessment at every 30 years' reassessment.

(3) Poverty of the owners of lands; and lastly

(4) Illiteracy.

सत्यमेव जयते

Oral Evidence.

8525. *The Chairman:* Rao Sahib Desai, you are Deputy Director of Agriculture at Surat?—Yes.

8526. You have put in a very interesting note and my colleagues and I are greatly obliged to you. Have you any general statement to make at this stage or shall I proceed at once to ask you questions?—I have no statement to make.

8527. You say on page 572 of your note, that the number of vernacular agricultural schools is insufficient?—Yes.

8528. You say "There should be at least one such school in each district." What type of school exactly do you propose?—Just like the one that you saw at Loni. I have got two in my district, one at Godhra in the Panch Mahals and one at Surat.

8529. Are they conducted in exactly the same fashion as is the school at Loni?—Yes.

8530. How many districts are there altogether?—Five districts.

8531. You have got two schools, and you think one in each district is enough?—For my tract it would do if we had three, because I consider Surat and Broach as one.

8532. Are you attracted by that type of school because you think it makes a contribution towards the education of the farmer?—Yes.

8533. Have you followed the after-careers of boys who have been through these schools in your own district?—Yes, most of them have taken to agriculture.

8534. They have gone back to their own farms?—Yes; very few, about 5 to 5 per cent., have gone into the public service.

8535. Could you give us those figures definitely?—I will send them* later on.

8536. Perhaps you would consult with the authorities at the schools?—Yes.

8537. Do you know whether an accurate record of after-careers is kept in the case of those schools?—Not very particularly, but we try to find out how many are farming.

8538. You apparently agree with me that such accurate record of after-careers is very important?—Yes, it is necessary.

8539. On the page 572 in answer to sub-section (x) you say, "Agriculture can be made attractive to middle class youths, by offering them lucrative posts both in the Agricultural and Revenue Departments, and especially so in the latter where at least 25 per cent. of the posts should only be filled with agricultural graduates." You are here, of course, thinking of the educated non-agricultural classes, are you not? You are not thinking here of middle class youths of the agricultural and cultivating class?—In this connection I have taken into consideration all those graduates who come out from the Agricultural College.

8540. You are not thinking here of the boys of the Loni school type?—No, not of the middle or primary schools.

8541. I suppose most professions can be made attractive if the salaries are sufficiently lucrative?—Quite so, but then if agriculture, which is the main industry of India, is to be made lucrative, there must be some inducement held out.

8542. On page 573 you say, "As regards finance, Government may assist the Local Boards with substantial contributions, but if that is not possible,

* *Vide* Appendix.

they may empower the Local Boards to levy special cess for the purpose." What do you mean there by a special cess?—Something like a local fund cess such as Government is now levying, Re. 1. Finance is not my subject. I simply suggest how to raise money, that is all.

8543. Forgive me; you do not suggest how to raise money, you suggest money should be raised?—That is, by some means that will not be objectionable.

8544. I am trying to discover whether you harbour any ambition to levy an *octroi* tax, a local tax on produce?—Not on any special thing; it is only a special tax either on the assessment which might be increased by one or two annas, or any other cess that the authorities may think best.

8545. On page 574 you say, "Government as supreme landowner of the soil should finance all such operations tending to improve the soil. It should also arrange for long-term credit to cultivators. The short-term credit may be left to be managed by the co-operative societies or the village *sowcar*." How comes it, if investment in these securities is sufficiently attractive, that the public does not finance agriculture?—That comes later on.

8546. I know, but I want to ask you here in connection with this?—Because sometimes restrictions are put on the *sowcars* by Government.

8547. You say, "Government as supreme landowner of the soil should finance all such operations tending to improve the soil." I want you to tell the Commission how it comes about that private persons do not invest their savings or credit in the improvement of the soil?—Because they do not see the security in it.

8548. Do you think the security is there for Government?—The Government as supreme landowner has every right and power over it.

8549. I so often meet the idea that the Supreme Government is something different from the taxpayer. Now I want to know what fund do you suggest the Supreme Government should tap in order to create this credit?—That is the business of the Government; my suggestion is only that even if Government has to borrow money on loan, just as it does for other things, it should be done.

8550. There is no magic about a loan, you know; it is only pledging the taxpayer's money?—Yes.

8551. I should like to see the words "the taxpayer" inserted wherever the word Government comes in this memorandum of yours?—There would be a little difference there.

8552. I only want wherever possible to make it plain that there is no magic about Government; the only funds available to Government are the funds of the taxpayers of this country. You know that, do you not?—I know that.

8553. On a point of detail, you said that private persons were disinclined to finance agriculture because of certain restrictions. What did you mean by that?—The Agriculturists' Relief Act has put certain restrictions on the *sowcars*.

8554. What restrictions?—As regards the mortgages or the rate of interest.

8555. Do you not think the general effect of the actions of Government over the last 50 years has been to increase the security to the lender out of all proportion to that which used to be enjoyed by *sowcars* in the old days?—I do not know the conditions in the old days; I know current conditions.

8556. Do you not think the power to recover in the courts has immensely increased the security of the *sowcar*?—Not in the case of agriculture.

8557. *Mr. Calvert:* Does that Act impose restrictions on the moneylenders as regards mortgages?—Yes, because they are considered as mortgages which have to be redeemed under the Agriculturists' Relief Act; instalments are given instead of possession of the land.

8558. Is the restriction on the cultivator or on the moneylender?—On the moneylender.

8559. *The Chairman:* Would it not be more correct to say that the restriction is on the cultivator, but its effect is felt by the moneylender; would not that be the position?—Take it anyway, but that is the general impression.

8560. You say, "The rate of interest charged on *taccavi* should not be more than that which Government has to pay for borrowing money *plus* the establishment cost." Do you suggest that Government is making money on *taccavi* loans at the moment?—No, I do not suggest that; I only suggest the rate of interest should be as cheap as possible to the cultivator.

8561. Do you think it ought to be cheaper than it is now?—Yes.

8562. Then do you think the Government is making money of *taccavi* loans?—I do not know that myself.

8563. You say that *taccavi* should be distributed directly by a responsible Revenue Officer not below the rank of an Assistant Collector?—Yes.

8564. Do you suggest that if officers below the rank of Assistant Collector distribute *taccavi* that the whole of the loan does not reach the cultivator?—I do not want to make any imputations against anybody.

8565. But your imputations are in your words here?—Quite true, but then that is the safest way of expressing my views that there may not be any undue delay and undue harassment to the cultivators asking for the loan. I do not want to charge my colleagues with anything.

You want more security for your words than you are prepared to offer Government for its *taccavi* loan, I think!

8566. On page 575 you say, "It is generally seen that a cultivator with a smaller holding attends to his land very carefully and tries to produce more in comparison with that of a man with bigger holding." Do you wish the Commission to understand that you think the standard of cultivation in small holdings is higher than the standard of cultivation in large holdings?—Yes.

8567. Is that your experience after many years of service?—That is my observation during 30 years of service.

8568. *Sir Chunilal Mehta:* What do you mean by the expressions "smaller holding" and "bigger holding"?—The smaller holding is between 5 and 15 acres; between 35 and 50 acres we should call bigger holdings.

8569. *The Chairman:* I do not want to press the point too far, but holdings of, let us say, 5 to 6 acres, except in very peculiar and special circumstances, are not economic in the sense that they are capable of supporting a man and his family?—In dry areas they are not, except in very highly cultivated areas.

8570. On holdings of 5 to 6 acres is it possible for the cultivator to comply with the soundest rules of husbandry in the matter of crop rotation?—He does everything better than the bigger holders. The only difficulty is that he does not find employment for the whole year; he has to shift somewhere else to seek employment in his spare time, and he generally does that. It is only the small cultivators who try to raise the crops in the rainy season, either themselves or with their families; and then they try to get further occupation.

8571. I suggest to you it is infinitely easier for a cultivator handling 20 acres to farm with sound practice in the matter of crop rotation, tillage and so forth, than it is for a man who is farming, let us say, 5 acres. What do you say to that?—I think the 5 acre man does it more efficiently than the 20 acre man.

8572. *Mr. Calvert:* May I ask what you mean by "more." You say "produce more"?—"More" is a comparative term.

8573. Do you mean more per man or more per acre?—More per acre.

8574. *The Chairman:* On page 575 you say, "This enactment will throw out nearly 50 to 60 per cent. of the present cultivators into regular labourers without giving them any training for any sort of skilled labour." What do

you mean by that exactly?—I do not know what the present lines of the Bill are, but in Mr. Keatinge's time he discussed with me his Bill, and from that I learned that he wanted to make an economical holding according to each district or each taluka, and the minimum limit was to be fixed for each taluka. In one taluka it was considered that at least 20 acres of land was necessary to support one family without any other occupation. Now if 20 acre holdings are to be produced, then all those between 5 and 20 acres will have to be eliminated. Most of the holdings are between 5 and 10, and 10 and 15 acres. If we are going to convert these holdings into 20 acre holdings, the greater portion of the present cultivators will be ousted. That is what I mean.

8575. Yes, I understand your views, without necessarily agreeing with them; but when you speak of "this enactment," to what precisely do you refer?—That is the consolidation of holdings.

8576. But I take it you refer to a particular Statute or Bill?—Yes.

8577. Which Bill?—I do not know; I have written already that I do not know myself, but it is rumoured that it is being introduced.

8578. You are being very hard on a Bill which you have not seen?—Yes, but it is referred to.

8579. *Sir Henry Lawrence:* There was a draft Bill, was there?—Yes.

8580. Which you saw?—Yes, that was discussed with me at Surat.

8581. *Dr. Hyder:* You are talking of Mr. Keatinge's Bill?—Yes, in Mr. Keatinge's time.

8582. *The Chairman:* But are you referring to Mr. Keatinge's Bill here?—Yes.

8583. With regard to page 576 as to fertilisers, we should like to hear a little more as to your views on green manuring. Have you had experience of *sann*-green manuring?—Yes, I have been trying my best for several years since. In Broach I have not been so successful because sometimes the manure does not rot in the soil if the September rains are not enough. Then it remains on the surface not rotted and is carried away by the wind. The best method I find is that as soon as the *sann* gets to a height of about 2 to 3 feet it is cut and dried for three days in the open fields; then it is made into oblong blocks interlaid with mud.

8584. Cowdung or mud?—Ordinary field mud. Then it is kept for about six months so that it becomes the best possible manure and gives the best results. I have seen the effects of this manure being applied on the farms. It would solve the great difficulty in some of the Gujarat tracts where the rainfall in September is very precarious.

8585. Have you ever tried spraying these successive layers with a weak solution of cowdung?—No, sometimes earth is put over it.

8586. So that you are making a compost?—Yes.

8587. That is not quite the same thing as ploughing in a green crop, is it?—No, it is not quite the same.

8588. When you plough in a green crop which you have also dried, does that involve a fallow?—Yes, that would be the best thing.

8589. A whole year's fallow?—Yes; but no cultivator is ready to keep up fallow for a whole year.

8590. Do you know any large cultivators who are prepared to have a fallow?—Very few cultivators.

8591. And no small cultivators I suppose?—No small cultivator can afford to do it.

8592. But you still think the small cultivator is the most efficient?—In his own inter-cultivation and other things.

8593. On the same page you give the examples of Rajpipla and Chotta Udaipur where Governmental action has been taken to compel the sowing of new varieties of cotton seeds?—Yes.

8594. You argue from that, I understand, that in British India the same compulsion might be applied?—Yes.

8595. You see the difference between the two conditions, do you not?—I know, and so I do not press it. I simply suggest it, if it is possible on political and other grounds.

8596. If it were capable of proof that 80 per cent. of the cultivators in an area were willing to adopt improved varieties, would you compel the remaining 20 per cent.?—I think it would be justified.

8597. It might be justified, but would it be expedient; would you do it?—I think I should do it.

8598. Have you wide experience of the co-operative movement?—In the ordinary routine I observe things and in some cases I also help; I cannot be said to possess so much experience as the people in the department.

8599. Do you think that the co-operative organisations are being used as fully as they might be to advertise improved methods of cultivation and improved varieties of crop; in other words, do you think they are being used for propaganda purposes or not?—To a very small extent.

8600. Do you think it might be well if the co-operative organisations were more active in propaganda?—I think so, because they have got a large number of people.

8601. On page 578 you say, "To make the rural life more attractive and happy by improving the hygienic surroundings of the village, by creating suitable games and giving other facilities available in towns and taluka *kasbas*." What do you mean by creating suitable games?—That is for the children of the village to have suitable games like cricket; clubs might be formed in almost all villages to guide these people and create a taste for these games.

8602. Would you like to see an attempt made to revive the ancient village organisation with the panchayet at its head?—Yes.

8603. How do you account for the decline of that system?—During the very severe rule of Mohammedans and Marathas in the intervening period these things have been lost. In peaceful times like the present I think they will take that form again.

8604. You probably know the history of the panchayet system of local leadership?—Yes.

8605. How was the panchayet constituted?—In olden times the headmen and some people of the village took upon themselves the whole burden of paying the assessment to the Government and of managing any disputes arising in the village. They did various other things; they assisted each other in sowing and harvesting, and other things.

8606. Were they usually old men?—Old men of good reputation in the village. Where the villages were small, two or three villages combined.

8607. Do you think the theory that wisdom goes with old age is as popular as it used to be?—Now-a-days it is not so.

8608. *Sir James MacKenna:* You would not be offended if I called you one of the old stalwarts of the Bombay Agricultural Department, would you?—No, on the contrary, I should thank you.

8609. I think you told the Chairman you had had 30 years' service in the Agricultural Department?—Yes.

8610. At what pay did you commence?—I began as a clerk on the Surat farm at a salary of Rs. 25.

8611. And you have now risen to be Deputy Director?—Yes, drawing Rs. 700.

8612. I think it would be interesting if you told the Commission what your training was?—I was the first student in the agricultural diploma course, in the first batch perhaps, under Sir Thomas Middleton in the beginning, and then under Dr. Mollison afterwards.

8613. You took the diploma?—Yes, I took the diploma. I applied to take my degree, but I could not be spared, and my Director did not allow me to do so; he said my rights would not be overlooked because I was not a graduate; so I kept quiet and have been working since then.

8614. After that you took up an appointment at Rs. 25 a month?—Yes.

8615. After you got your diploma?—After I got the diploma, I was given the appointment by Dr. Mollison himself as a clerk on the Surat Farm.

8616. At Rs. 25 a month?—Yes.

8617. And after that what was your career?—After ten months I got the post of Superintendent on the same farm commencing at Rs. 50 to 100. In 1902 I was given a post at Rs. 150 to Rs. 250 at the Hissar cattle-breeding farm. That farm was in a very bad state; the Government wanted to improve it and Dr. Mollison wanted my services there as agriculturist; so I went there for one year. On my return I had an appointment at Rs. 150 to Rs. 200 on the Surat Farm.

8618. Then you became a Deputy Director?—I became Divisional Superintendent of Agriculture in the year 1908; I remained for ten years in that position. I got the post of Deputy Director in 1918, and since then I have been working as Deputy Director.

8619. So that you have had a nice steady upward tendency all through your career?—Yes.

8620. Ending up as senior Deputy Director?—Yes.

8621. A good deal of work was done in this Presidency by Dr. Mollison?—Yes.

8622. Do you think the progress since Dr. Mollison left has been very marked compared with the amount of work that was done when he was working single-handed in the Presidency?—I think the progress now is considerably more.

8623. But the groundwork done by Dr. Mollison was extremely sound?—Yes, I must say that.

8624. Some of your best known cottons were produced then?—Yes, it was he who did the first work in cotton-breeding at the Surat Farm in the year 1901, and after that he tried to popularise the whole movement throughout India when he became Inspector General.

8625. We are now talking about our own times; we belong to the old school?—Yes.

8626. As you know, the Indianisation of the services is the policy of Government now. What method of training do you think is best for young lads who aspire to become Deputy Directors?—I purposely omitted to deal with that; I am on the verge of retirement and I do not want to make any comments on that.

8627. Would you rather not give me your opinion?—I will do so if you wish.

8628. I think it would be very desirable, because you are a very senior officer; you have gone through one process of training; we want to know what is the best method of training young men?—After graduating here, any of the first class students, after, say, four or five years' experience in India, may either be sent abroad, or an institution which may compare with English institutions might be established and further training given here.

8629. You are a firm believer in their doing a number of years' work locally after taking a degree?—I think so.

8630. That is better than sending them abroad immediately after taking their degree?—Yes.

8631. You attach great importance to the value of practical training?—Yes: unless they can compare Indian agriculture with English agriculture, I do not think they will be successful.

8632. They must have a thoroughly good grounding in their own subject before they try anything new?—Yes.

8633. How many farms have you in your circle?—I have got three big farms and two smaller ones.

8634. Do you live on one of them?—No, I live just near the central farm, near the Surat farm itself.

8635. How often are you able to visit that farm?—Almost every week.

8636. Do you find time to conduct research yourself as Deputy Director now?—I must say that with my touring and the official work which is increasing very much, I have very little time to do any research work myself.

8637. Of course, you supervise it very closely?—Yes.

8638. And you have a large staff of trained research workers?—Yes, I have about 24 graduates and some three or four gazetted officers under me.

8639. But speaking from your own experience, would you not think it would be a good thing if the Deputy Directors had time to keep a little research going?—Yes, I think so.

8640. Great emphasis is laid on the close relationship between teaching and research; I should have thought the relation between research and propaganda was also close?—Yes.

8641. If you had time and had not so many farms under your charge you would be doing a good bit of research, I take it?—Yes.

8642. *Professor Gangulee:* What are the precise duties of a Deputy Director of Agriculture?—The precise duties are to see that the farms are well managed; the Deputy Director is responsible for all the experiments conducted on the farms.

8643. Who organises the experiments?—Mostly the Deputy Director, in consultation with the Director if the farm is a new one.

8644. Experiments are organised in consultation with you?—Yes. Then the Deputy Director has to do propaganda in the district, that is the main item if any real good is to be done by the Deputy Director. He has to see to all the requirements of the district; that is to say, any correspondence or disputes arising out of land come finally to the Deputy Director for information, either from the Government, the Revenue Department or some other department; he has to attend to that. He gets so many letters that he has very little time to do all these important things.

8645. Then I understand the first item of your work is to carry on experiments in the field?—Yes.

8646. The second item is propaganda?—Yes.

8647. Propaganda in what form, in the fields of the cultivators?—Yes, in conversation, attending big shows, and giving lectures on important occasions anywhere in the whole of the division.

8648. Do you participate in the organisation of shows and things of that sort?—Yes, it is all under my guidance. If I can be present, so much the better; if not, my Divisional Superintendent will attend to it.

8649. And you have to attend to the administration of your officers?—Yes.

8650. What is the nature of correspondence of which you speak? Is it correspondence with the Government?—Correspondence with the subordinates, correspondence with the superior officer and correspondence with local bodies.

8651. Is there any correspondence with the public?—Yes, so many queries come that we are really tired of giving them answers and satisfying them.

8652. Is there any correspondence from the large cultivators?—Yes, they enquire about many things.

8653. Who records the results of field experiments?—The Superintendent.

8654. Under your guidance?—Yes.

8655. And you go through the collected data?—Yes.

8656. You are stationed most of your time at Surat?—No, nearly half the month I am out in the district, and sometimes even more; the rest of the time I am in Surat.

8657. You come into contact with the co-operative credit societies?—Yes.

8658. And any other village organisation?—Yes, the Development Associations and Agricultural Associations, or any other society, such as the Cotton Sale Societies, in which the department has any interest or to which the department has got anything to say. Whenever we go there we see the Presidents or Vice-Presidents of all these associations, discuss things with them and lay out the lines, for the work; there are so many things.

8659. I want to get an idea of the nature of your propaganda and demonstration work. You carry on both demonstration and propaganda?—Yes.

8660. What is the nature of your propaganda?—The nature of the propaganda is to arrange small shows in the district.

8661. Let us take a particular village; you want to visit that village?—Yes.

8662. Do you get invitations from the village?—In some cases there are some controversial subjects to be discussed; if they have got some complaint about their lands, or want to introduce something new, as for example, a cotton sale society or an implements society, they invite us; otherwise we go of our own accord.

8663. Then how do you proceed?—If I stay there I generally enquire of the leading gentlemen or leading cultivators of the place where I may be put up for the night; they generally come and we discuss other matters with them as to local requirements.

8664. Are you in touch with any agricultural school in your division?—Yes.

8665. On page 572 you say, "The present courses do not suit the wants of rural population." That is in regard to agricultural education. Have you any definite suggestion as to how these courses should be improved?—I was not referring to the agricultural schools when I said that; that is with regard to the ordinary schools in the rural areas that are managed by the Education Department. An agricultural bias should be given in the general education.

8666. On page 573 you advocate compulsory primary education, do you not?—Yes.

8667. Do you think the time has come for that?—I think the time is more than ripe.

8668. You think it would be a good thing for the country?—Yes.

8669. Do you think the country would be prepared to pay excess tax or cess for it?—That is not my look-out. I do not go so deep into the subject as that; that is the look-out of the politicians and the people on the Councils.

8670. I suppose you realise that you cannot get 9*d*. for 4*d*.?—If you want my personal opinion, I would sacrifice anything else for education. Whatever my personal needs may be, I would sacrifice them for the sake of education. But I cannot give a general ruling as to what Governments should or should not do.

8671. But you think compulsory education would be good for the country? —Yes, it is necessary, that is my point. Unless there is general education you cannot expect the agriculture of the country to improve.

8672. I agree, but do you think because it is a good thing for the country, the country ought to be prepared to pay for it?—Yes, they must pay for it.

8673. You say the administration of education should be left to the Local Boards?—Yes.

8674. Are you in touch with the local bodies?—Now the whole administration of primary education is being handed over to Local Boards.

8675. But are you in touch with the work of the Local Boards?—Some of the Local Boards.

8676. Do you think they will be able to manage it?—It is an experiment; I cannot give my opinion off-hand.

8677. *Sir Ganga Ram:* You intend to reserve your opinion until you have retired?—I am on the point of retiring.

8678. *Professor Gangulee:* On page 573 you emphasise the importance of having demonstration farms and lessening the cost of maintaining such farms. The sum and substance of it is this, that you want farm costings to be kept in every demonstration farm?—Yes.

8679. Do you keep costings?—Yes.

8680. Have you introduced any system of keeping farm accounts?—We have, on all our farms.

8681. What do you understand by farm costings? Detailed farm accounts? —Everything, every pie.

8682. Do you believe in maintaining the continuity of demonstration work? —Yes.

8683. Year by year?—Yes.

8684. Do you do that yourself?—Yes, I have been doing it for 20 years.

8685. On page 574 you attribute indebtedness to "High charges of litigation and several other indirect taxes falling on the cultivators." What taxes are you referring to?—Taxes on tea, sugar, clothing, all the necessaries of life of the cultivator.

8686. Are you suggesting that they are so excessive as to be a cause of indebtedness?—In proportion to their earnings these charges are heavy.

8687. You also attribute indebtedness to some extent to excessive expenditure incurred on social customs. Do you consider that social expenditure is showing a tendency to increase?—No, it is not increasing; I should say there is a tendency for it to decrease.

8688. Can you give us any idea as to what percentage of the total income of the peasantry goes in taxes?—I have no data.

8689. Then you say, "We have already an example of the Agriculturists' Relief Act which, instead of giving the desired relief, has done some mischief." What precisely do you mean?—I mean that after the passing of the Agriculturists' Relief Act the *sowcars* instead of lending money on mortgage or on personal security only, have been asking cultivators to sell their lands either with or without condition, on the merely oral understanding that when the money is repaid with interest the land will be returned.

8690. On the oral understanding?—Yes, no written agreement is made; and it is only when every pie is paid the land is returned. In the event of the *sowcar dying*, the heirs not being instructed as to whether it was a conditional or a real sale, difficulties arise and the cultivators lose their land.

8691. That is to say, you think land is passing into the hands of the moneylenders owing to this Act?—Yes.

8692. What was the original intention of this Act?—To protect the cultivator.

8693. So that the object of this Act has been frustrated?—That is my view.

8694. You think the rules as to *taccavi* should be made more elastic?—Yes.

8695. In what way?—When a man applies to the Collector for *taccavi* the correspondence goes to the *mamlatdar*. It is sent back to the village where a form has to be filled up saying that the man owns so much property, a house and other things. It then goes back again to the authority sanctioning the *taccavi;* then it comes back again to the *mamlatdar*, and afterwards the *taccavi* is paid. These routine formalities take a very long time.

8696. There is considerable delay in formalities?—Yes.

8697. Can you suggest any method by which these formalities could be obviated?—I have already said it.

8698. You think that it should be in the hands of responsible Revenue authorities?—Yes.

8699. On the question of fragmentation of holdings you say the proposed enactment "will throw out nearly 50 to 60 per cent. of the present cultivators into regular labourers without giving them any training for any sort of skilled labour." I do not understand that statement. What economic law, as a result of this enactment, would operate so as to throw out 50 or 60 per cent of the cultivators from their land?—The largest number of holdings are between 5 and 10 acres. The number of holdings between 10 and 15 acres come next, and then come the holdings between 15 and 20 acres. Above 25 acres the number is substantially decreased, and up to 100 acres still more decreased. 20 acres at least are necessary to maintain one family.

8700. *The Chairman:* You are thinking more of the sub-division than of the fragmentation of holdings?—Yes.

8701. *Mr. Calvert:* Do you mean an owner's holding or a cultivator's holding?—A cultivator's holding.

8702. *Professor Gangulee:* On page 578 you say the occupation of agriculture is not looked upon as an honourable one. Is that by the educated people?—By almost all people; above all, officials.

8703. They do not consider it honourable?—No.

8704. Do you consider it honourable?—I consider it most honourable.

8705. *Dr. Hyder:* Have you in Gujarat a proverb similar to the Hindustani proverb which says that the best occupation is trade and the worst is Government service?—The actual feeling in Gujarat is that the best occupation is Government service and the worst is agriculture.

8706. *Sir Ganga Ram:* As Deputy Director of Agriculture I suppose you share that view?—I am doing my best to urge people not to accept any service but to go in for agriculture; but a man in Government service with an income of Rs. 10 to Rs. 15 a month is considered to be in a better social position than a cultivator, even though he owns his land. In my district most of the land is owned by *pattadars* who consider it below their dignity to cultivate the land, as they did before 1900.

8707. *Sir Chunilal Mehta:* Why is that?—That is because of this general education which has caused people to give up agriculture and seek Government service.

8708. *Professor Gangulee:* Have you any suggestion to make as to how this mental outlook could be changed?—I can only make one suggestion; I found that during the War when prices were so high men in Government service could not maintain themselves on salaries of 15 to 20 rupees a month and they went back to the land.

8709. You mean that economic pressure would bring them back to the land?—Yes, if you raise the standard of living they will have to go back.

8710. Therefore the necessary pre-requisite of such a change of outlook is improvement of the standard of living?—Yes.

8711. On page 578 you say, "No definite policy is laid down by Government as regards the land tenure and other prohibitive legislation which Government intend to take in the near future or at a distant date." What prohibitive legislation are you afraid of?—I do not want to go into the details of what Government are going to do in the future. This Agriculturists' Relief Act is one thing; then every time there is fear of the assessment being raised. The system of giving receipts is a very big item in the mind of the cultivator nowadays; whenever I go into the district I hear a great clamour about that. The payment of the assessment to the village authorities used to be credited in the country account book; that system has now been discontinued and a receipt only is given. The people have misgivings; they say, "Government do not want to maintain our right on the land, we are

being treated like ordinary tenants." This sort of thing has had its effect on the mind of the capitalist and has deterred him from investing money in land. On the contrary, I know of some people who have been selling their land. Big people owning thousands of acres of land in Surat, for instance, a very well known family who have been doing this business for the last 100 years or more, have been selling their land simply because of that fear.

8712. Do people complain about it to you?—Yes, several of them.

8713. Is there any Taluka Development Association in your district?—Several.

8714. How are they working?—Those that have got good finances are working very well.

8715. Have they got good men?—Yes.

8716. Energetic young men who know the job?—Yes.

8717. You are quite satisfied with them?—In a taluka in Surat there is one of which the President is a young energetic man who has thousands of acres of land; he is a barrister of a very well-known family; he is an educated man and is interested in the land. An agricultural graduate of the best type is working very well for a Taluka Development Association which is doing very good work. That was the first association started; it was the work of Sir Chunilal Mehta. Since then I have been able to add about five associations while I have been in my division.

8718. *Mr. Calvert:* On page 572 you say, "Agriculture can be made attractive to middle class youths by offering them lucrative posts both in the Agricultural and Revenue Departments"?—Yes, or any other Department, such as Forestry, Engineering or even Education.

8719. But how do you propose to make agriculture attractive by taking youths away from it?—They will be very few out of the total population; if you take 100 or 200 people it will not matter very much. What I mean is this that if, instead of graduates in arts becoming *mamlatdars*, agricultural graduates became *mamlatdars*, they would understand things better than the ordinary layman; that is my idea.

8720. We have had evidence that these graduates prefer Government service to practical farming?—Up till now it has been so.

8721. Do you think the cure for that is to reduce the pay of the Agricultural Service until it is no longer attractive?—You will not get recruits for the college if you do that.

8722. Do you suggest that they should be forced into practical farming?—That is my desire; I have suggested that several times; but you cannot expect all of them to go in for farming.

8723. Is it your opinion that there is more money to be made from teaching agriculture than from practising it? For instance, could you have earned your present salary from practising agriculture?—Do not ask about individual cases.

8724. Are there in your circle any moneylending landlords?—Very few nowadays; there were many before this Agriculturists' Relief Act was passed. Now they are not going in for it unless on the condition that the land is sold subject to the oral condition that it is to be returned after the money is paid. There are *sowcars* who do business on those lines, but they will not advance money on the personal security of cultivators.

8725. You seem to advocate that Government should start agricultural banks. What exactly do you mean by an agricultural bank?—I mean that whenever cultivators want money it should be advanced by agricultural banks.

8726. Is that something different from co-operative banks?—Yes.

8727. Do you know any country in the world where agricultural banks have been successful?—I have read of it in some European countries, but I cannot give you definite instances now.

8728. You cannot tell me which country?—No.

8729. On page 575 you state a lot of objections to the consolidation of holdings?—Yes.

8730. Are those objections based on your practical efforts to consolidate holdings or is it merely theory?—My practical experience has been in Gujarat. In Baroda they saw what you had done in the Punjab and tried to copy you. They made permissive legislation, but it has been a dead letter.

8731. They passed their Act first and saw the Punjab system afterwards?—I do not know. I suggested to Mr. Keatinge that if this idea was to be tried in this Presidency, Ahmednager might perhaps be the most suitable place.

8732. On the same page you say you doubt very much whether the scheme will work successfully. If it succeeds in an out-of-the-way wild Province like the Punjab, why should it not succeed everywhere?—There may not be Calverts all over India who can do it.

8733. On page 578 with regard to attracting capital you give a number of reasons why capitalists do not invest money in agriculture; and yet they lend money to agriculturists?—Yes, on security.

8734. It was said of England once that the only persons who made any money out of agriculture were the lawyers who were engaged in drawing up the mortgages?—I said in the beginning that litigation was a factor.

8735. The people who make money out of agriculture are the money-lenders?—Yes.

8736. Could you tell us roughly what percentage of the cultivated area of Gujarat you have influenced with your new methods?—Do you mean taken as a whole, or with reference to cotton or any particular crop?

8737. Taken as a whole?—It will not be more than about 20 per cent.

8738. As high as 20 per cent.?—In the South it is more than that, while in the North it is less than that.

8739. Of all the crops?—Not all, only cotton.

8740. But taking the gross cultivated area how much will it be?—It would not be more than 10 per cent.

8741. You are a very experienced gentleman; have you in the course of your cogitations compared the standard of cultivation by persons who are holding land on lease as tenants with that of persons who are cultivating their own land?—Yes.

8742. Which does the most intensive cultivation?—Those that have got their own land.

8743. And if a man is cultivating some land as owner and some land as tenant, what will be the position?—He will pay more attention to his own land than he will pay to the landlord's land.

8744. He gives more ploughing to his own land?—Yes.

8745. What about manure?—He would give more manure to his own land; that applies to everything.

8746. He is apt to concentrate on his own land?—Yes, and treat the rest as a side industry.

8747. *Mr. Kamat:* You are advocating agricultural colleges for the divisions, are you not?—Yes.

8748. That is to say, agricultural colleges for Gujarat, Sind, Karnatic, and so on?—Yes.

8749. And it is part of your system of divisional agricultural colleges that 25 per cent. of the posts in Government service should be reserved for graduates of those colleges?—Yes.

8750. And yet you try to persuade people not to go into Government service?—I am against Government service, but the first thing is that I want to attract as many students to agricultural colleges as is possible by any means; so that if they do not get Government service they will have to return to the land; they will not go to other occupations.

8751. You think this system of guaranteeing 25 per cent of the posts in Government service will attract students?—It is not guaranteeing; it is an understanding by the Government.

8752. Without this understanding there would not be enough students attracted to divisional agricultural colleges?—I doubt it.

8753. You think that without this system of guaranteeing or understanding, there would not be enough pupils coming to the agricultural colleges?—Not so many. If there were one more college, there would be enough students for two colleges, but not for four.

8754. What is the value of these agricultural colleges from the point of view of practical farming in your opinion?—The only question that matters is how to train these people up; I have already suggested that those going in for farming must have something like a post-graduate course of two years' actual farming; if that could be arranged, I think it would be the best possible training.

8755. So far we have heard that very few people go back to practical farming after graduating from these colleges?—Yes.

8756. Therefore the value of the agricultural colleges lies in the scientific training and training of teachers?—Yes.

8757. Not turning out practical farmers?—No. When people come out of colleges, even from European Universities, they are not masters of their vocation; it is the after-study that makes the man. College merely affords a guide as to how to find out things.

8758. If so many of these students do not go back to actual farming, is there any point in insisting that those who are admitted to these agricultural colleges for training for the first year's course should be mainly from the agricultural classes?—If they come from the agricultural classes, so much the better; that is desirable.

8759. But they do not go back to farming?—Never mind, wherever they go they will always have that tendency to look to agriculture as their own subject, and even though they go into other occupations they will always be talking to the public and interesting them in agriculture.

8760. If you want to turn out scientific men, why not avail yourselves of the best intellectual material without this particular preference for students from the agricultural classes?—I say that is the most desirable thing, but if you cannot get that, then you can go to the next best.

8761. With regard to the seasonal shortage of labour, you say something about the card system. Will you amplify that?—I am Chairman of the Divisional Board of Agriculture for Gujarat; during the last three years several complaints have been made by cultivators as to this labour question. I have asked for several books on this labour question from different parts of India and outside India to see for myself whether there is any easy remedy that could be suggested to the Division and to Government. From all the literature I got from Bengal, Mysore, Africa and other places I have only elicited one point, that is that in Rhodesia there is a system by which once you employ a servant he has to complete his contract for two years, five years, or whatever may have been arranged. If he fails to complete his term of employment and wants to join another service, he must take his card with his employer's signature on it; without that card no other person could employ him.

8762. Is not that tantamount to a system of indenture?—No, not at all; it is not the system of indenture such as exists in Fiji and other places. This card system is very simple; if my servant has this card with my signature upon it, he can leave me and seek other employment.

8763. Will you require legislation to enforce such a system?—Yes, I think legislation will be required.

8764. And you think that is the only way to remedy the present position?—Yes. A cultivator may pay Rs. 700 or Rs. 800 to a single labourer and he may run away next day and get employment on some railway work or something of that kind; the employer cannot get the man back and he loses heavily. Some remedy is necessary. This is merely my suggestion after studying so many laws on this matter in different parts of the world; that is the simplest I can find.

8765. You explained the working of the Deccan Agriculturists' Relief Act to some of the Members of this Commission. That Act has defeated its own purpose?—Yes.

8766. Will you tell me why the psychology of the moneylender has not been changed by that Act, and why he is tightening his hold on the borrower? Is it that he feels that the law has created disabilities and difficulties in his way?—Yes, whenever he sues a cultivator, the tendency is for the court to give instalments either with or without interest and in very small amounts. He cannot afford to lend on those terms and therefore he tightens his grip on the cultivator. When he sues in the civil court to recover his money, in accordance with the Relief Act he is not given a decree committing the borrower to jail or ordering the sale of the borrower's cattle; he merely gets a decree ordering yearly instalments, or whatever the court may think fit. It is natural that the *sowcar* in those circumstances should take steps to protect himself before lending.

8767. So that mortgages on land are taken in the form of fictitious sales?—Yes.

8768. That is the result of the passing of the Deccan Agriculturists' Relief Act?—Yes, such sales did not take place before the passing of that Act.

8769. The real remedy is to provide finance through land mortgage banks and not try by artificial means to alter the psychological relations between lender and borrower?—I do not know anything about land mortgage banks.

8770. But you agree that artificial means of correcting the relations between moneylender and borrower have no effect?—That I agree with.

8771. *Dewan Bahadur Malji:* Having regard to the atmosphere that is created by the present education in primary schools, may I take it that the bias schools will really prove a turning point in the history of education in rural areas?—Yes.

8772. The education of the adults will play the next important rôle?—Yes.

8773. You are actually trying both these experiments in the Surat district?—Yes.

8774. And you think they are, on the whole, a success?—Yes.

8775. Some of the Development Associations to which you have referred have been registered under the Co-operative Societies Act and some not?—Yes.

8776. Is there any sentimental objection to having them registered under the Co-operative Societies Act?—Not so much sentiment; I think it is a personal matter in one or two cases. Some of them are willing to be registered under the Co-operative Societies Act, and I think the others will come round in the course of time. We ought not to magnify that point at all. When they see other associations registered under the Act and see their work, they will come round of their own accord.

8777. In the case of associations which are registered under the Co-operative Societies Act the members will have some sort of guarantee?—Yes.

8778. But not so in the case of mere individual members; they might drop out at any time by non-payment of the prescribed fee of Re. 1 per annum?—That will be so even if they are registered.

8779. In that case the society's membership is practically guaranteed; they continue as members?—But if they want to drop out they may.

8780. In that case, of course, it will be left to them?—Yes.

8781. It may be made compulsory?—Then people may not like to get themselves registered, if you make it compulsory.

8782. I refer to societies as such; they are practically made compulsory members of the Institute?—If they get themselves registered under the Charitable Endowments Act, we want security for the money.

8783. But the difficulty will be with regard to individual members dropping out at any moment?—They will not drop out; Government has authorised the collection of the fees from members.

8784. Did not an experiment of that kind fail in Broach and Khandesh?—That was long ago.

8785. And things have not yet settled themselves down?—No.

8786. In Southern Gujarat is there a tendency to grow more cotton or cotton with cereals?—It depends on the values of the individual crops; the cultivator will grow what is more profitable.

8787. Do they sow cotton upon cotton in the next year?—Yes, if cotton prices are good they will sow cotton after cotton for several years. It is a commercial matter; you cannot force them to do what you want them to do.

8788. Would you not use compulsion?—No, I will not give any consent to that; I would leave the cultivator free.

8789. Do you advise him?—We advise, but they will not follow our advice. They will only go according to the money they get, and if by growing cotton they can get more money, I would certainly allow them to do so.

8790. *The Chairman:* I suppose that is without prejudice to what you told the Commission just now about your desire to compel the 20 per cent. who might resist the plan of improved cotton varieties?—Yes.

8791. *Dewan Bahadur Malji:* Would you advise it even at the expense of deterioration of land?—No, it will not deteriorate cultivation. Now instead of growing 2 feet apart they are growing 6 feet apart.

8792. You mean ridge cultivation?—No, they are growing cotton 4 to 6 feet apart; next year they are changed so that the roots do not come on the same row, that makes alternate rotation.

8793. A sort of half fallow?—Yes.

8794. What do you take to be the ordinary return of cotton crop per acre?—It depends on the price; if you tell me the price I will give you the outturn.

8795. And could you tell me the costings?—Yes.

8796. What is the ordinary thing?—For the Broach district I take it at 400 lbs. an acre, and the cost of cultivation is between Rs. 50 and Rs. 60.

8797. Will the difference be the net result or do you deduct other allowances?—No, there are no other allowances.

8798. Then what is the margin of profit?—You can calculate it according to the price you put on the crop.

8799. *Professor Gangulee:* Do you mean 400 lbs. of lint?—No, 400 lbs. good cotton, *kapas;* that is the average yield for the Broach district.

8800. *Sir Ganga Ram:* What is it in America?—1,000 lbs. per acre; in Egypt it is 1,500 lbs. per acre.

8801. *Sir Chunilal Mehta:* Do you think the prices of cotton are now going down?—Yes, with the result that food crops will be grown instead of cotton crops.

8802. *Dewan Bahadur Malji:* The exchange question also affects the situation?—That is a political question; I have no concern with it. I do not desire to express my opinion on that unless you desire it.

8803. Do you think the agriculturist will suffer in any way because of the exchange?—Yes.

8804. You are in favour of loans on easier rates of interest?—Yes.

8805. The present rates do not pay the agriculturist?—No, and will not pay.

8806. You told us that agricultural banks are required?—Yes.

8807. Am I to take it that you desire some sort of zamindars' banks which may advance large sums of money to large landholders?—I suggest Government agricultural banks financed by Government.

8808. Such as exist in Baroda territory?—Yes.

8809. You have also advocated the extension and repair of wells and tanks out of Famine Reserve Funds?—Yes, that is the greatest necessity where no canal irrigation is to be had.

8810. That is a great need of the day in Gujarat?—Yes, in the whole of Gujarat.

8811. You have referred to the fragmentation of holdings in Baroda territory. I think you have inadvertently omitted to mention Sokhda. Have you seen that is being done in Sokhda?—No.

8812. Will you be surprised to learn that half or three-quarters of the work has been done there?—I should be glad to see it.

8813. That is the consolidation in Baroda territory?—I should not be surprised at anything that that State does.

8814. *The Chairman:* Do you mean that nothing they could do would surprise you?—No; take the case of the States of Rajpipla and Chhota Udaipur; they wanted to have the whole of the land sown with one kind of seed and they did it with one stroke of the pen.

8815. *Sir Chunilal Mehta:* In Baroda it is a voluntary system?—Yes.

8816. *Sir Ganga Ram:* In the Punjab it is subject to consent?—Our Government would desire it, but they have to consider whether it would be palatable to the people; they have to take public opinion into consideration.

8817. *Sir Henry Lawrence:* I think you said you looked to the panchayets to help in the improvement of agriculture?—I was thinking of the petty litigation in which cultivators become involved; if that could be handed over to the panchayets I think it would lessen the evil to some extent.

8818. Then you do not advocate using the panchayets for the improvement of agricultural practice in any way?—I doubt whether they will be of any great use in that respect.

8819. You want the panchayets to help to settle disputes between cultivators and their creditors?—Yes.

8820. Do you look to panchayets of the old type or the new type?—Of the new type. They could deal with village problems such as hygiene and roads. During the last monsoon the villages got into such dirty state that on entering a village one got knee-deep in mud. The village panchayets could deal with matters of that sort. That is why I have suggested that the village panchayets might be asked to see to certain improvements in and around the village itself.

8821. Do you want these panchayets to be constituted in the way in which they used to be constituted or in some different way?—On the lines that have been charted out at present, with some small additional powers.

8822. The present panchayets are very different from the old panchayets?—Yes, they are different from the old panchayets; I do not advocate the old panchayets at all.

8823. The old panchayets were for each separate community?—Yes.

8824. There were separate panchayets for *patidars*, Brahmins, and so on. Do the *Dhuralis* have panchayets?—I cannot say exactly what they were, but they had some such thing.

8825. So that in one large village you might have four or five different panchayets under the old system?—It may be.

8826. Whereas now the custom is for one panchayet to represent all the different classes of the community?—Of the whole village.

8827. Do you think the old form of panchayet can still be effective?—I make no comparison with the old panchayet; I only advocate the new form of panchayet which is representative of the whole village and is able to deal with these things.

8828. Representative of all classes?—Yes.

8829. That is what you advocate?—Yes.

8830. Do you propose to entrust to a panchayet of that kind powers of compelling cultivators to improve their practice? If, for instance, 80 per cent. of the cultivators are prepared to adopt a certain practice, is the panchayet to have powers of compulsion with regard to the remaining 20 per cent.?—No.

8831. Then what authority is to enforce that improved practice?—Government; nobody else.

8832. The *mamlatdar*?—No.

8833. Then who?—The Government itself.

8834. But the Government must act through some local agency?—No doubt they might act through the Revenue authorities, but the final judgment should rest with the Government.

8835. But the final judgment of the Government must be enforced in actual detail by some local agency; what is your local agency?—My local agency is the *mamlatdar* and the village officers.

8836. You advocate that?—Yes, but I do not agree that these panchayets should be given that power.

8837. But you wish to have this compulsory power?—Only in very rare cases.

8838. Where it does occur you want to have it enforced, by the *mamlatdar*, the village *patel*, and so on?—Yes, if it is to be administered at all.

8839. But that is what you advocate?—Yes.

8840. You mention that some change in the system of keeping village accounts has deprived *sowcars* and capitalists of any confidence and prevented them from investing capital in land. Has that view of yours ever been represented to Government?—I do not know.

8841. You have not reported on it?—No, but I have heard that people have protested against it several times.

8842. *Sir Chunilal Mehta:* What is the change?—Some ten years ago there was a regular book kept showing the rent a man had to pay and what he owed, and these books were checked. Now that system has been abolished, and only a small paper is given for the amounts received, and most of these papers are lost by the cultivators.

8843. *Sir Henry Lawrence:* Has that been inquired into by the Revenue Officers and any report made to higher authority?—No.

8844. You have never represented this?—No.

8845. How long have you been aware of these difficulties?—It is five or ten years since the change was made. I did not think it was my duty to report the matter; it is the duty of the people themselves.

8846. *Sir Chunilal Mehta:* You are not aware that the people have made representations about it at any time?—They have made representations to local officers. Villagers have asked me what the idea was, and I told them they used to get their receipts in a book, and now they get them on pieces of paper. Personally, if I get a receipt I do not care whether it is on a piece of paper or in a book.

8847. *Sir Henry Lawrence:* But you say intelligent men, capitalists, do care?—Capitalists and *sowcars* do not know what these things are.

8848. They are all ignorant?—Not exactly ignorant, but they know very little about this Government business.

8849. *Sir Ganga Ram:* Did I understand you to say to the Chairman that only 3 to 5 per cent of the product of your school take to agriculture?—Of the college graduates. Of the graduates of Poona college, 3 to 5 per cent have taken to agriculture and the rest have gone into service.

8850. What do you refer to here, in what you say on page 572?—The agricultural graduates.

8851. How many years' service have you?—30 years.

8852. During your service, what agricultural improvements have you introduced to justify your salary?—I have enumerated them all.

8853. I can only find one paragraph, in which you say you or your department introduced ground-nut; that is all?—That is my own thing.

8854. I give you credit for that, but what else have you done?—Introduced improved cultivation. The cultivators used to sow at a distance of 18 inches apart when we started the Surat farm.

8855. Give me the economic value of that. How much more do they get now?—10 to 15 or 20 per cent.

8856. You say your capacity is only 400 lbs. an acre; our cotton is 700 lbs.?—It is not 700 lbs.; it may go to 500 or 550 lbs.

8857. Do not contradict me; I say what I mean. We can produce that amount up-country; what have you been doing in the direction?—Have you read my ridge cultivation pamphlet? It has gone up to 1,000 lbs. on the Surat farm. It is all done by ridge cultivation.

8858. What do you mean by 'ridge cultivation'?—Our method of planting cotton on ridges. We are trying to spread that as much as possible.

8859. To what extent have you spread it?—This is only a recent introduction, it was introduced in the last three or four years. It may take six or even ten years to spread it over the whole tract.

8860. By that time you will have retired?—Somebody will succeed me.

8861. Is there any possibility of irrigation from the four rivers that pass through your territory? Have you ever noticed that those rivers bring down volumes of water, and no use is made of it? Have you ever made representations about that?—I know the history of this matter, because when the Irrigation Commission came in 1901 I was Superintendent of the Surat farm and collected almost all the data for them. I know from conversation with them then and from what I have learned from our department that it is impracticable to have any canal irrigation from the Narbada or the Tapti.

8862. Is that the opinion of the irrigation people now?—I do not know what their opinion is, but since then the matter has never been gone into by anybody else.

8863. You have never given thought to it?—It was found to be impracticable; how could thought be given to it?

8864. Can you point to one paragraph where they say it is impracticable?—You must refer to the Irrigation Commission Report of 1901.

8865. You live at Surat?—Yes.

8866. Have you ever observed the desolation on both sides of the Tapti river?—Yes.

8867. Have you ever represented that that might be improved, and that the river might be taken advantage of to a certain extent?—It cannot be.

8868. Do not say 'it cannot be'?—The country is too level near the sea; there is no gradient for a canal.

8869. Have you never thought about it? It has pained me every time I have passed that way?—I do not think anything can be done.

8870. You said in answer to Sir Henry Lawrence that you advocated panchayets; do you mean for a village or a taluka?—For big villages, and for small villages combined together.

8871. How many people would you have in it?—2,000.

8872. Two thousand?—A population of 2,000.

8873. That is not what I mean. How many people would there be on the panchayet?—Half a dozen at the most.

8874. How would you select those men, by franchise? I suppose there are different castes in the villages?—Yes.

8875. Would you give them representation according to the number of people?—That must be decided by others.

8876. Have you seen panchayets working in any other Presidency?—No, but I have seen them in my own district.

8877. Are they working well?—They are not working very well, but they are working now.

8878. If their decrees are not accepted by the parties, would you give them powers to enforce them?—Yes.

8879. When you talk of long-term loans, how many years have you in mind?—10 to 20.

8880. At what rate of interest?—5 per cent.

8881. Simple or compound interest?—It may be simple interest.

8882. Government themselves pay compound interest; why should they charge only simple interest?—If you want to, you could charge compound interest; I do not mind.

8883. I only wanted your opinion?—Government can get money at 4 per cent, and I say they should charge 5 per cent.

8884. You have said that in Surat there are big landlords. One is Mr. Modi, a barrister?—Yes.

8885. How much does he own?—About 2,000 acres.

8886. Taking it at 1,500 acres, how much can he make?—At least Rs. 15, and it may be Rs. 20 an acre. It may be more, but it will not be less than Rs. 15.

8887. With 1,500 acres that means Rs. 30,000?—Yes.

8888. Does he make that?—Yes.

8889. He is a private practising barrister?—Yes.

8890. You say the rate of interest on *taccavi* should not be more than what Government has to pay. How much interest does Government charge now in this Presidency?—6½ per cent.

8891. You think they should only charge 5 per cent?—5 per cent or whatever they have to pay.

8892. Do you think that money before it reaches the cultivator filters through their fingers somehow?—I do not want to make that suggestion.

8893. What is your opinion? We want to find out if this sort of thing happens?—I refuse to make that assertion.

8894. We want your opinion?—I have given that already, in very plain terms.

8895. What is the cost of a well?—From Rs. 400 to Rs. 1,000 or Rs. 1,500 according to the tract.

8896. According to depth?—According to the depth in the tract.

8897. You say fragmentation of holdings is slowly adjusting itself?—Yes.

8898. How?—If I have to divide my property with my brother I will either take it myself or hand it over to him. That is the way things are being done.

8899. But by law?—By mutual understanding.

8900. On page 575 you refer to the Mahommedan law of inheritance. There is no such thing; they simply followed the Hindu law, so far as fragmentation is concerned. Tell me something about the rotation of crops. With a holding of 20 acres, what would be sown in the first year?—It depends on the type of land. We have two types of soil. On the black soil it will be cotton and *juar*, and sometimes wheat.

8901. Give me the rotation?—If it is a systematic rotation it will be cotton followed by *juar*.

8902. What do you expect to get out of it?—Our average with cotton is 400 lbs. an acre.

8903. What is the gross value of the income you get from that?—It depends on the market price of the commodity raised.

8904. Take the average rate?—About Rs. 10 to Rs. 15 per acre. Rs. 200 to Rs. 300 for 20 acres.

8905. What is the pay of a *chaprasi*?—About the same.

8906. If you cannot teach them to make more than that, you must not blame them if they go into service, where they have a safe job and no fear of famine and so on?—No, we do not.

8907. If you are to justify the existence of your department, you must teach them to earn more?—We are trying to teach them better farming.

8908. Not more lucrative farming?—Better farming means that.

8909. How much can you teach them to earn?—15 to 20 per cent. more.

8910. That means Rs. 400. If it was an irrigated area, how much would you expect?—We have no such thing. Our black soils are unirrigated, and there are very few localities where the wells are working now.

8911. There is no canal irrigation?—No.

8912. Absolutely none?—In North Gujarat there is one small canal.

8913. *Dr. Hyder:* You do not think it will be a wise policy to control the credit of cultivators by restricting the sale or mortgage of their land?—No.

8914. How old are you?—55.

8915. You have no doubt studied the *sastras*?—Very little.

8916. I wondered whether in your study of the *sastras* you had come across the following passage: "And the Earth said, 'Let no mortal give me away.'" Have you pondered over the meaning of this passage?—I have never studied the *sastras*. My study has been agriculture all my life.

8917. To go back to the panchayets, can you give me the causes of the decay of this institution? I understood you to say in reply to the Chairman that the causes were purely political?—Yes.

8918. The question is important, because everybody is talking of the institution of panchayets. Do you think the India of the present day is the same as the India of old?—No.

8919. Did they have railways in the old days?—No.

8920. Did they have a postal service?—No.

8921. Did they have legislative councils?—No, but something of the same type. There were councils attached to the Rajahs, but I am not a historian and I am not supposed to know all this.

8922. People in the old days did not have Government institutions reaching every village. To-day the humblest cultivator can go to the nearest police station, to the court of the *mamlatdar* or, if not satisfied, to the Collector?—Yes.

8923. Such things did not exist in the old days, so that the people had to fall back on institutions of their own?—Yes.

8924. In view of the changed conditions in India to-day, do you think a revival of the panchayets would be successful?—Yes.

8925. You still think so?—Yes, because the litigation and waste of time involved are much worse than the advantages due to railways, posts and other things.

8926. *Sir Chunilal Mehta:* In answer to the Chairman you said only 3 to 5 per cent. of the boys from agricultural schools go into service?—Yes.

8927. The others go back to the land?—Yes. That is from my Gujarat schools; I do not know about Loni.

8928. You have two such schools?—Yes.

8929. When was the one at Surat started?—In your *régime*, three or four years ago.

8930. You cannot have much experience of what happens to the boys from that school?—Two batches have left. From the other school, which was started in 1919, there have been five batches.

8931. What class of boys attend those schools?—Mostly sons of cultivators.

8932. Do any Bhils go there?—Yes. I think eight to ten boys belong to the backward classes.

8933. These boys of the backward classes have nothing else to fall back on?—No, they must go back to their land.

8934. Anyhow, the number of boys turned out by both your schools is small?—It is limited to 30 students a year.

8935. And these schools have only been going for about five years?—Yes.

8936. You said something about cotton-breeding on your farm at Surat?—Yes.

8937. When was Dr. Mollison in charge?—In 1900 he went to America, and on his return started cotton-breeding on the Surat farm.

8938. In 1901?—Yes. He taught me as soon as he came to India.

8939. How long was Dr. Mollison in charge of that farm?—Until he became Inspector General, towards the end of 1901.

8940. He was in charge only a few months?—Yes.

8941. Who took charge of it afterwards?—Mr. P. Mehta was there temporarily for two years.

8942. Who came after him?—Mr. Fletcher.

8943. How long was he there?—1903 to 1908.

8944. And after 1908?—Dr. Main was in charge for ten years; then came Professor Patel, who was in charge for two or three years, and since then I have been in charge.

8945. Has there been any change in the method of cotton-breeding since the time of Dr. Mollison?—There was some change after Mr. Fletcher came, about 1908.

8946. Has there been any change since 1908?—No, it has been going on on the same lines.

8947. Giving very good results?—Yes.

8948. On page 572 you say post-graduate teaching in agriculture should be introduced in the agricultural colleges. What are you referring to there?—Post-graduate teaching for these agricultural graduates, as in other countries. These people when they go out are not so well trained as we expect them to be. Some of the intelligent men who graduate, if they had two years post-graduate training, would be the best men possible.

8949. Are you referring to practical training?—To training in whatever line they want to take up; practical agriculture, commercial farming, scientific research, agricultural chemistry, botany, etc.

8950. That would fit them for the work of practical cultivation?—Yes. I have suggested practical work for those people who wish to take up commercial farming. They should have two years' training on commercial or Government farms before taking up agriculture. Some of the graduates who have taken to agriculture have lost instead of gained, and they should receive a thorough practical training before they take to actual farming.

8951. With regard to *taccavi*, you say Government should charge the rate of interest at which they are able to borrow, *plus* establishment charges. Would you also include any allowance for losses on *taccavi* loans?—Yes.

8952. Is it your opinion Government is now charging more than would be covered by those three items?—I think so.

8953. On what data?—It is only my rough calculation. The losses are very few.

8954. How do you know that?—I see it is rigidly collected.

8955. If you look in divisions other than your own you will find there are plenty of losses. You have said that the cultivator who has only a small holding is more efficient and farms better than the big farmer. What exactly do you mean by that?—He is able to take more care of his land and crops; a man with 15 acres can look after them better than a man with 100.

8956. *Sir Ganga Ram:* I am cultivating 50,000 acres?—Your conditions may be different; you are doing it on a commercial scale.

8957. *Sir Chunilal Mehta:* Will a man who cultivates 5 acres show better results than a man cultivating 25 or 30?—A man cultivating only 5 acres is able to find the labour within his own family; he will not want any hired labour. No supervision is required.

8958. How many acres can an ordinary family (a man, his wife and two children) look after properly?—It will vary according to the taluka. In some places 5 acres will be enough; in other, dry areas 20 acres may be required to support a family.

8959. You would rather go in for small plots?—Yes.

8960. After your long experience in the Agricultural Department you say about Rs. 15 an acre is the net return to the cultivator?—Yes.

8961. *The Chairman:* In a dry area?—Yes.

8962. *Sir Chunilal Mehta:* It is almost all dry. People require more than what to live a decent life?—Yes.

8963. What do you propose to remedy this state of things?—To improve their agriculture and increase their yield is one thing.

8964. You say that better seed will only increase the return by 15 per cent?—Better cultivation will give some 10 per cent more.

8965. How much more can you add altogether by your efforts?—By better seed, 10 to 25 per cent more. By better cultivation, proper rotations and manuring, about the same amount.

8966. By all your improvements you might be able to raise the return from Rs. 15 to Rs. 30?—Not beyond that, certainly.

8967. If you could do that, would Rs. 30 be sufficient to attract people to cultivation?—It is not enough.

8968. Then what should be done?—There should be some subsidiary industries for smallholders.

8969. You say nothing about that in your note?—I had no time.

8970. What do you suggest?—There are several side industries. First and foremost there is the keeping of cattle.

8971. Do the cultivators in your Division keep cattle?—Yes, as many as they can maintain on their farms.

8972. *Sir Ganga Ram:* On what percentage of their land do they actually grow crops?—On the whole of it.

8973. Then what do they keep the cattle on?—They grow *juari*, *bajri*, *kadab* and rice-straw.

8974. *Sir Chunilal Mehta:* Cows and bullocks?—The higher people keep buffaloes chiefly; they have some prejudice against keeping cows. They do not castrate the bulls, the progeny of the cows, and so the cows do not pay them.

8975. Do they purchase their bullocks?—Yes. Only the low-caste people keep cows, and then one, two or three at the most.

8976. You consider cattle-breeding is a feasible proposition for cultivators?—Yes.

8977. Is cattle-breeding a possibility in Gujarat?—Yes, except in the most southerly part of the Surat district, where there is heavy rainfall, and which may not be suitable for cattle-breeding.

8978. Is cattle-breeding being taken up more now than it was 10 or 15 years ago?—No; less.

8979. Why?—Because the areas lying under grass have all been brought under cultivation on account of the high price of cotton and foodstuffs, so that they are not able to maintain the number of cattle they had before.

8980. Do not they stall-feed?—No.

8981. What other subsidiary occupations are there?—Poultry, sheep and goats, in the case of low-caste people who have no religious objection. They do that now to some extent, but it requires to be much improved. The poultry are in very bad conditions; very inferior birds are kept throughout India. Then there is spinning and weaving. I do not know about spinning, but I would like weaving to be introduced as far as possible.

8982. Do the cultivators do any weaving now?—Yes.

8983. What kind of cloth do they weave?—When I was a boy all my relations used to weave. Our people are *Desais*, and we used to weave all our requirements.

8984. Has that died out?—Almost.

8985. Why?—Because they do not want to take the trouble. They go to the market and get ready-made clothes.

8986. Do you think with propaganda hand-weaving could be introduced again?—Yes; people are realising they are losing a lot of money by purchasing these things.

8987. What other industries would you recommend?—There are several others which depend on the locality, like lac-making.

8988. *Professor Ganguly:* Do you consider the present standard of the graduate course of the agricultural college is low?—No.

8989. It is quite satisfactory?—Yes.

8990. But you want a post-graduate course added?—Yes.

8991. Is the post-graduate course satisfactory?—It has not been arranged yet.

8992. You have the M.Sc. course at Poona now?—That is different from what I have suggested; I want special training.

8993. You referred to the system of recruitment of agricultural labour in your district. What are the outstanding features of that system?—In former times the cultivator advanced a man sufficient money for his marriage, say Rs. 40 to Rs. 70, and for that the man and his wife used to serve the cultivator for the whole of their lives.

8994. A sort of slavery?—They were fed and clothed by the cultivator and given burial expenses if anybody died. That has been replaced by the contract system with contracts for a term of years, and the money advanced has risen to Rs. 700, and then often the men run away and the cultivators lose their services.

8995. Would you restrict their freedom of movement?—Unless a man has settled with his former master he should not go to another one.

8996. Have you made a study of the exchange question?—No. I have read the newspapers; that is all.

8997. *Mr. Calvert:* Do I understand your view is that so far as agriculture alone is concerned, the poverty problem is insoluble?—I think so. The only solution is for the cultivator to work eight or ten hours a day throughout the year.

8998. *Sir Chunilal Mehta:* Does that apply to irrigated tracts, or only to dry?—In the irrigated tracts they have to work all the year.

8999. *The Chairman:* How long have you known rural India intimately?—At least since I entered the service.

9000. How long is that?—Nearly 30 years.

9001. Have you known the same district through all those years?—I have gone over most of India. I served for six months on special duty in Sind; I served eleven months in the Punjab and then went to the Central Provinces, the United Provinces and Bihar and Orissa with Dr. Mollison on a tour.

9002. *Sir Ganga Ram:* You have served in the Punjab?—Yes, for a year on the cattle farm there.

9003. *The Chairman:* Are you familiar now with the districts you knew intimately 30 years ago?—I know Gujarat very well indeed.

9004. What do you think about the standard of living of the cultivators in that district you know so well?—It has increased to a large extent.

9005. It is higher now than it was 30 years ago?—Yes.

9006. To what do you attribute that?—Outside influences.

9007. I want something more definite?—On account of the railways and other facilities, people get about and see things. They acquire habits like drinking and smoking. Formerly very few people drank tea; now no one will go to work without taking a cup of tea. That is the worst of it. A man who used to have only one coat now requires three or four. Their houses have materially improved.

9008. *Sir Ganga Ram:* Do they eat wheat or *juar*?—It is according to the local produce. Southern Gujarat produces *juar*. If they grow rice, they eat rice; if *bajri*, *bajri*.

9009. *The Chairman:* My colleagues have been enticing you off the main line of my question. So far you have described changes in the habits of the cultivator; what I want to know from you is whether you think the purchasing power of the cultivator has risen in the years during which you have known this district so well?—It increased to some extent up to the outbreak of the War, but very slowly. After the War it increased rapidly, between 1918 and 1924. Now a depression has set in, and their purchasing power has been much reduced. For a year or two it does not matter, but if it continues for five years there must be a contraction in the standard of living.

9010. They are still attempting to maintain the standard of living to which they attained in 1920-21?—Yes.

9011. But if the period of depression continues, that standard will have to be contracted?—Yes.

9012. But you are definitely of opinion that on the whole the purchasing power of the cultivators in Gujarat has risen during the period of 30 years during which you have known the district?—Yes.

9013. Are there more power pumps in Gujarat now than there were when you first knew the district?—There were practically none to start with, and now in one taluka there are more than 100.

9014. Are there any other power machines?—There are now 125 tractors in Gujarat alone.

9015. What has been the effect of the introduction of labour-aiding machinery on the well-being of the cultivator?—If the machinery and spare parts could be supplied, it would materially help them.

9016. Have you ever taken a course in agricultural economy?—No.

9017. You rely on your common sense?—Yes.

9018. *Sir Ganga Ram:* You say "if the agricultural machinery was supplied". Do you mean supplied free?—No.

9019. What is the cost of ploughing with a tractor?—Rs. 10 to Rs. 25 an acre.

9020. For one ploughing?—Yes.

9021. If I undertook to do it for Rs. 5 what would you say?—I would give you a very big contract!

9022. *The Chairman:* What do you propose to do when you reach the moment for retirement?—I would like to go in for private farming. I have already applied to Government and to the Collector of Surat to give me the worst piece of land that they have, which is not occupied by anybody, and I want to show what can be done with it and utilise my experience there. I do not know whether I will get the land, but if I do I want to utilise my knowledge by farming myself, at the same time placing my experience at the disposal of the Agricultural or the Co-operative Department. My sole ambition is to do farming myself.

(The witness withdrew.)

The Commission then adjourned till 10 a.m. on Tuesday, the 9th November, 1926, at Bangalore.

APPENDIX.

The Vernacular Agricultural School, Godhra, was started in 1920-21. Out of 89 students that were admitted, 68 went successfully through the complete course of the school till the end of 1925-26. Of these successful students 32 are reported to have engaged themselves in their own agricultural pursuits independently, 1 in private agricultural service, 8 in the Agricultural Department service, 4 in other departments, 11 have joined other occupations, and as regards the remaining 12, no definite information is available.

MGIPC—L—491 RC on A—16-5-27—2,002.

INDEX

Note.—Figures in brackets refer to pages of written memoranda; other figures to questions in oral evidence.

ADMINISTRATION.

Agricultural Department, Bombay, expenditure of, one-third on research and two-thirds on demonstration and propaganda (*Mann*) 3332, 3333.
———, lack of appreciation by, of irrigation questions (*Inglis*) (226, 227), 5242, 5257, 5274, 5282-5284 5364-5366, 5440- 5442, 5470, 5471, 5609-5611.
———, organisation of (*Mann*) (1), (*Burns*) (100).
———, past defects of (*Rothfield*) (163).
———, staff of, in West Khandesh (*Knight*) 5873-5876.
———, necessity for increasing (*Mann*) 3620-3625.
———, work of, in Bijapur (*Naik*) 4692-4694.
———, does not attract best European research workers (*Mann*) 2757-2759, 3293-3295.
———, higher posts in, can be filled by Indians (*Mann*) 2756.
Agricultural overseers, work of (*Naik*) 4694.
All-India Cattle Committee, need for, as co-ordinating and advisory body (*Bruen*), 7131-7134.
Board of Agriculture, has not been of assistance in animal husbandry (*Bruen*) 7091, 7128-7130, 7151, 7152.
———, is at present unwieldy (*Mann*) 3815, 3816.
———, might be made a body to consider agricultural problem as a whole (*Mann*) 3815.
———, necessity for veterinary representation on (*Farbrother*) 4026.
———, no Indian representative on, ever appointed by Bombay (*Patel*) (540), 8373, 8374.
———, should become consultative committee of specialists (*Mann*) 3782.
———, valuable as furthering co-operation between Provincial Agricultural Departments (*Jenkins*) (447), 5, (*Appendix*) (*Mann*) (271, 272).
Board of Agriculture, Bombay, as co-ordinating body between different departments, unsuccessful (*Mann*) 5632.
———, composition and functions of (*Mann*) 5631.
———, is attended by Irrigation officers (*Inglis*) 5253-5256.
———, necessity for smaller boards, acquainted with local conditions (*Mann*) 5643-5650.
———, possible reconstruction of, as provincial counterpart to proposed central organisation (*Mann*) 5633-5639.
———, should meet more frequently and have a standing committee (*Mann*) 5635, 5663, 5664.
———, standing committee of, might co-ordinate Agricultural and Irrigation Departments (*Mann*) 5646-5647.
———, useful as advisory body (*Mann*) 5632.
Boards of Agriculture, divisional (*Mann*) 5643-5645.
Board of Education, need for, with adequate representation of Agricultural Department (*Patel*) (528), 8054-8058, 8392-8395.
Branch and feeder railway lines, a great asset to agriculture (*Mann*) 2829-2831.
Cattle, arrangements for their transport by rail unsatisfactory (*Mann*) 3247-3249, 3770.
Central Agricultural Research Board, for financing research, with series of committees dealing with specific branches of research, suggestion for (*Mann*) (3, 7, 8), 3193-3195, 3202, 3203, 3253-3266, 3318, 3319, 3549-3552, 3704-3711.
Centralisation, danger of (*Mann*) 3390-3397.
Central Irrigation Board, proposed, composition and functions of (*Harrison*) 5675-5680, 5683.
———, preferable to single officer acting as Irrigation Adviser to Government of India (*Harrison*) 5681.
Central legislation for control of cattle disease, need for (*Farbrother*) (122, 123), 4033-4035.

ADMINISTRATION—*contd.*

Central organisation, for agriculture, financing of (*Jenkins*) 7409-7412, 7414.
———————————, ideal system of, on lines of Indian Central Cotton Committee (*Mann*) (3), 2765, 3254, 3257-3266, (*Jenkins*) 7402-7404, 7413, 7414.
———————————, might have inspecting and consultative committees (*Mann*) 3779-3781.
———————————, need for (*Mann*) 3777, 3778, (*Jenkins*) (447), 7250-7252.
———————————, provincial representation on (*Jenkins*) 7405.
———————————, research by, suggested methods for (*Jenkins*) (447), 7405.
———————————, suggested functions for (*Patil*) (512, 513).
———————————, trade representation on (*Jenkins*) 7407, 7408.
———————————, *see also* Board of Agriculture, Central Agricultural Research Board, Central Rural Development Board and Financing of Research.
———————, for animal husbandry (*Bruen*) 7131-7134.
———————, for co-operative work (*Jenkins*) (448), 7314-7316.
———————, for irrigation research (*Inglis*) (228), 5276-5279, (*Harrison*) 5674, 5675.
———————, for irrigation questions generally, *see* Central Irrigation Board.
Central Rural Development Board, a, not a suitable body to undertake rural development (*Mann*) 3390-3397.
Civil Veterinary Department, *see under* **VETERINARY,** Veterinary Department.
Collectors, should be charged with general oversight of agricultural work in their district (*Naik*) (141, 142), 4724, 4725, 4727-4729, 4788-4794, 4877.
———, *see also* Revenue officers.
Communications, improvement of, its effect on supply of fuel from forests (*Edie*) (146), 4321, 4322, 4374-4376.
———————————, to facilitate marketing (*Patil*) (509, 510).
———————————, to provide alternative markets (*Mann*) 2928.
———————————, to secure markets for fruit, etc. (*Naik*) (139), 4213-4215.
———————————, would extend area of intensive cultivation (*Mann*) 3408, 3409.
Concessions, railway, for agricultural shows, etc., fairly liberal (*Mann*) 3454, 3455.
Conference of veterinary officers, might take place at same time as meetings of Board of Agriculture (*Farbrother*) 4021, 4022.
———————————, should be held more frequently (*Farbrother*) (120).
Co-operation between Provinces, must come from provincial initiative and not be imposed from above (*Burns*) 3859.
———————————, can be secured by delegating provincial officers to other Provinces temporarily (*Burns*) (102, 103), 3873, 3874.
———————————, by conferences of research workers (*Jenkins*) 7311-7313.
———————————, instances of value of (*Jenkins*) (447).
———————————, need for further (*Jenkins*) (446, 447).
———————————, value of Board of Agriculture as providing means for (*Jenkins*) (447).
Co-operation of Agricultural Department with Co-operative Department (*Collins*) 4887-4896 (*Jenkins*) (464).
———————————with Education Department (*Mann*) 3363-3365.
———————————with Forest Department (*Mann*) 2948 (*Edie*) 4225, 4226, 4332-4334.
———————————with Irrigation Department (*Mann*) 2864-2867, 3156 (*Inglis*) (226, 227), 5242-5357, 5397-5399, 5440-5442, 5466, 5472, 5473, 5499, 5500-5523, 5542-5544, 5593-5604, 5611 (*Harrison*) 5748-5750, 5779-5781.
———————————with Meteorological Department (*Mann*) (8), 3148-3150 (*Burns*) (103), 3915-3920, 3973, 3974.
———————————with Veterinary Department (*Farbrother*) 4022-4027.

ADMINISTRATION—*contd.*

Co-operation of Agricultural Department with allied departments, by means of Departmental Joint Boards (*Rothfield*) 4540.
Co-ordination of provincial veterinary work (*Farbrother*) (120), (*Bruen*) 6895, 6896, 7089-7091, 7123.
Crop conferences, desirability of (*Jenkins*) 7311, 7312.
Departments allied to Agriculture (Education, Forest, Irrigation and Veterinary) should come under same Minister as Agriculture (*Mann*) 3389, (*Rothfield*) 4540-4544, (*Desai*) (577).
Departmental Joint Boards for securing co-operation between Agricultural and allied departments, success of in Bombay (*Rothfield*) 4540.
Deputy Directors of Agriculture, duties of (*Desai*) 8642-8664.
Director of Agriculture, duties of (*Burns*) (100, 101).
District Local Boards, apathy of cultivators with regard to (*Knight*) 5845-5848, 5911, 5912.
———, have been handicapped by lack of funds (*Mann*) 2844, 2845.
———, may be in charge of roads in dry tracts, but not in irrigated areas (*Inglis*) (230).
———, necessity for caution in handing roads over to (*Harrison*) 5694, 5751.
———, roads built by Irrigation Department, should not be handed over to (*Harrison*) 5695, 5696, 5718-5725.
———, should appoint their own veterinary staff, distinct from that of Civil Veterinary Department (*Farbrother*) 4063-4066.
———, should control veterinary dispensaries in their areas (*Farbrother*) (119, 121), 4098-4102.
———, their control of roads leading to deterioration (*Mann*) 2839-2841, 3759-3763, 3812-3814.
———, would require provincial advice and support in veterinary matters (*Farbrother*) 4099, 4100.
Exchange of information with workers in other Provinces and at Pusa (*Mann*) 3315, 3316, (*Burns*) (102, 103), 3873, 3874, 3888, 4001-4008.
Financing of research, by grants from Central Government (*Mann*) 2770, 3127-3130, 3193-3197, 3202, 3203, 3253-3266, 3390.
———, by Indian Central Cotton Committee (*Mann*) 2975-2979, 3198-3201.
———, by means of an export cess (*Mann*) 3026, 3053, 3054.
———, by Sassoon David trustees (*Mann*) 2975-2979.
———, desirability of permanent provincial fund to ensure continuity (*Mann*) (2), 3613.
———, proposals for (*Mann*) (2) (*Burns*) (101), 3840, (*Jenkins*) (438), 7246, 7247, 7540-7542.
———, veterinary, by committee appointed by the Government of India (*Farbrother*) (118), 4017, 4018.
Freight rates and facilities, complaints regarding, brought to attention of railways by Agricultural Department (*Mann*) 2833-2835.
Freight rates on railways, obstacle of high, to marketing of agricultural products (*Mann*) (8).
Glanders and Farcy Act, effect of (*Farbrother*) 4039, 4040.
Government of India, may usefully co-operate with, but not direct, Provincial Agricultural Departments (*Mann*) (2, 7, 8), 3193-3195.
———, might control financing of veterinary research (*Farbrother*) (118).
———, must always interest itself in agriculture (*Mann*) 2766-2769, 3549.
———, scientific staff of, no need for large increase in (*Mann*) (8).
———, should be in a position to take more active part in large irrigation schemes and more active direction when schemes concern two or more Provinces (*Harrison*) 5682.
———, should have a veterinary department of its own to co-ordinate control of epidemics (*Farbrother*) (119).
———, should not control Provincial Agricultural Departments (*Burns*) (102).
———, scientific staff of, need not be increased (*Burns*) (102), 3858-3862.
———, suggestions for action by (*Mann*) (718), 2770, 2771, 3127-3130, 3320, 3321.

ADMINISTRATION—*contd.*

Indian Central Cotton Committee, methods and work of (*Mann*) (2, 3), 2765, 2975, 2976, 3025, 3128-3130, 3198-3201, 3256, 3267, 3268, 3551, (*Jenkins*) (439), 7245-7249, 7402, 7403, 7413-7422, 7424-7430.
Indian officers of Agricultural Department, good work of (*Patil*) (512).
———————————, training for (*Patil*) (512), 8351-8363.
Institute of Plant Industry, Indore (*Jenkins*) (447, 448).
Livestock Department, may be under Agricultural or Veterinary Department (*Farbrother*) 4050-4053, 4118-4122.
———————, should be under Director of Agriculture (*Bruen*) 6887, 6889, 7116-7118.
Meteorological Department, problems requiring study by (*Mann*) (18), 3148-3150, (*Burns*) (103), 3915-3920, 3973, 3974.
———————————, not of great assistance to cultivators (*Patil*) (513).
Organisation of research by crops, *see under* RESEARCH.
Port, need for a, between Bombay and Colombo (*Naik*) (136), 4741-4743.
Postal facilities, their extension desirable (*Mann*) 2847, 2848.
Provincial Agricultural Departments, should be independent of outside assistance (*Patil*) (512).
———————————————, should include section dealing with marketing (*Patil*) (511).
Railway administrations, no means of bringing pressure to bear on (*Rothfield*) (163).
Railway communications, need for improvement of (*Inglis*) (234), (*Patil*) (513).
———————————, *see also* Branch and Feeder lines.
Railway rates for agricultural produce, sometimes unduly high (*Collins*) (198).
———————————, questions regarding, should be dealt with by Commerce Department of Government of India (*Collins*) (198), 5152-5156.
———————————————————, sometimes manipulated to prejudice of agriculturists (*Rothfield*) (163), 4490, 4491, 4545, 4608-4611.
———————————————, higher in India than elsewhere (*Patil*) (510).
———————————————, should be reduced (*Patil*) (513).
———————————————————, for timber and fuel, usually high (*Edie*) 4377, 4378.
Revenue Department, distribution of leaflets on improved implements by (*Jenkins*) (459), 7343-7346.
———————————, importance of co-operation with (*Jenkins*) (443), 7464.
———————————, should co-operate in inducing cultivators to adopt better system of cultivation (*Jenkins*) (456), 7858-7864.
———————————, relations of, with Irrigation Department (*Inglis*) 5474-5476.
Revenue officers, and rural problems (*Knight*) 5883-5889.
———————————, their advice sought by cultivators (*Knight*) 5888, 5889.
———————————————, collaboration of with Agricultural Department (*Knight*) (286), 5907-5909, 6055-6059.
———————————, *see also* Collector.
Roads, bridging of (*Mann*) 3741, 3742, (*Edie*) 4455-4457.
———, condition of (*Mann*) 2838, (*Naik*) 4843-4847, (*Collins*) 5104-5106, (*Knight*) (287), 6091-6096.
———, construction of, by forced labour, undesirable (*Knight*) 6037-6045.
———, control of, by District Boards, has led to deterioration (*Mann*) 2839-2841, 2844, 2845, 3759-3763, 3812-3814, (*Harrison*) 5694, 5751.
———, importance of, to agriculture (*Mann*) 2847, (*Naik*) (140, 141) (*Knight*) 6090.
———, importance of made (*Knight*) (287), 5835.
———, in irrigated tracts in the Deccan, are in some cases in charge of canal staff (*Mann*) 2842, 2843, (*Inglis*) (230).
———————————————, need for further (*Inglis*) (230, 234), 5412, 5413.
———————————————, part of District Board cess should be earmarked for (*Inglis*) (230).
———————————————, should be under control of canal staff (*Inglis*) (230), 5288.
———————————————, their control by Irrigation Department (*Harrison*) 5697, 5698.
———————————————————, when made by Irrigation Department, should not be handed over to District Boards (*Harrison*) 5695, 5696, 5718-5725.

ADMINISTRATION—*concld.*

Roads, kutcha, cannot be improved by village agency (*Knight*) 5836, 5837.
————————Government funds for (*Knight*) 5843, 5869.
————————, improvement of, by District Boards, hindered by lack of money (*Knight*) 5835-5845, 5910, 6060-6065.
————————, in backward areas might be managed by Revenue Department (*Knight*) 5868.
————————, lack of, in Khandesh (*Jenkins*) 7817.
————————, maintenance and transport charges on made and *kutcha* (*Knight*) 5932-5934.
————————, need for provision of further in forest areas (*Collins*) (193).
————————, provision of, by loans to meet non-recurring costs (*Knight*) 5930-5931.
————————, regular programme for construction of, by Forest Department (*Edie*) 4322-4324.
————————, second class, need for extending (*Patil*) (513).
Rural Development Department, need for, to absorb all duties of Agricultural Department except research and of Co-operative Department except urban co-operation (*Jenkins*) (464), 7847-7852.
Secretariat system, should be replaced by system of Ministeries organised as in other countries (*Rothfield*) (163), 4487-4489, 4533, 4534, 4540.
Superior Provincial Agricultural Service, officers for, can be trained in India (*Mann*) 2823-2827.
————————————————————, except at present for such posts as mycologist (*Mann*) 2826, 2964.
Tramways, possibilities of (*Mann*) 3040-3044.
Veterinary Service, is too small and neglected to do effective work (*Rothfield*) (163).
————————————, need for considerable development of (*Collins*) (193), 5107, 5108.
————————————, *see also* under **VETERINARY**.

AGRICULTURAL INDEBTEDNESS.

Absentee landlordship, is increasing and must be discouraged (*Salimath*) (373, 380), 6725-6727.
Backward tribes, should not have the right to alienate land (*Knight*) (290).
Bhils, sometimes repay debt by working as labourers for their creditors (*Knight*) 5945, 6097-6100.
Cattle-mortality, not a main cause of borrowing (*Collins*) 5033, 5034.
Causes of indebtedness (*Collins*) (194), 4910, 4911, 5033-5035, 5040-5042 (*Knight*) (289), (*Maxwell*) (337), (*Salimath*) (373), (*Jenkins*) (448), (*Patil*) (513), (*Patel*) (520), (*Desai*) (574), 8685-8688.
Causes preventing repayment, (*Patil*) (513), (*Desai*) (574).
————————————, failure of crops the chief cause of (*Jenkins*) (448).
Co-operative movement, spread of, a remedy for evils of indebtedness (*Collins*) (194).
————————————, does not so far afford adequate finance (*Jenkins*) 7761-7763.
Cotton-growers in Khandesh, are not so hampered by indebtedness as is sometimes believed (*Jenkins*) (448).
Credit, as a cause of debt (*Knight*) 5936-5940, (*Maxwell*) 6224.
————, danger of facile (*Collins*) (194), 5200-5202.
————, long-term cheap, needed for redemption of mortgages (*Patel*) (530).
————, of cultivators, increase in, may increase their indebtedness (*Mann*) 3502, 3503.
————, restriction of, prevents wasteful expenditure (*Knight*) (290, 291).
————, sources of (*Rothfield*) (163), (*Jenkins*) (448), (*Patil*) (513), (*Desai*) (574).
Cultivators, agriculture being a marginal industry, are not benefitted by cheap capital unless they have a surplus to permit of repayment (*Patil*) (513).
————————, capital for, should be provided at cheap rates and rationed (*Patil*) (513), 7989-7992.
————————, cost to, of starting afresh on an economic holding (*Knight*) (290), 5849, 6031-6035.
————————, honesty of, in repayment of loans, excessive (163), 4492-4494, 4573-4577.
————————, loans to, must be given for productive purposes only (*Patel*) (530).
————————————, need for supervision of (*Patel*) 8111-8123, 8401, 8402, 8427, 8428.
————————, poverty of, causes of (*Salimath*) (380), 6787-6791.
————————, profits made by, improvement of, by improving marketing, punishing fraud and giving them a voice in Imperial policy, a remedy for insolvency (*Rothfield*) (164).

AGRICULTURAL INDEBTEDNESS—*contd.*

Cultivators, should not be allowed to contract debts of more than one-fifth the value of their land, except for land improvement (*Salimath*) (373).
———— , when deeply in debt, should be encouraged to give up their holdings and start afresh (*Rothfield*) 4492-4494.
————, when deeply in debt, should not be encouraged to give up their holdings and start afresh (*Collins*) 4937-4939.
Damdopat, application of rule of (*Naik*) 4735-4737.
Deccan Agriculturists Relief Act (*Mann*) 3164, (*Collins*) (194), 4941, (*Knight*) 5979-5982, (*Desai*) 8553-8559, 8689-8693, 8765-8770.
Economic holdings, should be inalienable and impartible (*Knight*) (291).
Education against wasteful expenditure (*Knight*) (290).
Execution proceedings against cultivators, defects of (*Knight*) (289, 290), 5983-5990.
————, by Revenue Department (*Maxwell*) 6231, 6323-6331.
Inalienability, conditions for (*Knight*) (290, 291).
————, not affected by Navadari tenure (*Maxwell*) 6308-6317.
Indebtedness, causes of (*q. v.*)
————, due more to misdirection than shortage of capital (*Mann*) 3500-3502, 3562-3564.
————, influence on, of precariousness of rainfall (*Mann*) 3562-3567.
————, problem of, old standing (*Knight*) (288).
————, relief of, by loans from Government or land mortgage banks at low rate of interest to enable cultivators to repay their debts (*Naik*) (137), 4199-4207, 4744-4751, 4856-4862.
————, remedies for (*Maxwell*) (337, 338).
————, suggestions for lightening, (better farming, compulsory and adult education, improved communications and marketing facilities (*Desai*) (574).
Insolvency Act, need for propaganda to explain uses of (*Rothfield*) (164), 4492-4495, 4573-4577.
Insolvency laws, little use made of, by cultivators (*Mann*) 3671-3673.
Investigation of ten typical cotton-growing villages in Khandesh (*Jenkins*) (448, 449).
Lack of facilities for investing money, its effect on agricultural indebtedness (*Collins*) 5040-5042, (*Rothfield*) (163).
Land mortgage banks, establishment of, a remedy for evils of indebtedness (*Collins*) (194).
Land Revenue Code, Bombay, Section 86, effect of (*Maxwell*) (337, 338), 6228-6232, 6300-6302, 6323-6338, 6421, 6422.
————, should be repealed (*Maxwell*) (337, 338), 6409.
————, effect of repeal of, on co-operative societies (*Maxwell*) 6303-6307.
Legal privileges for cultivators, special, undesirable (*Rothfield*) (164), 4569.
Litigation, avoidance of, by legislation setting up local bodies to decide disputes (*Patel*) 8027-8029.
————, causes much waste of money by cultivators (*Patel*) 8026.
Moneylending landlords, worse than ordinary money lenders (*Rothfield*) 4571, 4572.
Moneylenders, are depositing their money in credit societies (*Collins*) (200).
————, can sometimes recover long-standing debts by transferring their dues to societies (*Collins*) (200), 5084.
————, can never be entirely replaced by co-operative societies (*Collins*)5089-5092.
————, evasion of restrictions by (*Desai*) 8689-8693, 8766-8768.
————, further legislation to control, undesirable (*Collins*) 5092-5103.
————, give greater elasticity in repayment than credit societies (*Collins*) 4906, 4907, 5077-5080.
————, methods of (*Knight*) (287, 288).
————, performs a useful part in rural economy (*Knight*) (287, 288).
————, rate of interest charged by, 12 to 18 per cent. (*Naik*) 4861.
————, is higher in famine areas and where education of people is low (*Collins*) 5191-5194.
————, does not represent cost of borrowing (*Collins*) 5074-5076, 5184, 5185.
————, figures for various districts (*Collins*) (200).
————, has been reduced by activity of Co-operative Societies (*Naik*) (139).
————, is high owing to uncertainty of repayment (*Collins*) 5096, 5186-5188.

AGRICULTURAL INDEBTEDNESS—*concld.*

Moneylenders, rate of interest charged by, to agriculturists with large assets usually lower than co-operative societies' rates (*Collins*) (200), 4901-4903.
———————————————, to agriculturists with limited assets, formerly about 24 per cent. but since reduced by activity of co-operative societies (*Collins*) (200), 4981-4983, 5043.
———————————————, varies according to class of population (*Collins*) 5196, 5197.
———————, supply bulk of loans required by cultivators in Bijapur district (*Naik*) 4701-4704.
Monsoon, uncertainty of, a cause of debt (*Collins*) 4909-4911.
———————, not a principal cause of debt (*Maxwell*) 6221-6224.
————, effect of bad, in causing indebtedness, should be combated by extension of dry farming (*Knight*) (290), 5850.
Mortgage of lands, rarely undertaken to provide funds for land improvement (*Rothfield*) 4551.
———————, long-term cheap credit needed for redemption of (*Patel*) (530).
———————, sometimes takes the form of fictitious sale owing to restrictions placed on moneylenders (*Desai*) 8689-8693, 8766-8768.
Mortgage and sale, right to, should be restricted in backward areas (*Rothfield*) (164).
———————, policy of restriction of, has failed in certain Indian States (*Desai*) (574).
———————, right to, should not be restricted (*Desai*) (574).
Non-terminable mortgages, should be prohibited (*Rothfield*) (164), (*Maxwell*) (337, 338), 6285, 6286.
———————, should not be prohibited (*Collins*) (194), 5046.
Peasant proprietors, decline of (*Maxwell*) (337), 6225, 6226.
Poverty of agriculturists, causes of (*Salimath*) (380), 6787-6791.
Productive debt, not an evil (*Collins*) (194).
State regulation of interest (*Mann*) 3164.
Usurious Loans Act, not applied in Bombay (*Rothfield*) 4550, (*Naik*) 4734, 4735, (*Collins*) 4940, (*Maxwell*) 6278-6281.
———————, stricter application of, undesirable (*Collins*) (194).
———————, application of, may help cultivators to some extent (*Salimath*) (373).
———————, will not help cultivators unless Government finance is available (*Desai*) (574).
Unsecured loans, mean higher rate of interest (*Knight*) 5942-5945.
Remission of revenue (*Maxwell*) 6318-6322.
Rental values, need for reduction of (*Salimath*) (373), 6792-6794.
Right of sale, its limitation not important (*Salimath*) (373).
———————, some limitation of, desirable (*Patil*) (513).
Rural debt, unable to estimate extent of, in Bombay (*Patil*) 7958-7963.

AGRICULTURAL INDUSTRIES.

Agriculture, should be where possible the whole-time occupation of cultivators (*Jenkins*) 7822, 7824-7826.
Caste prejudices, to subsidiary occupations (*Salimath*) (377).
———————, *see also* Poultry-keeping.
Cattle-breeding and dairying, might be developed (*Collins*) (196), (*Patel*) (538), (*Desai*) 8970-8980.
Co-operative: fruit sale societies (*Burns*) (104), 3967-3970.
———————: organisation of subsidiary industries (*Naik*) (139), (*Collins*) (195), 5008, (*Jenkins*) (462), 7826.
———————: societies of producers of raw materials, may attract industries to rural areas (*Salimath*) (377).
Cottage industries, usually skilled occupations (*Mann*) 3468.
Cultivators, can make their own cloth (*Salimath*) (377), 6649-6658.
———————, must adopt subsidiary occupations if their condition is to be improved (*Patel*) (538), 8472-8476, (*Desai*) 8960-8976, 8997, 8998.
———————, number of days worked by (*Salimath*) (377), 6616-6620, (*Patel*), (537, 538), 8476.
———————, number of days worked by average family of five, 180 days each per annum (*Patil*) (514).
———————————————, varies greatly in different districts (*Patil*) 7900, 7901.

AGRICULTURAL INDUSTRIES—*contd.*

Factories for using agricultural products, might be subsidised or financed by Government (*Mann*) 3463-3465, 3467.
Field embankments, should be constructed by cultivators in spare time with help of taccavi loans (*Salimath*) (377).
Fruit-growing, possibilities of (*Burns*) (104).
————, limited by lack of irrigation facilities and organisation for marketing (*Patel*) (538).
————, financial difficulties in regard to (*Burns*) 3949-3953.
————, research into (*Jenkins*) (440).
Fruit-preserving (*Burns*) (104), 3956-3961, 3979.
————, should not receive State-aid (*Burns*) 3962-3966.
————, research into (*Jenkins*) (440).
Fruit-marketing (*Burns*) (104), 3954, 3955.
Government assistance for subsidiary industries (*Mann*) 3463, 3465, 3469, 3473, 3474, 3476-3478, (*Salimath*) (377).
Hiring of carts and bullocks, principal subsidiary occupation of cultivators in Khandesh (*Jenkins*) (462), 7819-7821.
Importance of subsidiary industries (*Collins*) 5003.
Lac cultivation (*Mann*) 3098.
Possibilities of subsidiary industries (*Collins*) 5004, 5007.
Poultry keeping, caste prejudices against (*Patel*) 8439-8441, 8515-8521.
————, need for improvement of (*Patil*) (514), (*Patel*) (538), (*Desai*) 8981.
Propaganda, necessary to induce villagers to employ spare time in improving health conditions of their environment (*Salimath*) (378).
————, to encourage subsidiary industries, may be carried out by graduates in their vacations (*Patel*) (539).
Provision of subsidiary industries, difficult (*Knight*) (295), 6067-6089.
Rural industries, need for study of (*Salimath*) (377).
Spare-time industries for cultivators, must be distinguished from industries using agricultural products (*Mann*) 3466.
————, necessity for encouraging and organising (*Mann*) 3581-3586.
————, need not be subsidised by Government (*Mann*) 3469.
Spinning, *see* Weaving.
Suggestions for subsidiary industries (*Naik*) (139), (*Salimath*) (377), (*Desai*) 8981-8987.
Vegetable drying and canning (*Patel*) (538).
Weaving, by hand, is dying out but might be revived by propaganda (*Desai*) 8982-8986.
————, by local Mahars, decaying in West Khandesh (*Knight*) 6072-6075, 6081-6083.
————, cloth produced and marketing arrangements, (*Salimath*) 6650-6657.
————, scope for improvement in (*Salimath*) 6658.
————, Government classes for (*Salimath*) (377).
————, importance of (*Salimath*) (377).
————, little scope for, in Kaira district (*Maxwell*) 6404-6408.
————, no caste prejudice against (*Salimath*) 6647-6649.
————, not altogether suitable as occupation for cultivators (*Jenkins*) 7822, 7826.
————, the teaching of, to cultivators (*Mann*) 3471-3474, 3767-3769, (*Knight*) 6080.
————, (*Patel*) (538), 8330-8342.

AGRICULTURAL LABOUR.

Attracting labour to new areas, (*Appendix*) (*Patil*) (515-517), 7907-7911.
————, areas available for (*Maxwell*) (339).
————, by grant of big areas to individuals of large means on favourable terms (*Collins*) (196).
————, by paying higher wages and introducing contract system (*Desai*) (577).
————, conditions for success of propaganda for (*Salimath*) (378).
————, methods adopted and suggestions for (*Maxwell*) (339).
————, trying to attract small cultivators, has failed in Mysore (*Collins*) (196), 4942, 4943.
Card system for indentured labour, should be introduced to prevent loss to cultivators (*Desai*) (577), 8761-8764, 8993-8995.
Cultivators, settlement of, in forest areas to provide labour (*Edie*) 4342-4345.
Labour, available for forest work, insufficient (*Edie*) (146), 4252-4260, 4335-4345, 4434-4437.

AGRICULTURAL LABOUR—*contd.*

Labour, for wages, becoming subsidiary industry for small cultivators in the Deccan (*Mann*) (9).
Land in Dharwar and Belgaum districts, has gone out of cultivation owing to attacks by wild pigs and malaria (*Salimath*) (374).
Medical facilities and more generous forest policy, might prevent land going out of cultivation in North Kanara (*Maxwell*) (339).
Shortage of labour, (*Rothfield*) (164), 4519, 4617-4623.
———————, alleged, due to inability of farmers to pay market rate of wages (*Patil*) (508), 7912, 7921-7925, 7964-7972.
———————, causes of (*Mann*) 2939-2944, 3173, (*Collins*) (196).
———————, disease and faulty diet as causes (*Mann*) 3427.
———————, does not necessarily imply a higher standard of living (*Mann*) 2938, 2940.
———————, due to shortage of labour power rather than of individuals (*Mann*) 3425, 3426.
———————, has not yet led to increased use of labour-saving machinery (*Mann*) 2936, 2937.
———————, is seasonal (*Mann*) 3423, 3424, (*Maxwell*) (339), (*Salimath*) (378), (*Desai*) (577).
———————, lack of information regarding (*Collins*) (196).
———————, suggested remedies for (*Collins*) (196), (*Desai*) (577).
———————, the chief cause of rise in wages (*Mann*) 2935.
Wage rates, in Bombay (*Mann*) 3751-3753.
————, increase in, has encouraged absenteeism (*Maxwell*) (339).

ANIMAL HUSBANDRY.

All-India Cattle Committee, need for, as co-ordinating and advisory body (*Bruen*) 7131-7134.
Anand Central Creamery, results of, should be published (*Patel*) 8492, 8493.
———————, should be used to organise production and sale of butter on commercial lines (*Patel*) (537), 8160-8163, 8196-8210.
Animal nutrition, importance of studying (*Bruen*) 7135, (*Patel*) 8382-8391.
Annual buying and selling of cattle by cultivators (*Knight*) (294), 5860-5863, (*Maxwell*) 6241.
Bajri crop, largely depended on for fodder (*Maxwell*) 6391, 6392.
Board of Agriculture, has not assisted animal husbandry (*Bruen*) 7091, 7128-7130, 7151, 7152.
Brahmani bull system, failure of (*Bruen*) (401, 402).
Breeders, professional, are fast dying out (*Bruen*) (399).
———————, competition with, of Sindhi animal brokers (*Bruen*) 7216-7218.
———————, methods of, are deteriorating (*Bruen*) (399), 6998-7001.
———————, need for training of, in farming and cattle-breeding (*Patel*) (531).
———————, pay higher rates for forest grazing than ordinary cultivators (*Edie*) 4396-4399.
———————, their work no longer remunerative (*Bruen*) 7166-7175.
Breeding, farms for, run by non-official organisations in Bombay (*Jenkins*) (459), 7776, 7777.
————, Government farms for (*Bruen*) (402-408, 410, 411), 7083.
————, methods of, in the past (*Bruen*) (399).
———————, present (*Bruen*) (399, 400).
Breeds of cattle in Bombay, existence of and necessity for various types (*Bruen*) (401).
———————, Amrit Mahal (*Bruen*) (403), 6952.
———————, Dongi (*Bruen*) 7064, 7065, 7106, 7107.
———————, Gopi (*Mann*) 3001.
———————, Kankrej (*Mann*) 3000, (*Bruen*) (403).
———————, Malvi (*Bruen*) 6952, 7219.
———————, Nimari (*Bruen*) 6952.
———————, Sindi (*Bruen*) (403, 404), 7219, 7220.
———————, in Nasik and Khandesh (*Jenkins*) (459).
Buffaloes, are superseding cows as milk producers (*Bruen*) (401), 6950, (*Patel*) 8140.
————, breeding of, to improve milk-production (*Bruen*) 7100-7105.
————, can never rival cows as draught producers (*Bruen*) (401).
————, essential for dairy industry (*Bruen*) 7061, 7211.
————, low price of (*Bruen*) 7065.

ANIMAL HUSBANDRY—*contd.*

Buffaloes, milk of, average yield (*Patel*) (535), 8153.
————————, preferred to cows' milk (*Bruen*) 7059, 7060, 7067, 7068, (*Patel*) 8144, 8145, 8280-8284.
————, need for cattle farm for improving (*Patel*) (532).
————, need for more care of (*Patel*) (531).
————, receive more attention than cows and are consequently improving (*Bruen*) (401), 6949.
————, statistics of distribution of milch, in Bombay (*Patel*) (532).
————, their use for ploughing (*Bruen*) 7063-7065, 7107, 7108.
Bullocks, area cultivable with pair of (*Knight*) 5991-5995, 6016-6020, (*Bruen*) 7033.
————, capable of 7 years' work (*Bruen*) 6966-6969.
————, mature at 4½ to 5 years (*Bruen*) 6966.
————, numbers of, in Bombay (*Bruen*) 6960, 6962, 6963.
————, provision of better, essential for introduction of iron ploughs (*Knight*) (293).
————, requirements of, in Bombay (*Bruen*) 6964, 6965, 6970, 7031-7034.
————, waste of power of, on small holdings (*Patel*) 8435-8438.
Bulls, clubs for in villages (*Bruen*) (405).
——, premium (*q. v.*)
——, belonging to Agricultural Department, other than premium, are let out for stud purposes (*Bruen*) 7229-7231.
Butter, importance of melting point of (*Bruen*) 7232, 7233, (*Patel*), 8146-8148.
————, need for uniform and high quality of (*Patel*) (534), 8168-8174.
————, trade in, suggestions for (*Patel*) (535), 8152-8154.
————————, Government assistance for (*Patel*) (535), 8166-8175.
————————, organisation of, in India and other countries compared (*Patel*) (534).
————————, in Northern Gujarat (*Patel*) (533).
——, *see also* Dairy products.
Butter fat test basis, should be employed in paying for milk (*Patel*) 8180-8187.
Castration, by Burdizzo method (*Farbrother*) 4175.
————, of inferior bulls (*Jenkins*) 7504-7506.
————, religious objections to (*Bruen*) (400).
Cattle, are above the average in districts where they are well cared for (*Bruen*) 6994-6997.
————, as draught animals, manure and milk producers (*Bruen*) (399).
————, causes of good quality of, in Kaira district (*Maxwell*) 6327, 6382-6390.
————, districts where they are distinctly above and below average (*Bruen*) 6993.
————, foreign demand for Indian, would be valuable (*Bruen*) 7234,7235.
————, price of (*Bruen*) (400), 7193-7196.
Cattle-breeding, and dairying, might be developed as subsidiary occupations (*Collins*) (196).
————————————————, teaching of (*Bruen*) 7119-7127, 7142-7144.
————————————, is not remunerative (*Bruen*) 7166-7178.
————————————, a practicable proposition in Khandesh (*Jenkins*) 7865-7867.
————————————, *see also* Improvement of breeds.
————————————, societies, and milk-recording societies, need for (*Patel*) (537).
————————————————, area required for, in forests (*Jenkins*) 7630-7634.
————————————————————, assistance given to, by Livestock Department (*Bruen*) 7156-7160.
————————————————————, defects of (*Bruen*) (404).
————————————————————, good work done by (*Bruen*) (404).
————————————————————, have difficulty in paying (*Bruen*) 7176, 7177.
————————————————————, in Poona (*Jenkins*) 7842-7844.
————————————————————, need for propaganda to create demand for (*Collins*) 5009.
————————————————————, numbers of (*Bruen*) (404), 7154.
————————————————————, objections to, by Forest Department (*Jenkins*) (460), 7630-7634, 7784.
————————————————————, scheme for, in Khandesh (*Jenkins*) 7347-7352, 7780-7781.
————————————————————, should be developed (*Collins*) (200), (*Salimath*) (379).
————————————————————, should be encouraged by grant of forest grazing areas on concession terms (*Jenkins*) (460), 7347, 7500, 7782-7784.
Cattle Committee, Bombay, report of (*Bruen*) 7031-7033.
Cattle Committees (divisional) (*Jenkins*) (460).
Cattle insurance (*Mann*) 3685-3691.
Cattle-lifting, does not exist in Bombay (*Bruen*) 7225, 7226.
Cattle mortality, not a main cause of borrowing (*Collins*) 5033, 5034.
Cattle population of Bombay, 9·9 millions (*Bruen*) 6953.

ANIMAL HUSBANDRY—*contd.*

Cattle population of Bombay, only ⅓rds of requirements produced in Bombay (*Bruen*) 6960.
Chaff-cutters, provision of (*Jenkins*) (461, 462).
Clover, substitutes for (*Mann*) 3731-3736.
Co-operative dairying, possibilities of (*Patel*) (532-537), 8155-8176.
see also Butter, trade in.
Co-operative fodder storage (*Jenkins*) (461), 7836, 7837.
Co-operative grazing schemes in forest areas (*Jenkins*) (462), 7500-7502, 7591,7592
see also Cattle-breeding societies.
Co-ordination between Provinces in veterinary and animal husbandry matters, (*Bruen*) 6895, 6896, 7089-7091, 7123.
Cows, calving of (*Bruen*) 7013-7015, 7214, 7215.
——, in Bombay, number 1½ millions (*Bruen*) 6958, 6959, 7013, 7017, 7018.
——, 75 per cent. of, are uneconomic (*Bruen*) (402), 6957.
——, little attention paid to (*Bruen*), (402, 403).
——, must produce some milk to be economic (*Bruen*) 7068, 7214.
——, their use for ploughing (*Bruen*) 7092-7095.
Cross-bred animals, are better milk producers because more attention has been paid to them (*Bruen*) 6908, 6909.
——, liable to disease of (*Bruen*) 6906.
Cross-breeding (*Mann*) 3001-3003.
Crossing of indigenous with European or American cattle, a hindrance to improvement of cattle (*Bruen*) 6906.
——, objectionable (*Bruen*) 6899, 6900.
——, first crosses successful as milk producers (*Bruen*) 6901-6903.
——, second crosses, definition of (*Bruen*) 7003.
——, hopeless (*Bruen*) 6904, 6905, 6910, 6911, 7003-7006.
——, policy of military dairy farms (*Bruen*) 6901-6912.
Cultivators, annual buying and selling of cattle by (*Knight*) (294), 5860-5863, (*Maxwell*) 6241.
——, as a rule keep one or two buffaloes and no cows (*Patel*) 8153, 8291, 8293.
——, risk to, from purchase of high-priced cattle, worth running (*Bruen*) 7181, 7182, 7192-7196.
——, should keep cows rather than buffaloes (*Bruen*) 7211-7215.
——, will never improve their cattle unless present system is made unprofitable (*Knight*) (294).
Dairy industry, advantages of, as cottage industry (*Patel*) 8462-8466.
——, co-operative (*q. v.*).
——, hygienic, can be made commercially profitable (*Bruen*) 6930, 6934, 6935, 7178-7180.
——, difficulties of (*Bruen*) 6930, 7179, 7180.
——, in the Deccan, possibilities of (*Bruen*) 7206-7209, (*Patel*) 8457-8461.
——, in Gujarat, causes of failure of (*Patel*) 8294.
——, extensively carried on (*Collins*) 5052-5055.
——, pays because of attention given to cattle and because run as cottage industry (*Bruen*) 7203-7208.
——, need for introduction of, as subsidiary industry (*Collins*) (196), (*Patel*) (538), 8265-8270, (*Desai*) 8970-8980.
——, should be encouraged and subsidised in districts for supplying milk to cities (*Bruen*) 6938-6940, 7035-7038, 7084, 7207, 7208.
Dairy products, loss of export market for (*Bruen*) 6941, 6942, 7210.
——, prices of (*Bruen*) (400), 7019, (*Patel*) (532).
——, supplying of, can be made commercially profitable (*Bruen*) 6941.
Dairy work, teaching of (*Bruen*) 7119-7127, 7142-7144.
Deterioration of cattle (*Bruen*) (400-402), 6894, 6922, 6949, 6950.
Draught animals, importance of improvement of (*Mann*) 2993.
Dual-purpose breeds (*Jenkins*) 7778, 7779, (*Patel*) (531), 8138-8143, 8278, 8279, 8489.
Elimination of useless animals (*Patel*) 8429-8434.

ANIMAL HUSBANDRY—*contd.*

Enclosure of grazing-grounds, its effect on cattle-breeding (*Knight*) 6024,6028, (*Maxwell*) 6387-6391, (*Jenkins*) (461), 7355-7361, (*Patel*) 8124-8127, 8289.
Famine Fodder Fund, success of (*Bruen*) 6924.
Fodder, ample (if properly conserved and used) to last through months of scarcity in normal years (*Bruen*) 6922, 6923, 6926, 7007-7009, 7023-7025.
———, crops in Bombay Presidency (*Mann*) 3093, 3094, 3417-3421.
———, difficulties of cutting, carting, etc. (*Bruen*) 7011, 7012, 7039-7042.
———, for milk production (*Bruen*) 7111-7115.
———, intensive cultivation of (*Jenkins*) (462), 7507-7510.
———, in times of famine (*Bruen*) 6924-6926.
———, its supply from forests may be increased by restricting grazing (*Knight*) (295, 296).
———, perennial (*q. v.*).
———, preservation, experiments in (*Burns*) 3995-3998.
———, problem of, in Khandesh, suggestions for meeting (*Jenkins*) (461, 462).
———, shortage of, acute in certain areas from April to July (*Knight*) (294).
———, in Khandesh, lasts 12 to 14 weeks (*Jenkins*) (461).
———, may be overcome by growing fodder crops by well irrigation (*Maxwell*) (339).
———, need not occur if available grass could be distributed (*Knight*) (294).
———, occurs only in May and June (*Maxwell*) (339).
———, stored by Forest Department, against famine (*Edie*) 4261-4277.
———, 4,500 tons stored each year (*Edie*) 4271.
———, except in times of scarcity must be sold at a loss (*Edie*) 4275-4277.
———, grasses available for, vary in quality (*Edie*) 4349-4352.
———, research into (*Edie*) 4369, 4370.
———, intended only as supplementary supply (*Edie*) 4346-4348.
———, is sold at cost price in times of famine (*Edie*) 4447-4449.
———, methods and cost of baling hay for (*Edie*) 4440-4446.
———, reserve against famine, 20,000 tons (*Edie*) 4271.
———, may be increased in times of famine (*Edie*) 4271, 4310-4314.
———, transport of, difficult (*Edie*) 4314.
Forests, closing of, has little effect on deterioration of cattle (*Bruen*) 6922.
Fragmentation of holdings as an obstacle to improvement of breeds (*Bruen*) (400).
Ghi, demand for, greater than for butter (*Bruen*) 7028.
———, from buffaloes (*Bruen*) 7059, 7060, 7068.
———, is less profitable to make than butter (*Bruen*) 7029, 7030.
———, production of (*Patel*) (535), 8238-8241.
Gorakshans (*Bruen*) (404), 7080-7082, (*Patel*) 8285, 8286.
Government aid, for dairy industry (*Bruen*) 6938-6940, 7035-7038, 7084.
———, for improving breeds (*Bruen*) 7069-7083.
Grading, fundamental importance of, for cattle-breeding (*Patel*) 8407.
Grass-cutting, allowed in forests when grazing is prohibited (*Edie*) 4250.
Grasses, food value of different, understood by cultivators (*Burns*) 3994.
———, in Bombay, are unfit for cattle unless cut at a particular time (*Bruen*) 7049.
———, in forests, sold by auction to middlemen for resale to villagers (*Edie*) 4415-4420.
———, on field borders, utilisation of (*Maxwell*) 6392-6394 (*Jenkins*) (461).
Grass lands, ecological study of (*Burns*) 3893-3895.
———, importance of fencing to keep animals off (*Burns*) (101), 3877.
———, introduction of exotic grasses (*Mann*) 3417.
———, scope for improvement of (*Mann*) 3412-3416, 3422, (*Burns*) (101), 3875-3877, 3990-3993.
Graziers, professional, role of (*Maxwell*) 6239-6241.
Grazing, effect of common, on improvement of cattle (*Bruen*) 7185-7187.
———, facilities for, on Government lands, should be drastically reduced to get rid of useless animals (*Knight*) (294), 6020-6022.
———, in forests, allowed in 85 per cent. of forest area in Bombay (*Edie*) 4315.
———, classification of forests from point of view of (*Edie*) 4251.

ANIMAL HUSBANDRY—*contd.*

Grazing, in forests, communal, unsatisfactory (*Collins*) (196, 197), 4946-4948.
———————, control of, likely to prove successful (*Edie*) (145), 4244-4250, 4315-4318.
———————, co-operative (*see* Cattle-breeding societies).
———————, excessive, leads to deterioration of forests and thus to soil erosion (*Edie*) (146, 147).
———————, fees for, 4 annas a year per animal at present (*Edie*) 4426, 4294-4297.
———————, are increased to professional cattle breeders (*Edie*) 4396-4399.
———————, being low, lead to keeping of useless cattle (*Edie*) (145), (*Knight*) (294).
———————, increase of from 2 to 4 annas, has not restricted grazing (*Edie*) 4371, 4421-4425.
———————, or given rise to dissatisfaction (*Edie*) 4427-4430.
———————, raising of, its effect on grazing (*Edie*) (146, 147), 4241, 4372, 4373.
———————,might have a selective tendency (*Edie*) 4242.
———————, preferable to stall-feeding (*Jenkins*) 7788-7790.
———————, provision of, in areas of thick forest (*Edie*) (145).
———————, scheme for partial enclosure system (*Collins*) 5177-5180.
———————, value of, in Bombay, 21 lakhs, but is provided for 5 to 6 lakhs (*Edie*) 4325-4328.
———, in Kaira district, adequate (*Maxwell*) (339).
———————, but too much land given out for cotton cultivation (*Maxwell*) (339).
———, value of control of (*Jenkins*) 7357, 7358.
———, value of introducing rotational, and better grasses (*Jenkins*) (461).
——— grounds, insufficiently protected (*Maxwell*) 6253, 6254.
Green fodder, absence of, injurious to cattle (*Jenkins*) (461).
———————, silage as substitute for (*Jenkins*) (461).
Groundnut, its use as fodder (*Jenkins*) (461).
Herd books of chief herds of Indian cattle, should be maintained by the Government of India (*Mann*) (7).
Herd registers (*Bruen*) 7162-7164.
Horse-breeding, has been discontinued (*Farbrother*) 4154.
Improvement of breeds, attempts at, aims of agricultural Department (*Bruen*) (403), 6980, 7069, 7070, 7079-7083, 7163-7165, 7212-7215.
———————————, at Poona (*Patel*) 8403-8407.
———————————, Brahmani bull system, failure of (*Bruen*) (401, 402).
———————————, by enclosure (*Patel*) 8124-8127.
———————————, castration of inferior bulls (*Jenkins*) 7504-7506.
———————————, cattle-breeding societies (*Jenkins*) (460).
———————————, control of grazing (*Jenkins*) 7355-7361.
———————————, Divisional Cattle Committees (*Jenkins*) (460).
———————————, farms for production of good bulls (*Bruen*) (402).
———————————, history of previous (*Bruen*) (401, 402).
———————————, inauguration of special section of Agricultural Department (*Bruen*) (402).
———————————, increasing staff of livestock expert (*Jenkins*) (460).
———————————, increasing supply of trained cattle men of kamgar type (*Jenklins*) (460).
———————————, investigation of sources of supply of breeding bulls (*Jenkins*) (460).
———————————, other agencies for providing bulls (*Bruen*) (404).
———————————, Premium bull system (q. v.)
———————————, suggestions for effecting (*Patel*) (531).
———————————, village cattle shows (*Bruen*) (402).
———————, grading and milk recording of fundamental importance in (*Patel*) 8407.
———————, if effected, will be a substantial contribution to a better system of agriculture (*Bruen*) 6885.

ANIMAL HUSBANDRY—*contd.*

Improvement of breeds, is under the Agricultural Department in Bombay (*Farbrother*) 4051 with veterinary assistance when required (*Farbrother*) 4156.
——————————, may be under Agricultural or Veterinary Department (*Farbrother*) 4050-4053, 4118-4122.
——————————, need for co-operation of Agricultural and Veterinary Services to secure (*Farbrother*) 4022-4027, 4032.
——————————, objects of, to improve milk yield (*Mann*), 2992, 2994, 3000, 3001.
——————————, to secure good animals for ploughing the primary necessity (*Mann*) 2993.
——————————, obstacles to, adoption of buffaloes as milk producers (*Bruen*) (401), 6949, 6970, 7058-7062, 7211.
——————————, common grazing (*Bruen*) (399), 7185-7187.
——————————, crossing (*Bruen*) 6899-6912.
——————————, disease (*Farbrother*) (122, 123), 4029-4031, (*Bruen*) (406), 6893, 6894, (*Jenkins*) 7503.
——————————, famine (*Farbrother*) 4144 (*Bruen*) 6894.
——————————, fragmentation of holdings (*Bruen*) (400).
——————————, no adequate source of breeding bulls (*Jenkins*) (460).
——————————, overstocking of common pastures (*Jenkins*) (461).
——————————, religious objections to *castration* (*Bruen*) (400),
——————————, religious objections to slaughter (*Bruen*) (400).
——————————, starvation of female stock (*Bruen*) (400).
——————————, publication of handbook on (*Mann*) 3764.
——————————, will have good effect on crop production (*Patel*) (537), 8297, 8298.
Intensive cultivation of fodder crops (*Jenkins*) (462), 7507-7510.
Kadbi, its storage for fodder, (*Naik*) 4708-4711, (*Bruen*) 7050, 7051.
——————————, difficulty of inducing cultivator to store (*Bruen*) 7052-7057
——————————, Government scheme for, in Bijapur, a success (*Naik*) (138, 139), 4208-4212, 4674-4676.
——————, and other dry fodders, 25 per cent. wasted because fed to cattle without being threshed or chaffed (*Jenkins*) (461).
Livestock Department, research by (*Bruen*) 7145-7148.
——————————, should be under Director of Agriculture (*Bruen*) 6887, 6889, 7116-7118.
——————————, work of (*Mann*) 2882.
Melting point of cow and buffalo butter, importance of (*Bruen*) 7232, 7233, (*Patel*) 8146-8148.
Military dairy farms, should be under civil department (*Patel*) 8029.
——————————, their use for improvement of dairy farming and cattle-breeding (*Patel*) 8029-8033, 8494-8497.
Milk production in India and foreign countries compared (*Patel*) (536).
Milk recording, by private cultivators (*Bruen*) 7188-7190.
——————————, societies for (*Patel*) (535-537).
——————————, value of (*Patel*) (535), 8177-8187, 8327-8329, 8407.
Milk supply in towns, adulterated and insanitary (*Bruen*) 6932, (*Patel*) (533).
——————————, buffalo milk preferred to cows' milk (*Bruen*) 7059, 7060, 7067, 7068, (*Patel*) 8144, 8145, 8280-8284.
——————————, municipal control of supply, unsatisfactory (*Bruen*) 6943-6945.
——————————, importance of (*Mann*) 2994.
——————————, present price and consumption of (*Patel*) (533).
——————————, present system of, is sending animals to the slaughter-house (*Bruen*) 6930, 6932, 6938, (*Patel*) (531), 8408-8415.
——————————, pure, preferred when available (*Bruen*) 6933, 6936, 6937.
——————————, registration of itinerant vendors of, necessary (*Bruen*) 6946, 6947.
——————————, schemes for (*Mann*) 2995-2999, (*Patel*) (533, 534).
——————————, supplying of pure, can be made commercially profitable (*Bruen*) 6930, 6934, 6935.
——————————, too much stress must not be laid on sanitary side to start with (*Patel*) (534), 8149-8151.
Milk yield, (*Mann*) 2992, 3001, (*Patel*) (532, 535), 8153.

ANIMAL HUSBANDRY—*concld.*

Molasses, use of, for fodder (*Mann*) 3722-3730.
Pamphlets on animal husbandry (*Bruen*) 6982, 7098, 7099.
Pedigree bulls, are not appreciated by ordinary cultivators (*Bruen*) (405).
————————, no shortage of, in Kaira district (*Maxwell*) 6294, 6295.
————————, production of, costly (*Bruen*) (405).
Pedigree herds, difficulties of establishing (*Bruen*) (405).
Perennial fodders, may be planted on borders of water-channels (*Jenkins*) (461).
Pinjrapoles (*Bruen*) (404), 7080-7082, (*Patel*) 8285, 8286.
Premium bulls, fees for (*Bruen*) 6916-6920.
————————, 168 now at stud in Bombay (*Bruen*) 6914.
————————, rules for (*Bruen*) (408, 409), 6913.
————————, system of (*Bruen*) (402), 6976, 6977, 7069-7082, (*Jenkins*) (460), (*Patel*) 8285-8288.
————————, value of (*Bruen*) 6978, 6979.
Price of cattle and cow-products compared (*Bruen*) (400).
Prickly pear, its use for fodder (*Naik*) 4850-4852, (*Salimath*) 6777, 6778.
Private persons, land given on concession terms to, for cattle-breeding (*Bruen*) (405), 7153.
Rabaris (*see* Breeders).
Religious objections as an obstacle to improvement of breeds (*Bruen*) (400).
Research, by Livestock Department (*Bruen*) 7145-7148.
————————, on animal nutrition, insufficient (*Bruen*) 7135.
Salt, the giving of to cattle (*Jenkins*) (461).
Sheep-breeding (*Bruen*) 7199-7202, (*Jenkins*) (440), 7260-7266, 7677, 7678.
Silage (*Bruen*) 7011, 7012, 7042-7048, (*Jenkins*) (461).
Sindi animal brokers (*Bruen*) 7216-7218.
Stacking of fodder as famine reserve, well understood in Kaira district (*Maxwell*) (339), 6237-6239, 6398-6400, 6416-6420.
————————————————, will only be undertaken where cattle are worth it (*Maxwell*) 6291-6293.
Staff of Livestock Expert, (*Bruen*) 6983-6985.
————————————————, need for increased (*Bruen*) 6986-6988.
Stall-feeding, carried out in Kaira (*Maxwell*) (339).
————————, exercise for animals so fed essential (*Bruen*) 7108-7110.
————————, must be introduced if tillage is to be improved (*Knight*) (294).
————————, only used where animals are worth it (*Bruen*) 6927-6929.
————————, prevalent in Gujarat and Dharwar (*Bruen*) 6928.
Traditional methods of keeping cattle, encouraged by provision of free grazing (*Knight*) (294).
————————————————, responsible for much of the bad agriculture prevalent (*Knight*) (294).
Transport of animals by rail, arrangements for unsatisfactory (*Mann*) 3247-3249, 3770.
Village cattle shows (*Bruen*) (402).
Waste lands in non-forest areas, their utilisation for grazing (*Edie*) 4431-4433.
Wool, marketing of (*Jenkins*) (462), 7317-7321.

ATTRACTING CAPITAL.

Absentee landlordism, discourages land improvement (*Salimath*) (380).
————————————, is increasing and must be discouraged (*Salimath*) (373, 380), 6725-6727.
Annual rental system, discourages land improvements (*Salimath*) (380).
Cash rent versus batai (*Jenkins*) 7686-7692.
Capital employed in land improvement, considerable (*Mann*) 3758.
Causes preventing capitalists from taking to agriculture (*Desai*) (578), 8733-8735.
Change of method of keeping village accounts, has discouraged investment of money in land (*Desai*) (574), 8840-8848.
Competition for land and responsiveness of soil as factors (*Maxwell*) (341).
Factors discouraging owners of land from carrying out improvements (*Desai*) (578), 8711, 8712.
Inamdars, take little interest in improvement of their estates (*Mann*) 2969-2974.
Investment of money in land, encouraged by exemption of improvements from taxation (*Mann*) 3757.
————————————————, is increasing (*Collins*) 5085-5087.
————————————————, obstacles to: absence of any limit by which landlord can raise rents (*Collins*) (201).

ATTRACTING CAPITAL—*contd.*

Investment of money in land, change in method of keeping village accounts; an obstacle to, (*Desai*), (574), 8840-8848.
———————high rate of interest (*Rothfield*) (165).
———————liability of assessment to revision (*Maxwell*) (341).
———————system of tenancy at will (*Collins*) (201).
———————uncertainty of rainfall (*Maxwell*) 341.
Landlords, their part in the advancement of agriculture (*Mann*) 2968, 3347.
————, large, do not exist in Bombay apart from Sind (*Mann*) 2776, 2968.
————, take little interest in agricultural improvements (*Mann*) 3347, 3348.
Men of capital and enterprise, no longer interested in agriculture (*Salimath*) (380), 6740-6745.
Owners, cultivate their land better than tenants (*Desai*) 8741-8746.
Renting of land, pays better than management (*Patel*) (529, 530), 8422-8426.

BRUEN, Mr. E. J., Livestock Expert, Government of Bombay, 6883-7235, (399-411).

Agricultural and Veterinary Departments, should be under one Minister 6886-6888.
Agricultural Department's bulls (other than premium bulls), are let out for stud purposes 7229-7231.
All-India Cattle Committee, need for, as co-ordinating and advisory body, 7131-7134.
Animal nutrition, need for further research work on 7135.
Board of Agriculture, has not been of assistance in animal husbandry 7091, 7128-7130, 7151, 7152.
Brahmani bull system, failure of (401, 402).
Breeders (professional), are fast dying out (399).
———————, competition with, of Sindi animal brokers 7216-7218.
———————, methods of, are deteriorating (399), 6998-7001.
———————, their work no longer remunerative 7166-7175.
Breeding, methods of, in the past (399).
———————, present methods (399), 400.
———————, *see also* Improvement of breeds.
Breeds of cattle in Bombay, existence of and necessity for various types (401).
———————, Amrit Mahal (403), 6952.
———————, Dongi 7064, 7065, 7106, 7107.
———————, Kankrej (403).
———————, Malvi 6952, 7219.
———————, Nimari 6952.
———————, Sindi (403, 404), 7219, 7220.
Buffaloes, are superseding cows as milk producers (401), 6950.
————, breeding of, to improve milk production 7100-7105.
————, can never rival cows as draught producers (401).
————, essential for diary industry 7061, 7211.
————, low price of 7065.
————, milk of preferred to cow's milk 7059, 7060, 7067, 7068.
————, receive more attention than cows and are consequently improving (401), 6949.
————, their use for ploughing 7063-7065, 7106, 7107.
Bull clubs in villages (405).
Bullocks, in Bombay, area cultivable with pair of, averages 15 acres 7033.
———————, capable of 7 years' work 6966, 6968, 6969.
———————, mature at 4½ to 5 years 6966.
———————, number of, 3¼ millions 6960.
———————, 600,000 born each year, of which 25 per cent. die immature 6962, 6963.
———————, 7 lakhs required annually 6970.
———————, requirements of, 36 lakhs in 1920, 6964, 6965, 7031-7034.
Butter, *see* Dairy products.
————, meeting point of, very important 7232, 7233.
Castration, religious objections to (400).
Cattle, are above the average in districts where they are well cared for 6994-6997.
————, as draught animals (399).
————, as manure producers (399).
————, as milk producers (399).
————, districts in Bombay where cattle are distinctly above and below the average 6993.
————, Indian, foreign demand for, would be valuable 7234, 7235.

BRUEN, Mr. E. J.—*contd.*

Cattle, price of (400), 7193-7196.
Cattle-breeding, is not remunerative 7166-7178.
————————, *see also* Improvement of breeds.
Cattle-breeding and dairying, teaching of 7119-7127, 7142-7144.
———————— department, *see* Livestock Department.
Cattle Committee, Bombay, report of 7031-7033.
Cattle-lifting, does not exist in Bombay 7225, 7226.
Cattle population of Bombay, 9·9 millions 6953.
————————, only ⅔rds of requirements produced in Bombay, 6960.
Co-operative cattle-breeding societies, assistance given to, by Livestock Department 7156-7160.
————————, defects of (404).
————————, good work done by (404).
————————, have difficulty in paying 7176, 7177.
————————, numbers of (404), 7154.
Co-ordination between Provinces in veterinary and animal husbandry matters 6895, 6896, 7089-7091, 7123.
Cows, calving of 7013-7015, 7214, 7215.
——, in Bombay, number of 6958, 6959, 7013, 7017, 7018.
——, 75 per cent. of, are uneconomic (402), 6957.
——, little attention paid to (402, 403).
——, must produce some milk to be economic 7068, 7214.
——, their use for ploughing 7092-7095.
Cross-bred animals, are better milk producers because more attention has been paid to them 6908, 6909.
————————, liability to disease of 6906.
Crossing of indigenous with European or American cattle, a hindrance to improvement of cattle 6906.
————————, objectionable 6899, 6900.
————————, first crosses successful as milk producers 6901-6903,
————————, second crosses, definition of 7003.
————————, are of no value 6904, 6905, 6910, 6911, 7003-7006.
————————, policy of military dairy farms 6901-6912.
Cultivators, risk to, from purchase of high-priced cattle, worth running 7181, 7182, 7192-7196.
————, should keep cows rather than buffaloes 7211-7215.
Dairy farms, hygienic, can be made commercially profitable 6930, 6934, 6935, 7178-7180.
————————, difficulties of 6930, 7179, 7180.
————————, should be encouraged and subsidised in districts for supplying milk to cities 6938-6940, 7035-7038, 7084, 7207, 7208.
————————, the encouragement of, would re-act on improvement of cattle 6948.
————————, *see also* Milk.
————————, in the Deccan, could be made to pay 7206-7209.
————————, in Gujerat, pay because of attention given to cattle and because they are run as a cottage industry 7203-7208.
Dairy products, ghi (*q. v.*).
————————, loss of export markets for 6941, 6942, 7210.
————————, price of (400), 7019.
————————, supplying of, can be made commercially profitable 6941.
Dairy work, teaching of 7119-7127, 7142-7144.
Deterioration of cattle (400-402), 6894, 6922, 6949, 6950.
Diseases of animals, attack poor animals first, so that cultivators are justified in keeping higher-priced animals 7181-7183.
————————, effect of (406), 6894.
————————, importance of hereditary and congenital characteristics in giving immunity from 6899.
————————, lack of co-ordination between Provinces in regard to 6895, 6896.
————————, legislation necessary to prevent spread of, 6894.
Dual purpose animals 6949, 7020-7022, 7191, 7211.

BRUEN, Mr. E. J.—*contd.*

Famine Fodder Fund, success of 6924.
Farms for cattle-breeding, at Bankapur (403).
———————— Chharodi (406-408).
———————— Northcote (403, 410, 411).
———————— Willingdon (403, 404).
————————, difficulties of (405).
————————, effect of, on cultivators in neighbourhood (405, 406).
————————, inauguration of (402).
————————, need for 7083.
Feeding of animals (401).
Fodder, for milk production 7111-7115.
———, in Bombay, ample (if properly conserved and used) to last through months of scarcity in normal years 6922, 6923, 6926, 7007-7009, 7023-7025.
————————, difficulties of cutting, carting, etc. 7011, 7012, 7039-7042.
————————, in times of famine 6924-6926.
Foot and mouth disease 7184.
Forests, closing of, has little effect on deterioration of cattle 6922.
Fragmentation of holdings as an obstacle to improvement of breeds (400).
Ghi, demand for, greater than for butter 7028.
—, from buffaloes 7059, 7060, 7068.
—, is less profitable to make than butter 7029, 7030.
Government aid, for dairy industry 6938-6940, 7035-7038, 7084.
————————, for improving breeds 7069-7083.
Gowrakshaks, *see* Pinjrapoles.
Grasses in Bombay, are unfit for cattle unless cut at a particular time 7049.
Grazing, effect of common, on improvement of cattle 7185-7087.
Grazing lands, restrictions on, have little effect on deterioration of cattle 6922.
Herd registers 7162-7164.
Improvement of breeds of cattle, attempts at: aims of Agricultural Department (403), 6980, 7069, 7070, 7079-7083, 7163-7165, 7212-7215.
———————— ———————— Brahmani bull system, failure of (401, 402).
———————— ———————— farms for production of good bulls (402).
———————— ———————— history of previous (401, 402).
———————— ———————— inauguration of special section of Agricultural Department (402).
———————— ———————— other agencies for providing bulls (404).
———————— ———————— premium bull system (*q.v.*).
———————— ———————— village cattle shows (402).
————————, if effected, will be a substantial contrbution to a better system of agriculture 6885.
————————, obstacles to: adoption of buffaloes as milk producers, (401), 6949, 6950, 7058-7062, 7211.
———————— ———————— common grazing (399), 7185-7187.
———————— ———————— crossing 6899-6912.
———————— ———————— disease (406), 6893, 6894.
———————— ———————— famine 6894.
———————— ———————— fragmentation of holdings (400).
———————— ———————— religious objections to castration (400).
———————— ———————— religious objections to slaughter (400).
———————— ———————— starvation of female stock (400).
Indian cattle, foreign demand for, would be valuable 7234, 7235.
Inoculation, should be more generally used (406).
Isolation of infected villages, legislation for, essential (406).
Kadbi, difficulty of inducing cultivators to store 7052-7057.
———, should be stored for fodder 7050, 7051.
Livestock Department, research by 7145-7148.
————————, should be under Director of Agriculture 6887, 6889, 7116-7118.
Melting point of cow and buffalo butter, importance of 7232, 7233.
Military dairy farms, and cross-breeding 6901-6912, 7136, 7141.
————————, co-operation with 7085-7086.
Milk, adulteration of 6932.
——, from buffaloes, preferable to that of cows 7059.
——, municipal control of supply, unsatisfactory 6943-6945.

BRUEN, Mr. E. J.—*concld.*

Milk, present methods of supplying, in Bombay, involve drain on best animals 6930, 6932, 6938.
——, pure, preferred when available 6933, 6936, 6937.
——, registration of itinerant vendors of, necessary 6946, 6947.
——, supplying of pure, can be made commercially profitable 6930, 6934, 6935.
————————, difficulties of 6930.
——, *see also* Dairy farms.
Milk recording by private cultivators 7188-7190.
Pamphlets on animal husbandry 6982, 7098, 7099.
Pedigree bulls, production of costly (405).
————, are not appreciated by ordinary cultivators (405).
Pedigree herds, difficulties of establishing (405).
Pinjrapoles and Gowrakshaks (404).
————————, co-operation of, with Agricultural Department (404), 7080-7082.
Premium bulls, fees for 6916-6920.
————, 168 now at stud in Bombay 6914.
————, system of, (402), 6977.
————————, old rules for (408).
————————, revised rules for (408, 409).
————————, further revision in rules for 6913.
————————, requires expansion 6976, 7069-7082.
————————, value of 6978, 6979.
Price of cattle and cow-products compared (400).
Private persons, land given on concession terms to, for cattle-breeding (405), 7153.
Rabaris (*see* Breeders).
Religious objections as an obstacle to improvement of breeds (400).
Research, by Livestock Department 7145-7148.
————, on animal nutrition, insufficient 7135.
Sheep-breeding 7199-7202.
Silage 7011, 7012, 7042-7048.
Sindi animal brokers 7216-7218.
Staff of Livestock Expert, 6983-6985.
————————, need for increased 6986-6988.
Stall-feeding, prevalent in Gujarat and Dharwar 6928.
————, only used where animals are worth it 6927-6929.
————, exercise for animals so fed essential 7108-7110.
Taluka Development Associations, value of work of (405).
Vaccination, should be more generally used (406).
Veterinary and Agricultural Departments, should be under one Minister 6886-6888.
Veterinary and Livestock Departments, should be under Director of Agriculture, 6887-6889.
Village cattle shows (402).

BURNS, Dr. WILLIAM, D.Sc. (Edin.), Joint Director of Agriculture, Bombay Presidency, 3831-4008 (100-104).

ADMINISTRATION :

Agricultural Department, Bombay, organisation of (100).
Agricultural research, organisation of, with permanent staff as nucleus and temporary staff for particular pieces of research (101), 3840, 3908.
Co-operation between Provinces, must come from provincial initiative and not be imposed from above 3859.
————————————, can be secured by delegating provincial officers to other Provinces temporarily (103), 3873, 3874.
Director of Agriculture, duties of a (100, 101).
Exchange of information with workers in other Provinces and at Pusa (102), 3873, 3874, 3888, 4001-4008.
Financing of research, proposals for (101), 3840.
Government of India, should not control Provincial Agricultural Departments (102).
————————, scientific staff of, need not be increased (102), 3858-3862.
Meteorological Department, should be in close co-operation with Agricultural Department (103).
————————, opportunities for collaboration with (103), 3915-3920, 3973, 3974.

BURNS, Dr. WILLIAM—*contd.*

ADMINISTRATION—*contd.*

Organisation of research by crops 3840-3842.
Research committees (departmental) in Bombay Presidency, organisation of (101), 3856, 3857.

AGRICULTURAL INDUSTRIES :

Co-operative fruit sale societies (104), 3967-3970.
Fruit-growing, possibilities of (104).
————, financial difficulties in regard to 3949-3953.
Fruit-preserving (104), 3956-3961, 3979, 3980.
————should not receive State-aid 3962-3966.
Marketing of fruit (104), 3954-3956.
Sericulture 3982, 3983.

ANIMAL HUSBANDRY :

Ecological study of grasses 3893-3895.
Fodder preservation, experiments in 3995-3998.
Grasses, food value of different, understood by cultivators 3994.
Grass-land, great scope for improvement of (101), 3875-3877, 3990-3993.
————, importance of fencing to keep animals off (101), 3877.

CROPS AND CROP PROTECTION :

Cross-fertilisation 3864, 3870.
Drought-resisting varieties of crops, importance of 4001, 4002.
Improvement of crops, by breeding, importance of (103), 3864.
————, methods for (103).
Pests, prevalence of, in India (103), 3999, 4000.
Prophylactic measures against disease, importance of propaganda to encourage use of (104).
Seed-testing 3897-3904.
Selection, more important than hybridisation for improvement of crops 3864, 3865.

DEMONSTRATION AND PROPAGANDA :

Landlords, their part in the advancement of agriculture (102), 3913, 3914.
Literacy, value of, in facilitating propaganda (104).
Propaganda, example of the success of (102).

EDUCATION :

Agricultural bias schools, value of, in keeping peasantry on the land (104).
Agricultural college, need for, in Sind (102).
Agriculture graduates, their employment in Departments other than Agriculture 3975-3978.
European training for officers of Agricultural Department, desirable 3850-3855.
————, should be given after some service in India 3850-3855.
Poona Agricultural College, attendance at satisfactory (102).
————, majority of students at, seek official posts (102), 3910-3912.
————, 20 per cent. of students at, take up farming as career 3911, 3938-3945.
————, only 25 per cent. of students at, come from cultivating classes (102), 3872.
————, training at, previous to graduation, not sufficient to produce good research workers (100), 3835, 3836.
Research workers, training of (101).
School plots (102).
Secondary agricultural education, its provision by one-year course at agricultural college 3947, 3948.
Study leave for research workers (101), 3843, 3844, 3921-3928.
Teachers in rural areas, should be drawn when possible from agricultural classes (102).
Teaching and research, combination of (101).

BURNS, Dr. WILLIAM—*concld.*

RESEARCH:

Administrative work in agricultural colleges, takes up too much time of research workers (101).
———————————————, should be dealt with by appointing a secretary for whole institution 3837-3839.
Departmental research committees in the Bombay Presidency, organisation of (100), 3856, 3857.
European training for research workers, desirable 3850-3855.
———————————————, should be given after some service in India 3850-3855.
Exchange of information with workers in other Provinces and at Pusa (102), 3873, 3874, 3888, 4001-4008.
Facilities for research, fairly satisfactory (101).
Financing of research, proposals for (101), 3840.
Organisation of research, by crops 3840-3842.
———————————, by permanent staff as nucleus and temporary staff for particular pieces of research (101), 3840, 3908.
Programmes of research, importance of planning (101).
Research workers, must have working knowledge of all the sciences underlying agriculture and of agriculture itself (100).
———————————, must not be overburdened with administrative work (101), 3837-3839.
———————————, should be provided with understudies (101).
———————————, study leave for (*q. v.*).
———————————, training of (100).
———————————, training prior to graduation insufficient for (100), 3835, 3836.
Study leave, for research workers, importance of (101), 3843, 3844.
———————, rules for, sufficiently liberal 3922, 3924.
———————, should be encouraged 3923, 3925-3928.
Teaching and research, combination of (101).
Traditional methods of agriculture, value of research into (102,) 3909.
Understudies for research workers, desirability of (101).

SOILS:

Soil erosion, caused by unrestricted grazing (103).
———————————, rational system of grazing the best means of prevention (103).
———————————, its prevention by sand binding 3930-3934.

STATISTICS:

Statistician, value of a, in Agricultural Department (104), 3846, 3847.
Statistics, importance of interpretation as well as collection of (104).

WELFARE:

Amenities in villages, necessity for increasing, to keep peasantry on the land (104), 3878.

COLLINS, Mr. G. F. S., I.C.S., Registrar, Co-operative Societies, Bombay Presidency, 4879-5236 (193-201).

ADMINISTRATION:

Co-operation between Agricultural and Co-operative Departments, close in Bombay 4887-4896.
Railway rates for agricultural produce, sometimes unduly high (198).
———————————————————, questions regarding, should be dealt with by Commerce Department of Government of India (198), 5152-5156.
Roads, need for provision of further, in forest areas (193).
———, general condition of, unsatisfactory 5104-5106.
Veterinary Service, need for considerable development of (193), 5107, 5108.

COLLINS, Mr. G. F. S.—*contd.*

AGRICULTURAL INDEBTEDNESS :

Cattle mortality not a main cause of borrowing 5033, 5034.
Causes of indebtedness (194), 4910, 4911, 5033-5035, 5040-5042.
Co-operative movement, spread of, a remedy for evils of indebtedness (194).
Credit, danger of facile (194).
Cultivators, when deeply in debt, should not be encouraged to give up their holdings and start again 4937-4939.
Deccan Agriculturists' Relief Act, still used to some extent 4941.
———————————, stricter application of, undesirable (194).
Lack of facilities for investing money, its effect on agricultural indebtedness 5040-5042.
Land mortgage banks, establishment of, a remedy for evils of indebtedness (194).
Monsoon, uncertainty of, a cause of debt 4909-4911.
Non-terminable mortgages, should not be prohibited (194), 5046.
Productive debt, not an evil (194).
Usurious Loans Act, almost obsolete in Bombay 4940.
———————, stricter application, of undesirable (194).

AGRICULTURAL INDUSTRIES :

Cattle-breeding and dairying, might be developed (196).
Co-operative basis for agricultural industries (195), 5008.
Subsidiary industries, importance of, in improving rural economy 5003.
———————, possibilities of 5004-5007.

AGRICULTURAL LABOUR :

Attracting agricultural labourers to new tracts, may be achieved by grant of big areas to individuals of large means on favourable terms (196).
———————————————, by trying to attract small cultivators, has failed in Mysore (196, 4942), 4943.
Shortage of labour, causes of (196).
———————————, suggested remedies for (196).
———————, lack of information regarding (196).
Statistics regarding agricultural population, often show as labourers those who are really landowners 4945.

ANIMAL HUSBANDRY :

Cattle-breeding and dairying, might be developed as subsidiary occupation, (196).
———————————, are not usually an economic success 5157.
Cattle-breeding societies, should be developed (200).
———————————, need for propaganda to create demand for 5009.
Cattle mortality, not a main cause of borrowing 5033, 5034.
Communal grazing in forest areas, unsatisfactory (196, 197), 4946-4948.
Dairying, extensively carried on in parts of Gujarat 5052-5055.
Grazing in forests, scheme for partial enclosure system 5177-5180.

ATTRACTING CAPITAL :

Absence of any limit by which landlord can raise rents, an obstacle to investment of money in land (201).
Investment of money in land, is increasing 5085-5087.
System of tenancy at will, an obstacle to investment of money in land improvements (201).

CO-OPERATION :

Agricultural machinery, introduction of, might be in hands of Taluka Development Associations rather than special co-operative societies (199).
Auditing, of credit societies, must be carried out by Government staff 4953, 4978.
———————, 4979.
———————, of special societies 5122-5126.
Banking facilities in outlying towns, Government aid for (198), 5013, 5014.
Cattle-breeding societies, need for propaganda to create demand for 5009.
———————————, number of, in Bombay 5157-5160.

COLLINS, Mr. G. F. S.—*contd.*

Co-operation—*contd.*

Cattle-breeding Societies should be developed (200).
Central Banks and primary societies, link between, incomplete (193), 4918-4920.
———————, should be provided by Supervising Unions or Taluka Development Associations (193).
Central Banks, must employ larger and more efficient staff of inspectors (193), 5024-5026.
———————, should open more branches (193).
Central Co-operative Bank, Bombay, and the inspection of Central Banks 4975, 4976, 4980, 5221-5223.
———————, gives loans to Central Banks which are not self-supporting 4971.
———————, is financed by shares, debentures and deposits 4965-4967.
———————, loans made by, go through the Registrar of Co-operative Societies 4973, 4974.
———————, no Government money deposited with 4977.
———————, public deposits with, amount to about 50 lakhs 4970.
———————, reserve funds of primary societies are not deposited with 4968.
Compulsion of obstinate minorities, should be sparingly used (200).
Co-operative Banks, development of, will improve financing of agriculturists (193).
Co-operative Department, budget of, 5 to 6 lakhs 5129, 5130.
———————, need for 25 per cent. increase in staff of 5136-5141.
———————, value of 5127, 5128.
Co-operative movement, can never entirely replace the moneylender 5089-5092.
———————, has in the main achieved its objects (200).
———————, hindrances to spread of 5209-5212.
———————, need for expansion of 5135.
———————, social value of 5011, 5012, 5032.
———————, spread of, in Bombay 5015-5020.
Cotton societies, have particular need of Government help (198, 199), 4955.
Credit, evils of facile, will not be added to if co-operative societies reduce their rates of interest 5200-2502.
Credit (cash) requirements of cultivators, 3 crores a year, of which 2 crores are provided by co-operative societies (193), 5214-5220.
Credit societies, auditing of (*see* Auditing).
———————, cannot provide long-term credit 4928.
———————, charge simple interest on loans, with power to impose penal interest 5164-5169.
———————, chief needs of, education in management and co-operative principles and closer touch with Central Banks (198).
———————, for depressed classes (198).
———————, growth of, should be allowed to be spontaneous (198).
———————, inspection of 5221-5227.
———————, interest charged by (*see* Interest).
———————, loans to members of, limiting factors (198), 5021-5023.
———————, membership of, 12 per cent. of agriculturists occupying land (193), 5131-5135.
———————, reserve funds of, are put into their working capital 4968, 4969.
Decentralisation, must be general policy for co-operative societies (198), 5059.
Government, help to be given by, to non-credit societies (198), 4955.
———————, provision of direct financial assistance by 4921-4927.
———————, should aid in establishing banking facilities in outlying towns (198), 5013, 5014.
———————, should not advance money at low interest to cultivators for repayment of existing loans 4924.
Interest charged, by co-operative societies, figures for various districts (200).
———————, possibility of reducing (200) 4908, 5200-5202.
———————, varies in different districts (200).
———————, by moneylenders (*q. v.*)
———————, does not represent cost of borrowing 5074-5076.
Land improvement societies, importance and needs of (199).

COLLINS, Mr. G. F. S.—*contd.*

Co-operation—*contd.*

Land mortgage banks, control of (193), 5028.
———, co-operative nature of (193), 4929-4932, 5029-5031.
———, should be developed under existing Co-operative Credit Act 4984-4987.
———, (*see also* Long-term credit).
Loans by co-operative societies, employment of and possibility of repayment, must be carefully scrutinised (193), 5021-5023, 5223, 5224.
Local Boards, should subscribe to local branches of Co-operative Institute, Taluka Development Associations, etc. (198).
Long-term credit, cannot be provided by primary societies 4928.
———, may be defined as for anything over five years 5161-5163.
———, scheme for, chiefly intended for redemption of old debt and improvement of land 5203-5206.
———, should be provided by land mortgage banks (193), 4929.
Middlemen and co-operative sale societies, struggle between (199), 4955-4960.
Moneylenders, are depositing their money in credit societies (200).
———, can sometimes recover long-standing debts by transferring their dues to societies (200), 5084.
———, can never be entirely replaced by co-operative societies 5089-5092.
———, further legislation to control, undesirable 5092-5103.
———, give greater elasticity in repayment than credit societies 4906, 4907, 5077-5080.
———, rates of interest charged by, are higher in famine areas and where education of people is low 5191-5194.
———, do not represent cost of borrowing 5074 5076, 5184, 5185.
———, figures for various districts (200).
———, is high owing to uncertainty of repayment 5096, 5186-5188.
———, to agriculturists with large assets usually lower than co-operative societies' rates (200), 4901-4903.
———, to agriculturists with limited assets, formerly about 24 per cent. but since reduced by activity of co-operative societies (200), 4981-4983, 5043.
———, vary according to class of population 5196, 5197.
———, village, numbers of, are decreasing 5088.

Non-credit societies, capable of extension 4989.
———, chief openings for 4990-4992.
———, financing of 4999-5001.
———, importance of 4988.
———, should be independent of credit societies 4997, 4998.
———, should not receive financial aid from Government 5002.
———, special grants to, now given by Government (198).
———, will require Government aid for some time to come (198).
Non-official agencies and co-operative societies 4954, 5059-5065, 5223-5327.
Normal credit system, must be adopted by all co-operative societies (193), 4915-4917.
Organisation of co-operation in Bombay 4963-4965, 4971-4976.
Propaganda for co-operative movement, should be carried out by non-official agencies 4954.
Punctual repayment, if general, would enable societies to reduce rates of interest 4908.
———, is difficult owing to uncertainty of monsoon 4909.
Purchase societies, unit for, must be larger than a single village (198).
———, work of, can in some cases be undertaken by Central Banks, sale societies, Taluka Development Associations and primary societies (198).
Reserve funds of primary societies, are put into their working capital 4968, 4969.
Rural thrift movement 5081-5083.
Sale societies, difficulties of (199).
———, importance of (199).

COLLINS, Mr. G. F. S.—*contd.*

CO-OPERATION—*concld.*

———— ·——, varieties of (199).
Self-Government of co-operative societies (except in the matter of audit) the ideal •5059-5065.
Short-term credit, its provision through co-operative societies (193).
—— · ·———, may be defined as for anything under five years 5161-5163.
Single *versus* multiple purpose societies (198, 199), 4961.
Subsidiary industries, desirability of co-operative societies for (200).
Supervising Unions, if established, might replace inspectors 5225.
Supervision of credit societies, arrangements for 5221-5227.
—— ———————— ·—, Government staff for, insufficient (198).
Supervisors, pay and qualifications of 5114-5119.
Taccavi, dangers of (194), 5181-5183.
————, given to extent of 3½ lakhs a year, rising to 1½ crores in times of famine 5142-5146.
————, may be given for water-channel schemes 5147-5151.
—·———, money spent by Government on, would be better put into land mortgage banks 4922.
—— —, should be given where possible through co-operative societies (194), 4933-4936.
Taluka Development Associations, may be used for introduction of agricultural machinery (199).
—— ———————————, may undertake work of purchase societies (199).
—— · · ——— · ———, registration of 4919, 4920.

CROP PROTECTION :

Fencing of fields, importance of (195), 5170-5173.
———— · · ·—, provision of easy finance for (195).
Game laws, advantage of relaxation of (195).
Gun licences, for special guns for crop protection only 5049-5051.
———— ——, system of granting, should be systematised (195).

DEMONSTRATION AND PROPAGANDA :

Co-operative movement, agricultural propaganda through 4888-4896.

EDUCATION :

Provincial Service Revenue Officers, study of rural economy should be made a part of their curriculum 4884.

FINANCE :

See under CO-OPERATION.

FORESTS :

Communal grazing in forests areas, unsatisfactory (196, 197), 4946-4948.
Cultivators, have valuable privileges in forests (196).
Forests, should not be placed under Revenue Department (196).
Grazing in forests, scheme for partial enclosure system 5177-5180.
Outlying forests between intensively cultivated areas, scheme for, in East Khandesh (197).
Plantations near villages, should be encouraged (197).
Roads, in forests areas, provisions of (193).
Village forests, desirability of establishing (197).

HOLDINGS :

Consolidation, obstacles to 195).
· ————, voluntary (195), 5230-5233.
Fragmentation, should be rectified where possible by co-operative effort (195).
————, but compulsion of obstinate minorities inevitable (195).
Sub-division of holdings, should not be prohibited (195).
————————, draft Bill concerning, satisfactory 5228, 5229, 5233.

COLLINS, Mr. G. F. S.—*concld.*

MARKETING :

Co-operative marketing, (197).
————, cannot be organised properly in absence of data 4996.
Data regarding marketing, lack of (197).
— — — — — — — — —, must be obtained before effective action can be taken 4949-4952.
— — — — — — — — —, cannot be obtained through co-operative marketing societies 4994, 4995.
Grading of produce, knowledge of advantages of, spreading amongst cultivators 4912-4913.
Market facilities, improvement of, a chief necessity of rural development (197).
————, present, unsatisfactory (197).
Middlemen and co-operative societies, struggle between (199), 4955-4960.
Open markets, should be provided for chief forms of produce (197).

STATISTICS :

Census statistics of agricultural population, need for further sub-heads in (201).
Crops and rents, statistical information regarding (201).
Estimates of yield of principal crops (201).
Statistics regarding agricultural population, often show as labourers those who are really landowners 4945.

TARIFFS :

Sea freights, sometimes unduly high (198).

WELFARE :

Co-operative movement, social value of 5011, 5012, 5032.
— — — — — — — — —, as far as possible should be carried out without expense to Government 5111.
Economic surveys in rural areas, desirability of 5109, 5110, 5113.
Rural thrift movement 5081-5083.

COMMUNICATIONS—*see under* **ADMINISTRATION.**

CO-OPERATION.

Agricultural machinery, co-operative employment of (*Salimath*) (379).
— — — — — — — — —, introduction of, might be in hands of Taluka Development Associations rather than special co-operative societies, (*Collins*) (199).
Agricultural requisite societies (*Salimath*) (196, 197).
Audit, of co-operative societies generally, must be strengthened by appointment of more auditors (*Rothfield*) 4501, 4502.
— — — —, of credit societies, must remain in hands of Government (*Rothfield*) 4511, 4527-4532, 4556, 4566, 4567, (*Collins*) 4953, 4978, 4979.
— — —, of special societies (*Collins*) 5122-5126.
Banking, field of, must be occupied to utmost by co-operative movement (*Rothfield*) (164).
— — ——, Government aid for facilities in outlying towns (*Collins*) (198), 5013, 5014.
Better farming societies, should be encouraged (*Jenkins*) 7490-7494.
Cattle-breeding societies (*see under* ANIMAL HUSBANDRY).
Central Banks, and primary societies, link between (*Collins*) (193), 4918-4920.
— — — — — —, must employ larger and more efficient staff of inspectors (*Collins*) (193), 5024-5026.
————, should open more branches (*Collins*) (193).
Central Co-operative Bank, Bombay (*Collins*) 4965-4977, 4980, 5221-5223.
Central Co-operative Institute, Bombay (*Naik*) (139), 4739, 4775-4782, (*Jenkins*) (465), 7594, 7595.
Compulsion of obstinate minorities (*Rothfield*) (164), 4496-4500, (*Collins*) (200), (*Maxwell*) (340), (*Jenkins*) (469), (*Desai*) (578), (*Mann*) (11, 12).
Co-operative banks, development of, will improve financing of agriculturists (*Collins*) (193).

CO-OPERATION—*contd.*

Co-operative Department, budget of, 5 to 6 lakhs (*Collins*) 5129, 5130.
———————, co-operation of, with Agricultural Department, close (*Collins*) 4887-4896, (*Jenkins*) (464).
———————, need for 25 per cent. increase in staff of (*Collins*) 5136-5141.
———————, value of (*Collins*) 5127, 5128.
Co-operative movement, and rural reconstruction (*Mann*) 3557, 3591.
———————, can never dispense entirely with outside assistance and advice (*Rothfield*) 4512-4514.
———————, can never entirely replace the moneylender (*Collins*) 5089-5092.
———————, control of, in Bombay (*Rothfield*) 4526, 4558-4560.
———————, development of rural leadership, its chief value (*Mann*) 3378.
———————, educational value of (*Jenkins*) 7300, 7528.
———————, has in the main achieved its objects (*Collins*) (200).
———————, hindrances to spread of (*Collins*) 5209-5212.
———————, is progressing in Bijapur (*Naik*) 4701-4705.
———————, need for expansion of (*Collins*) 5135.
———————, propaganda by (*Lowsley*) (356), (*Desai*) 8599, 8600, (*Salimath*) (372).
———————, should not be aided by exemption from local taxation (*Mann*) 3701-3703, (*Rothfield*) 4596-4599.
———————, social value of (*Collins*) 5011, 5012, 5032.
———————, spread of, in Bombay (*Collins*) 5015-5020.
———————, success of, in Khandesh (*Jenkins*) 7469, 7470.
———————, supervision of (*Naik*) 4768-4770.
———————, the only hope of raising the standard of living in rural India (*Jenkins*) (464).
Cotton sale societies (*Mann*) 3681-3683, (*Jenkins*) (464, 465, 468, 469), 7511-7515.
Credit societies, auditing of (*see* Auditing).
———————, backed by co-operative banks should give short and long term credit (*Knight*) (287).
———————, can progress in more advanced areas (*Knight*) (287).
———————, cannot provide long term credit (*Collins*) 4928.
———————, cheap capital provided by, of no advantage unless cultivators have a surplus to permit repayment (*Paitl*) (513).
———————, chief needs of, education in management and co-operative principles and closer touch with Central Banks (*Collins*) (198).
———————, distribution of seed by (*Jenkins*) (454).
———————, do not at present afford adequate finance (*Jenkins*) 7761-7763.
———————, educative value of, even greater than financial value (*Jenkins*) 7300, 7528.
———————, establishment of, has lowered moneylenders' rate of interest (*Naik*) (139).
———————, for depressed classes (*Collins*) (198).
———————, growth of, should be allowed to be spontaneous (*Collins*) (198).
———————, in advanced areas, may distribute taccavi (*Knight*) 5913, 5914.
———————, inspection of (*Collins*) 5221-5227.
———————, interest charged by (*see* Interest).
———————, loans to members of, limiting factors (*Collins*) (198), 5021-5023.
———————, membership of, 12 per cent. of agriculturists occupying land (*Collins*) (193), 5131-5135.
———————, might make loans in kind instead of cash (*Naik*) 4766, 4767.
———————, need for supervising expenditure of loans (*Salimath*) (378).
———————, reserve funds of, are put into their working capital (*Collins*) 4968, 4969.
———————, should organise field demonstrations for their members (*Jenkins*) (444), 7294-7300.
———————, should stock ploughs for sale on hire-purchase and give demonstrations (*Jenkins*) (459).
———————, supervision of (*q.v.*).
Decentralisation, must be general policy for co-operative societies (*Collins*) (198), 5059.
Denmark, co-operation in (*Jenkins*) 7531-7537.
District Banks, control of (*Rothfield*) 4557.
Export and import business, might be conducted by co-operative societies (*Naik*) 4772.
Factions in villages, a hindrance to co-operative movement (*Jenkins*) (465).
Fencing societies (*Rothfield*) (164), (*Salimath*) (378, 379), 6622-6627, 6634-6636 (*Jenkins* (469).

CO-OPERATION—*contd.*

Fodder, storage, co-operative (*Jenkins*) (461), 7836, 7837.
Fragmented holdings, co-operative consolidation of (*Mann*) (11), (*Rothfield*) 4496.
Government, should appoint paid organisers for co-operative societies (*Naik*) (139), 4713, 4738, 4739, 4783-4787, (*Rohfield*) (164, 4503-4506).
———————, should not take active part in organisation of co-operative societies (*Jenkins*) (464), 7523-7528, 7558-7560.
———————, help to be given by, to non-credit societies (*Collins*) (198), 4955.
———————, provision of direct financial assistance by (*Collins*) 4921-4927.
———————, should allot larger funds for development of societies (*Jenkins*) (464), 7791-7793.
———————, should aid in establishing banking facilities in outlying towns (*Collins*) (198), 5013, 5014.
———————, should assist non-official co-operative bodies in management and supervision in initial stages (*Jenkins*) (464).
———————, should collect and diffuse information (*Jenkins*) (464).
———————, should enable officers in rural areas to obtain more knowledge of co-operative movement (*Jenkins*) (464).
———————, should encourage cultivators to join by granting concessions (but not money) to societies (*Jenkins*) (464).
———————, should not grant special privileges to co-operative societies (*Rothfield*) 4596-4599.
———————, supervision by, of co-operative societies (*q.v.*).
Grazing co-operative, in forest areas (*Jenkins*) (462), 7500-7502, 7591, 7592.
Implement distribution societies (*Jenkins*) (458, 459).
Interest charged by co-operative societies, figures for various districts (*Collins*) (200).
———————, possibility of reducing (*Collins*) (200).
———————, should be reduced if possible (*Maxwell*) (340).
———————, varies in different districts (*Collins*) (200).
Irrigation, co-operative ("phad" system) (*Jenkins*) (449, 450) 7734-7754.
———————, co-operative distribution of water unsatisfactory (*Harrison*) 5684, 5691, 5703-5710, 5734.
Irrigation societies (*Rothfield*) (164), 4552, (*Harrison*) 5689, 5692, (*Salimath*) (374).
Irrigation works, minor, co-operative construction of (*Maxwell*) 6242-6245, (*Lowsley*) 6489-6494, (*Harrison*) 5689-5692.
Land improvement societies, importance and needs of (*Collins*) (199).
Land mortgage banks (*Collins*) (193), 4929-4932, 4984-4987, 5028-5031.
Leadership in co-operative societies (*Rothfield*) 4561-4566.
Loans by co-operative societies, employment of and possibility of repayment, must be carefully scrutinised (*Collins*) (193), 5021-5023, 5223, 5224.
Local Boards, should subscribe to local branches of Co-operative Institute, Taluka Development Associations, etc., (*Collins*) (198).
Marketing, co-operative (*Mann*) (15), (*Rothfield*) 4598, (*Jenkins*) (462), 7317-7321.
Middlemen and sale societies (*Mann*) 3576, 3579, (*Collins*) (199), 4955-4960.
Non-credit societies, capable of extension (*Collins*) 4989.
———————, chief openings for (*Collins*) 4990-4992.
———————, financing of (*Collins*) 4999-5001.
———————, importance of (*Collins*) 4988.
———————, should be independent of credit societies (*Collins*) 4997, 4998.
———————, should be under Director of Agriculture or agricultural officer ranking as Assistant Registrar in Co-operative Department (*Desai*) (577, 578).
———————, special grants to, now given by Government (*Collins*) (198).
———————, will require Government aid for some time to come (*Collins*) (198).
Non-official agencies and the co-operative movement (*Naik*) (139), (*Rothfield*) 4503, 4547-4549, (*Collins*) 4954, 5059-5065, 5223-5227, (*Jenkins*) (465).
Normal credit system, must be adopted by all co-operative societies (*Collins*) (193), 4915-4917.
Officers of Co-operative Department, should have knowledge of agriculture (*Jenkins*) (464), 7516-7522.
Organisation of co-operation in Bombay (*Collins*) 4963-4965, 4971-4976.
Preference in supply of materials, etc., should be given to cultivators organised co-operatively (*Mann*) 3811.
Privileges for co-operative societies, undesirability of special (*Rothfield*) 4596-4599.
———————, suggestions for (*Mann*) 3811, (*Jenkins*) (464).
Producers of raw materials, co-operative societies of, might attract industries to rural areas (*Salimath*) (377).

CO-OPERATION—*contd.*

Protection and improvement of lands, co-operative schemes for (*Maxwell*) (340).
Punctual repayment, difficult (*Collins*) 4909.
———— ———— ————, if general, would allow societies to reduce rates of interest (*Collins*) 4908.
Purchase societies, suggestions for (*Naik*) (139), 4716, 4717, 4877, 4878, (*Collins*) (198, 199), (*Jenkins*) (465-468), 7400, 7401.
Reserve funds of primary societies, are put into working capital (*Collins*) 4968, 4969.
Rural Development Department, need for, to absorb all duties of Agricultural Department except research and of Co-operative Department except urban co-operation (*Jenkins*) (464), 7847-7852.
Rural industries, *see* Village industries.
Rural thrift movement (*Collins*) 5081-5083.
Sale societies (*Naik*) (139), (*Collins*) (199). (*Patil*) (510).
Seed, co-operative distribution of (*Naik*) 4771, (*Jenkins*) (454, 455), 7472-7475, 7586.
Self-government of co-operative societies (except in the matter of audit) the ideal (*Collins*) 5059-5065.
Silt in irrigation tanks, its clearance by co-operative effort (*Lowsley*) 6489-6491.
Single *versus* multiple purpose societies (*Collins*) (198, 199), 4961.
Subsidiary industries, co-operative development of (*Collins*) (200), (*Jenkins*) (462), 7826.
Supervising Unions, distribution of seed by (*Jenkins*) 7587.
— ————————, might replace inspectors (*Collins*) 5225.
Supervision of credit societies (*Rothfield*) 4526, 4558-4560, (*Naik*) 4768-4770, (*Collins*) (198), 5221-5227.
Supervisors, pay and qualifications of (*Collins*) 5114-5119.
Supply and maintenance of improved materials, co-operative organisation of (*Jenkins*) (444).
Taluka Development Associations, are voluntary associations receiving Government grant (*Knight*) 5879-5882.
———— - ——— - ——— - ———— -, demonstration and propaganda by (*Mann*) (6) 3377, (*Rothfield*) 4642, (*Knight*) 5832, (*Lowsley*) (356), (*Salimath*) (371, 372, 375), (*Jenkins*) 7444, 7445, 7451, 7580.
——— ———— - ——— - —— - —, conditions for membership of (*Mann*) 3227, 3398.
——— - ——— - ——— - —— -, failures of, usually in landlord areas (*Mann*) 3810.
—— - ——— - ——— - ———— -, financial help for, (*Mann*) 3212, 3213, 3800-3802.
———— - ——— - ——— ———— - ———— ————, should be increased (*Knight*) (286), 5902-5905.
——— ———— - ——— - ——— - —, Government subsidy for, should be replaced by provision and payment of agricultural graduate (*Jenkins*) 7448, 7460, 7564, 7565, 7794-7809.
—— - ——— - ——— - ——— - ——, have not undertaken adult education (*Knight*) 5897.
— - ——— - ——— - ——— - —, may fail from lack of rural leadership (*Mann*) 3378.
- ——— - ——— - ——— - ——— -, members of, are themselves cultivators (*Mann*) 3207.
— ——— ——— - ——— - ———, non-official support for, increasing (*Mann*) 3377.
—— - ——— - ——— - ——— - ——, organisation of (*Mann*) 3792-3799 (*Salimath*) (371, 372), 6666-6668.
——— - ——— - ——— - ——— -, organisers of (*Lowsley*) 6533-6536 (*Jenkins*) 7452-7458, 7588-7590.
——— ——— ——— - ——— -, paid employees of, type of not satisfactory (*Jenkins*) 7801-7804, 7815, 7816.
—— ——— - —— - ——— - ——, present work and possibilities of (*Naik*) 4715-4721, 4759-4765, 4873-4878 (*Maxwell*) 6423, 6424.
——— - ——— - ——— ——— -, procedure for starting (*Mann*) 3795.
——— ——— ——— - ——— -, registration of (*Rothfield*) 4600-4607, (*Mann*) 3399, 3627-3635, (*Collins*) 4919, 4920, (*Desai*) 8775-8785.
— ——— ——— ——— - ——, should become independent in short time (*Mann*) 2808, 2809, 3209.
—— ——— ——— ——— ——, should not deal in agricultural products (*Jenkins*) 7583-7585.
—— - ——— ——— ——— - —, smaller bodies than, need for (*Mann*) 3214, 3215.
——— ——— ——— ——— -, possibilities of (*Rothfield*) 4643, 4644.
——— ——— ——— ——— -, stimulus for, at present comes from outside (*Mann*) 2806, 2807, 3208, 3642.

CO-OPERATION—*concld.*

Taluka Development Associations, stimulus for, required from, outside (*Knight*) 5881-5893.
———, stimulus for, comes from within (*Jenkins*) 7447-7451, 7561-7563, 7845, 7846.
———, supervision of (*Mann*) 3803-3806.
———, use of: to replace direct Government agency (*Mann*) 3626.
———: for introduction of agricultural machinery (*Collins*) (199).
———: for work of purchase societies (*Collins*) (198), (*Jenkins*) 7581, 7582.
———: for running agricultural bias schools (*Salimath*) 6659, 6660.
——— for sale and hire of implements (*Salimath*) (377), (*Jenkins*) (458, 459), 7340, 7341.
———: for seed distribution (*Jenkins*) (454), 7586.
———: for co-operative grazing in forests (*Jenkins*) 7591.
———, value of (*Mann*) (6), 2806, 2810-2812, 3167-3170, 3205-3207, 3226, 3636-3644 (*Rothfield*) 4640-4641, (*Knight*) (286), (*Bruen*) (405), (*Desai*) 8713-8717.
Tanks for irrigation, their construction by co-operative effort (*Lowsley*) 6492-6494.
Village co-operation for propaganda purposes (*Salimath*) (372).
Village industries, co-operative (*Naik*) (139), (*Salimath*) (377).
Villages, should be organised on co-operative lines (*Mann*) 3431.
Votes in co-operative societies, their attachment to the share rather than the member (*Jenkins*) (467), 7400, 7401. 7529, 7530.
Warehouses, co-operative (*Patil*) (509).

CROPS AND CROP PROTECTION.

Bajri, research on (*Mann*) 2981-2985, 3228, 3322-3325.
Better quality crops, importance of securing higher price for, when marketing (*Jenkins*) (453), (7330).
———, measures necessary to introduce (*Jenkins*) (453, 454).
Canadian fencing, its use for keeping out wild pigs (*Mann*) 3766, 3737.
Commercial crops, are replacing but should not be allowed to replace food crops in dry tracts (*Patil*), (511), 7885-7893, 7938-7944, 7973-7975, 8001-8007, 8017-8023.
———, effect of their increase on food crops (*Mann*) 3607-3612.
———, replacement of food crops by (*Jenkins*) 7566-7569.
Compulsion, use of, in newly irrigated areas to secure the growing of improved varieties of crops (*Inglis*) 5292-5297, 5477-5479.
Cotton, better quality, may involve reduction in yield per acre (*Jenkins*) 7333.
———, cost of cultivation and return of (*Desai*) 8794-8801, 8900-8907.
———, grading of, should be done by Government (*Mann*) (13, 14), 3683.
———, improved, area covered by (*Mann*) 3432.
———, cost of cultivating not increased (*Jenkins*) 7331.
———, extra profit from (*Salimath*) (376), 6747-6749, (*Jenkins*) 7336, 7337.
———, organisation to supply seed for (*Mann*) (13, 14).
———, principal varieties of (*Mann*) 3269-3271.
———, schemes for increasing use of (*Salimath*) (376).
———, seed for better-quality slightly more expensive (*Jenkins*) 7332.
———, inferior, sowing of, prohibited by certain Indian States (*Mann*) (14), (*Jenkins*) 7334, 7335.
———, but could not be prohibited by Provincial Government (*Mann*) 3353, 3354.
———, Kumta used in heavier soil and Dharwar-American in lighter (*Salimath*) 6784-6786.
———, profit to cultivators per acre of (*Jenkins*) (456), 7691, 7838, 7839.
———, varieties of and yield in Khandesh (*Jenkins*) 7692-7707, 7733.
Cotton-breeding at Surat farm (*Desai*) 8936-8947.
Cotton Ginning and Pressing Factories Act, success of (*Jenkins*) 7338.
Cotton Transport Act, success of (*Jenkins*) 7338, 7619-7622, 7810, 7811.
Cross-fertilisation (*Burns*) 3864, 3870.
Crops grown, in Bijapur district (*Naik*) 4695-4698.
———, in Kaira district (*Maxwell*) 6366-6372.

CROPS AND CROP PROTECTION—*contd.*

Crops grown, in Southern Division (*Salimath*) (376).
Deterioration of seed, cultivators' methods of avoiding satisfactory (*Mann*), 3445, 3446,
Drought-resisting varieties of crops, importance of (*Burns*), 4001, 4002.
Fencing, co-operative, has been successful in Bombay (*Rothfield*) (164).
——————, Government should contribute share of cost of (*Rothfield*) (164).
——————, co-operative effort for (*Salimath*) (378, 379), 6625-6627.
——————, cost of (*Maxwell*) 6378.
——————, difficulties in way of (*Salimath*) (379), 6622-6624, 6634-6636.
——————, effect of tariff on imported (*Salimath*) 6690-6692, (*Maxwell*) 6289, 6290.
——————, importance of (*Collins*) (195), 5170-5173, (*Salimath*) (374, 375), 6605, 6606, 6722-6724.
——————, minimum height for, 5 feet (*Maxwell*) 6375-6377.
——————, provision of easy finance for (*Collins*) (195).
——————, recognition by cultivators of importance of (*Maxwell*) (338).
——————, should be made available at cheaper rates (*Maxwell*) (338), 6233-6236.
——————, societies for, difficulties of (*Jenkins*) (469).
——————, taccavi for (*Maxwell*) (338).
Food crops, are being replaced by commercial crops (*see* Commercial Crops).
——————, effect on, of increase in commercial crops (*Mann*) 3607-3612.
——————, improvement of (*Salimath*) (376).
——————, production of, in Bombay (*Patil*) 7973-7975, 8017-8023.
Game laws, advantage of relaxation of (*Collins*) (195).
Germination percentages (*Mann*) 3447-3453.
Grapes, now invariably sprayed for mildew (*Mann*) (5, 6).
Groundnut, improved seed for, has replaced whole of old seed (*Mann*) 3435, 3446, (*Desai*) (576).
Gun licences, for special guns for crop protection only (*Collins*) 5049-5051.
——————, system for granting, should be systematised (*Collins*) (195).
Higher-yielding crops, cotton extra profit derived from (*Jenkins*) (453), 7495, 7496, 7499.
——————, do not require better cultivation than ordinary varieties (*Jenkins*) 7498.
——————, importance of organising supply of sufficient seed for (*Jenkins*) (453).
——————, the easiest form of improvement to popularise (*Jenkins*) (453).
Hunting parties to keep down wild animals, under consideration (*Salimath*) (376).
Improvement of crops, by breeding, importance of (*Burns*) (103), 3864.
——————, methods for (*Burns*) (103).
——————, depends on general adoption by cultivators of improved varieties produced (*Jenkins*) (453).
——————, examples of (*Jenkins*) (455).
——————, factors making greatest appeal to cultivators (*Jenkins*) (453).
——————, importance of maintaining standard of improvement (*Jenkins*) (453).
——————, first stage in, work of plant breeder and experimental station (*Jenkins*) (453).
——————, second stage in, work of district demonstrator and organiser (*Jenkins*) (453).
——————, suggestions for (*Desai*) (576).
Insurance of crops, importance of (*Mann*), 3788, 3789.
Juar, research into (*Mann*) 2981-2984, 3228, 3322, 3325.
——————, hindered by lack of money and men (*Mann*) 2985.
——————, smut in (*see* Smut).
——————, yield of rabi, in Dharwar district (*Salimath*) 6752-6758.
Methods of technical crop improvement likely to prove successful (*Jenkins*) (454).
Monkeys, do great damage to crops but are regarded as sacred (*Maxwell*) (338).
Nets as protection against grasshoppers (*Mann*) 3231, 3232.
New crops, introduction of, in irrigated tracts (*Inglis*) (236).
——————, unimportant (*Jenkins*) (454).
Organisers, function of, in introducing improved varieties (*Jenkins*) (454).
Pests, prevalence of, in India (*Burns*) (103, 104), 3999, 4000.
Plant breeders, function of, in introducing improved varieties (*Jenkins*) (454)
Prickly pear, harbours pigs and should be destroyed (*Naik*) (138), 4850-4852.
Principal crops grown in canal areas (*Inglis*) (236).

CROPS AND CROP PROTECTION—*concld.*

Principal crops grown in canal areas possible replacement of, by crops giving better financial return (*Inglis*) (236).
Prophylactic measures against disease, importance of propaganda to encourage use of (*Burns*) (103).
Quality of crops, importance of maintaining (*Patil*) (510).
Registered seed growers, should be appointed from cultivators using improved implements (*Jenkins*) (459).
Rice, area of, sown with improved seed (*Mann*) 3438.
Seed, improved, compulsory sowing of, desirable when it is already used by majority of cultivators (*Desai*) (576), 8593-8597, 8786-8793.
——— ———— ———, distribution of, by co-operative societies (*Naik*) 4771.
——— ———— ———— ———, by Supervising Unions (*Jenkins*) 7587.
——— ———— ———— ———, by Taluka Development Associations (*Mann*) (6), (*Jenkins*) 7586.
——— ———— ———— ———, importance of organising (*Jenkins*) (453, 454), 7471.
——— ———— ———— ———, present methods of distribution (*Jenkins*) (454, 455.)
——— ———— ———— ———, should be left as far as possible to co-operative unofficial bodies (*Jenkins*) (454, 455), 7472-7475, 7586.
——— ———— ———— ———, suggestions for (*Naik*) (138), (*Desai*) (576).
——— ———— ———, importance of distributing centres for good, in canal tracts (*Inglis*) (236).
——— ———— ———, keeping of large stocks of (*Mann*) 3674.
——— ———— ———, methods adopted to supply (*Mann*) 3442-3444.
——— ———— ———, now covers over 30 per cent. of crop area (*Mann*) 3432-3436.
——— ———— ———, supply of, through District Central Banks (*Mann*) 3679, 3680.
——— ———— ———, *see also* Cotton Seed.
Seed-testing (*Burns*) 3897-3904.
Selection, more important than hybridisation for improvement of crops (*Burns*) 3864, 3865.
Smut in juar, breeding of resisting varieties (*Mann*) 3331.
——— ———— ———, causes great loss (*Mann*) 3326, 3327.
——— ———— ———, inquiry into (*Mann*) 3328.
——— ———— ———, use of sulphate of copper to control (*Mann*) 3300, 3720, 3721.
——— ———— ———, use of treatment for, increased by propaganda (*Mann*) (5).
Successful efforts in improving crops, examples of (*Desai*) (576, 577).
Sugarcane, cultivation, extent of (*Inglis*) 5357-5361.
——— ———, prospects of in the Deccan (*Mann*) 3817-3821.
——— ———, rate of water for (*Inglis*) 5354, 5362, 5363.
——— ———, time of sowing of (*Inglis*) 5385-5387.
——— ———, water requirements of (*Inglis*) 5364-5369, 5390-5396, 5442-5444, 5588, 5593, 5624-5630, (*Mann*) 5641, 5658, 5659.
Tobacco (*Mann*) 3747-3750.
Vegetable oil, possibility of using thickened, as substitute for imported grease (*Mann*) 3111-3113.
Vegetables grown in Bombay (*Jenkins*) 7708-7718.
Wheat, export of (*Jenkins*) 7683-7685.
——— ———, growing of in rabi juar area (*Mann*) 3045-3050.
———, its substitution for millets and bajri in Bombay (*Jenkins*) 7623-7629.
———, method of cultivation and yield of (*Jenkins*) 7643, 7652.
———, profit to cultivator per acre of (*Jenkins*) 7840, 7841.
Wild animals, protection of crops against (*Mann*) 3177, 3736, 3737.
Wild pigs, damage done by (*Salimath*) (374), 6714-6721.
——— ———, fencing against (*q.v.*).
——— ———, necessity for guarding crops against, injuriously affects health of cultivators (*Salimath*) (374), 6603, 6604.

CULTIVATION.

Better quality crops, do not require more expensive cultivation (*Jenkins*) 7331.
Broad-ridge method of growing crops on irrigated land (*Patel*) (530, 531), 8316, 8317.
Cost of farming in Khandesh and Broach, figures for (*Patel*) (529, 530), 8078-8107, 8226-8236, 8299-8315, 8472-8481.
Cotton cultivation, comparison of yields by existing and improved methods (*Jenkins*) (456).
———————, existing practice (*Jenkins*) (455, 456).

CULTIVATION—*contd.*

Cotton cultivation, improvements in, sought to be introduced by Agricultural Department (*Jenkins*) (455), 7331.
Cotton rotation in Southern Gujarat (*Desai*) 8786-8793, 8900, 8901.
Demonstration and propaganda for improvement of cultivation, need for (*Jenkins*) (456).
———————————————, difficulties of (*Jenkins*) (457).
Dry farming, improvement of (*Mann*) 3596-3599, 3785-3787.
————, may discount failure of monsoon (*Knight*) 5850.
Fallowing (*Desai*) 8588-8592.
Harrowing (*Salimath*) 6773-6776.
Higher yielding crops, do not require more expensive cultivation (*Jenkins*) 7498.
Improvement of cultivation in irrigated areas, compulsion may be used where possible (*Inglis*) 5292-5295.
———————————————, must be brought about by indirect methods (*Inglis*) (229), 5259-5265.
Improvements of methods of cultivation and in rotations, examples of (*Desai*) (577), 8852-8860.
Improvement of tillage and crop cultivation, the primary method of securing increased yield (*Jenkins*) (455), 7497, 7498.
Intensive cultivation, found near big towns (*Mann*) 3407.
————————, might be extended by improved communications (*Mann*) 3408, 3409.
Irrigation agriculture (*note on*) (*Inglis*) (226-228).
Kumri cultivation, area of, not great in Bombay Presidency (*Edie*) 4285, 4286, 4289-4292.
———— ————, causes deterioration of forests and soil erosion (*Edie*) (146), 4287, 4288.
———————, control of (*Edie*) 4278-4280, 4330.
————————, period of rotation (*Edie*) 4278, 4331.
————————, settlement of tribes practising (*Edie*) 4281-4284.
————————, should be restricted (*Mann*) 2949.
Owners, cultivate their land better than tenants (*Desai*) 8741-8746.
Ploughing, not done at all in dry tracts in Dharwar district (*Salimath*) 6773.
Power cultivation, displaces labour and is unnecessary in India (*Patil*) (511), 7902-7907, 7917-7925, 8001-8007.
————————, in Khandesh, research into (*Jenkins*) (440).
————————, introduction of, would materially help cultivators (*Desai*) 9013-9017.
Revenue Department, should co-operate in inducing cultivators to adopt better system of cultivation by good tillage certificates giving rebate on assessment fees (*Jenkins*) (456), 7858-7864.
Rotation of crops, advantages of, appreciated by cultivators in irrigated tracts (*Jenkins*) (457).
———————————— at Jalgaon farm (*Jenkins*) (456, 457).
————————————, cotton (*Jenkins*) 7832-7835.
———————————————, should be improved by increasing part played by leguminous plants (*Jenkins*) (456).
———————————, suggestions for improvement of (*Salimath*) (376, 377), 6795-6797.
Suitable tillage implements, need for (*Jenkins*) (456).
Tilth, importance of preserving good, in irrigated areas (*Inglis*) (232), 5552.
Tractors, cost of cultivating with (*Desai*) 9018-9021.
————, ploughing with (*Knight*) (294), 6003-6005.
Wheat, methods of cultivation of (*Jenkins*) 7643-7652.

DEMONSTRATION AND PROPAGANDA.

Advertising of demonstrations, importance of (*Salimath*) (372), (*Jenkins*) (444).
Agricultural graduates, their value for propaganda (*Jenkins*) (443).
Agricultural patels, need for appointment of (*Jenkins*) (445), 7306.
———————————, status of (*Jenkins*) 7461-7463, 7549-7557, 7814.
————————————, use of revenue patels for, undesirable (*Jenkins*) 7554-7556.
————————————, work suggested for (*Jenkins*) (445), 7812, 7813.
Agricultural shows (small district) ineffective (*Jenkins*) (444).
Area of Presidency in which improvements have been introduced, 10 per cent. of total (*Patil*) 7950, 7951, (*Desai*) 8736-8740.
Backward tribes and the adoption of improved agriculture (*Jenkins*) 7612-7618.
Broadcasting, not an immediate possibility (*Mann*) 2849, 2850.

DEMONSTRATION AND PROPAGANDA—*contd.*

Canal officers, are educating cultivators in utilisation of water and improvement of agriculture (*Inglis*) 5262-5274, 5334-5336.
Cinema shows (*Jenkins*) (443), 7290-7293, (*Patel*) 8191, 8192, 8276, 8277.
Concentration of propaganda preferable to dispersion (*Mann*) 3429, (*Rothfield*) (163), (*Jenkins*) 7486-7489.
Continuity of demonstration and propaganda, essential (*Salimath*) (372), (*Desai*) 8682-8684.
Co-operation of Agricultural, Co-operative and Revenue Departments in propaganda work, value of (*Knight*) (286), 5907-5909, (*Jenkins*) (443), 7464.
Co-operative societies and propaganda (*see under* CO-OPERATION).
Cultivators, are not conservative (*Mann*) (5), 3348, (*Patil*) (507), 7949-7951.
——————, are very conservative (*Knight*) (286), 5890-5892.
——————, confidence of, in Agricultural Department, significant growth of (*Mann*) (2, 7), 2762-2764.
——————, methods of influencing (*Salimath*) (371), 6683-6686.
——————, must be guaranteed against loss caused by following advice given (*Desai*) (573).
——————, must have full confidence in demonstrators (*Desai*) (573).
——————, small, are not reached by Agricultural Department (*Knight*) 5951.
Demonstration farms, abandoned in Bombay (*Mann*) 3131.
——————, are not but should be run on commercial lines (*Maxwell*) (336, 337).
——————, cost accounts should be kept (*Desai*) 8678-8681.
——————, ineffectiveness of (*Mann*) (6, 7), 2803, 2804, 3348, 3349.
——————, of little value in backward areas (*Knight*) 5866, 5867.
——————, one needed in each district (*Desai*) (573).
——————, should pay their way or be closed down (*Inglis*) (228).
——————, value of (*Desai*) (573).
Demonstration plots, should be leased in different villages instead of using permanent plots (*Maxwell*) (336, 337), 6373, 6374.
Demonstration and propaganda, essentials for success of (*Jenkins*) (443).
——————, financing of (*Jenkins*) 7441, 7755-7757.
——————, lack of funds for (*Jenkins*) (446), 7433, 7596-7599, 7755.
——————, money spent on, disproportionately small to that spent on research (*Jenkins*) (446), 7309, 7310, 7432.
——————, non-official help in (*q.v.*).
——————, *see also* Propaganda.
Demonstrations, effectiveness of, would be increased if full accounts were published (*Rothfield*) (163), 4484-4486.
Demonstrations on cultivators' own fields, are the only effective method (*Inglis*) (229), (*Knight*) 5832-5834, (*Maxwell*) 6219, 6220, (*Jenkins*) (443).
——————, are effective for introduction of new crops but not for new tillage methods, etc. (*Desai*) (573).
——————, accurate records of, of no value (*Jenkins*) (446), 7307, 7308.
——————, cost accounts of, not taken (*Mann*) 3345, 3346.
——————, should be kept (*Maxwell*) (336, 337), (*Salimath*) (371), (*Rothfield*) (163), 4484-4486.
——————, desirability of further (*Mann*) 3135-3137.
——————, difficulties of (*Knight*) 5834, 5867.
——————, fieldmen for (*Jenkins*) (445), 7433-7435.
——————, methods for (*Mann*) 3337-3344, 3438-3441, (*Salimath*) (371), (*Jenkins*) (444-446).
——————, must be closely followed up (*Jenkins*) (445).
——————, only successful ones should be advertised (*Inglis*) (229), 5282, 5283.
——————, programme for (*Jenkins*) (445).
——————, showing all improvements, value of (*Salimath*) (371).
——————, usually confined to single factor of improvement (*Mann*) 3337.
——————, value of (*Mann*) (6), 2803, 2805.

DEMONSTRATION AND PROPAGANDA—*contd.*

Demonstrators, cannot be trained under District Boards (*Maxwell*) 6249.
————————, lack of sufficient (*Maxwell*) (336, 337).
————————, must have confidence of cultivators (*Desai*) (573).
————————, should be drawn from community to whom the demonstration is given (*Patil*) (511).
————————, unless properly trained are of little use (*Maxwell*) 6249, 6250.
Deputy Directors of Agriculture, demonstrations and propaganda by (*Desai*) 8659-8663.
District Agricultural shows (*Maxwell*) 6251, 6252, (*Jenkins*) (444).
Economic value of improvements, importance of demonstrating to cultivators (*Jenkins*) (444), (*Knight*) (286).
Fieldmen (*Jenkins*) (445), 7433-7435.
Improvements, if giving a quick return, will always be taken up (*Inglis*) (229).
————————, in other cases, indirect methods necessary to secure their adoption (*Inglis*) (229).
————————, recommendation of, undesirable unless they will give increased outturn of 15 to 20 per cent. (*Mann*) 3400-3402.
————————, value of, introduced by Agricultural Department (*Mann*) 3600-3603.
Intelligentsia, importance of interesting, in agriculture (*Mann*) 3539-3542.
Knowledge of improvements, does not filter down from large to small cultivators (*Mann*) 3462, (*Rothfield*) 4535, 4536, (*Jenkins*) 7438-7440.
Lantern lectures, value of (*Maxwell*) (336, 337).
————————, ineffective (*Jenkins*) (443), 7290.
Legislative Councils, their attitude towards agriculture (*Mann*) 3541-3546.
Literacy, value of, in facilitating propaganda (*Burns*) (104).
Local facilities for adopting improvements, importance of (*Jenkins*) (444).
Local needs, necessity for studying (*Salimath*) (372).
Local study, village by village, importance of (*Mann*) (6, 7).
Medals and certificates for cultivators, value of (*Knight*) 6101-6103, (*Jenkins*) 7853-7857.
Model schemes for land improvement and water utilization (*Lowsley*) (356), 6428-6431.
Non-official agencies, carry more weight than official (*Mann*) (6), 2813, 2814, 3217-3222, (*Inglis*) (234), 5563, (*Knight*) (286), (*Jenkins*) (443), 7436, 7437, 7442-7445, 7538, 7539, 7594, 7595.
Officials employed in propaganda, salaries of (*Mann*) 3210, 3211,
Organisation of sources of supply and maintenance, importance of and suggestions for (*Jenkins*) (444).
Personal influence, importance of (*Rothfield*) (163).
Private cultivators, results achieved by, have the greatest effect (*Inglis*) (234), 5563.
————————, should be induced to carry out demonstrations (*Inglis*) (234), 5320, 5321.
Propaganda, concentration of, preferable to dispersion (*Mann*) 3429, (*Rothfield*) (163), (*Jenkins*) 7486-7489.
————————, conditions necessary for its success (*Mann*) (6, 7).
————————, co-operative (*see under* CO-OPERATION).
————————, examples of success of (*Burns*) (102), (*Naik*) (136), (*Rothfield*) (163), (*Inglis*) (229), (*Knight*) (286), (*Patil*) (512).
————————, examples of failure of (*Inglis*) (229).
————————, in Bombay, organisation of (*Mann*) (7).
————————, carried out jointly by Agricultural and Co-operative Departments (*Mann*) (7), (*Rothfield*) 4538.
————————, success of (*Mann*) (5, 6).
————————, lack of sustained (*Maxwell*) (336, 337).
————————, must be brought to doors of cultivators (*Maxwell*) (336, 337), 6269, 6270
————————, need for intensive (*Salimath*) (371).
————————, should be directed to small holders (*Rothfield*) 4537.
————————, sufficient, cannot be carried out by Agricultural Department (*Salimath*) (371).
————————, suggested methods for (*Desai*) (573).
————————, to induce labourers to settle in uncultivated areas (*Salimath*) (378).
————————, to induce villagers to undertake sanitary schemes (*Salimath*) (378).
————————, to secure consolidation of holdings (*Knight*) 5962-5965.
Research, making results of, known to cultivators (*Mann*) 3163, 3226.
————————, of no value unless its results are incorporated in general agricultural practice (*Jenkins*) (446), 7309, 7310.

DEMONSTRATION AND PROPAGANDA—*concld.*

Shetki patels, *see* Agricultural patels.
Small cultivators, not reached by Agricultural Department (*Maxwell*) 6268.
Staff of Agricultural Department in Dharwar district (*Salimath*) 6762-6765.
Supervision and direction in case of improved methods (*Jenkins*) (444).
Vernacular leaflets, on animal husbandry (*Bruen*) 6982, 7098, 7099.
——— ———— on improved implements, should be distributed through Revenue Department (*Jenkins*) (459), 7343-7346.
Village co-operation for propaganda purposes (*Salimath*) (372).
Village patels, their attitude to demonstrations (*Knight*) (286), 5898-5901.

DESAI, Rao Sahib B. M., Deputy Director of Agriculture, Gujarat, Surat 8525-9022, (572-578, 603).

ADMINISTRATION :

Departments allied to Agriculture (Veterinary, Forests, Co-operative), should be under same Minister as Agricultural Department (577).
Deputy Directors of Agriculture, duties of 8642-8664.
Veterinary Service, should be under Director of Agriculture (577).

AGRICULTURAL INDEBTEDNESS :

Agriculturists Relief Act, has defeated its purpose 8553-8559, 8689-8693, 8765-8770.
Causes of borrowing (574), 8685-8688.
Mortgage and sale, policy of restriction of, has failed in certain Indian States (574).
———— — —, right to, should not be restricted (574).
Mortgages on land, sometimes take the form of fictitious sales owing to restrictions placed on moneylenders 8689-8693, 8766-8768.
Reasons preventing repayment (574).
Sources of credit (village moneylenders, co-operative societies and taccavi) (574).
Suggestions for lightening burden of debt (better farming, compulsory and adult education, improved communications and marketing facilities) (574).
Usurious Loans Act, will not help the cultivator unless Government finance is available (574).

AGRICULTURAL INDUSTRIES :

Cattle-breeding as a subsidiary occupation 8970-8980.
Hand-weaving, is dying out but might be re-introduced by propaganda 8982-8986.
Poultry-keeping, need for improvement of 8981.
Subsidiary occupations for occupiers of small holdings, are essential 8960-8976, 8997, 8998.
Suggestions for subsidiary industries 8981-8987.

AGRICULTURAL LABOUR :

Card system for indentured labour, should be introduced to prevent loss to cultivators (577), 8761-8764, 8993-8995.
Labourers, methods of getting, to take up land in uncultivated areas (577).
————, should be attracted to areas of shortage by paying higher wages and introducing contract system (577).
Shortage of labour, existence of seasonal in Gujarat (577).
————————, suggestion for overcoming (577).

ATTRACTING CAPITAL :

Causes preventing capitalists from taking to agriculture (578), 8733-8735.
Change in method of keeping village accounts, has discouraged investment of money in land (574), 8840-8848.
Factors tending to discourage owners of agricultural land from carrying out improvements (578), 8711, 8712.
Government Service, is regarded as more attractive than agriculture 8705-8707.
——— ————, attitude in regard to, may be changed by economic pressure 8708-8710.
Middle-class youths, attraction of, to agriculture (*see under* EDUCATION).
Owners, cultivate their land better than tenants 8741-8746

DESAI, Rao Sahib B. M.—*contd.*

CO-OPERATION :

Compulsion of obstinate minorities, may be practised in connection with co-operative irrigation and fencing schemes but not consolidation of holdings (578).
Co-operative organisations, might be used for propaganda 8599, 8600.
Non-credit societies, should be placed under Director of Agriculture or under agricultural officer ranking as Assistant Registrar in Co-operative Department (577, 578).
Taluka Development Associations, are doing good work 8713-8717.
———— ————————— ————, registration of, under Co-operative Societies Act 8775-8785.
Village Panchayets (*see under* WELFARE).

CROPS :

Cotton-breeding at Surat farm 8936-8947.
Cotton, cost of cultivation and return of 8794-8801, 8900-8907.
Groundnuts, value of introduction of new varieties (576).
Improvement of existing crops, suggestions for (576).
Seed, compulsory sowing of improved, desirable when it is already used by majority of cultivators (576), 8593-8597, 8786-8793.
Seed distribution (576).
Successful efforts in improving crops, examples of (576, 577).

CULTIVATION :

Cotton rotation in Southern Gujarat 8786-8793, 8900, 8901.
Fallowing 8588-8592.
Improvements in methods of cultivation and in rotations, examples of (577), 8852-8860.
Labour-aiding machinery, introduction of, would materially help cultivators 9015-9017.
Owners, cultivate their land better than tenants 8741-8746.
Tractors, cost of cultivating with 9018-9021.

DEMONSTRATION AND PROPAGANDA :

Area in which improvements have been introduced, about 10 per cent. of gross area of Presidency 8736-8740.
Continuity of demonstration work, importance of 8682-8684.
Co-operative organisations, their use for propaganda 8599, 8600.
Cultivators, must be guaranteed against loss caused by following advice given (573).
————, must have full confidence in demonstrators (573).
Demonstration farms, farm accounts should be kept at 8678-8681.
———— ————————, one needed in each district (573).
———— ————————, value of (573).
Demonstrations on cultivators' own fields, valuable for introduction of new crops but not for introducing new methods of tillage, etc. (573).
Demonstrations, suggested methods for (573).
Deputy Directors of Agriculture, demonstrations and propaganda by 8659-8663.
Field demonstrations, suggestions for increasing effectiveness of (573).
Propaganda, suggested methods for (573).
Value of improvements which could be introduced 8909, 8910, 8960-8967.

EDUCATION :

Administration of education, should be left to Local Boards (573), 8673-8676.
Adult education, suggested methods for popularising (572).
Agricultural bias, is required in all rural primary schools (572), 8665.
Agricultural Colleges, should be started in representative tracts in Presidency as well as at Poona (572), 8747, 8748.
———— ————————, students at, majority of, do not take up farming (572), 8758-8760.
———— ———— ———— —, require two years practical training after graduation 8754-8757.
———————————— ————, 25 per cent. of important posts in Revenue Department should be reserved for (572), 8749-8753.

DESAI, Rao Sahib B. M.—*contd.*

EDUCATION—*contd.*

Agriculture, should be a compulsory subject in all middle and high schools (572).
———————, and rural economics, should be optional subjects in Arts, Engineering and Forest Colleges (572).
Child labour, demand for, interferes with primary education (578).
Compulsory primary education, must be introduced if agriculture is to be improved (573), 8666-8672.
Education, present system of, tends to make students seek Government service rather than take up agriculture 8702-8710, 8719-8722.
Indian officers for Agricultural Service, should be sent abroad for further training after some years' service in India 8626-8632.
Loni-type schools, at Godhra (*Appendix*) (1603).
———————, one needed for each district (572), 8527-8532.
———————, pupils at, generally return to agriculture 8533-8536, 8926-8930.
———————, need for recording careers of 8537, 8538.
———————, principally sons of cultivators 8931.
Middle-class youths, may be attracted to agriculture by offer of lucrative posts in Agricultural and Revenue Departments (572), 8538-8541, 8718-8723, 8749-8753.
———————, and by giving facilities for training in commercial farming on Government and specially selected private farms (572), 8754-8757, 8948-8950.
———————, by granting of lands and long-term loans at low interest to develop them (572).
———————, by treating agriculture as an honourable profession (572), 8702-8705.
———————, at present prefer Government service to agriculture 8705-8710.
Night schools for adult education (572).
Post-graduate teaching in Agricultural Colleges (572), 8948-8950, 8988-8992.
Practical training, required for agricultural graduates 8754-8757, 8948-8950.

FERTILISERS:

Artificial manures, do not pay with dry crops on account of their cost (576).
Cowdung as fuel, methods of discouraging (576).
Fallowing 8588-8592.
Sangreen manuring, valuable when properly applied by Chinese method (576), 8583-8587.

FINANCE:

Agricultural banks, need for (574), 8725-8728, 8806-8808
Government, as supreme landowner, should finance all schemes of land improvement (574), 8545-8552.
———————, should provide long-term credit for cultivators (574), 8879-8883.
Long-term credit, should be provided by Government (574), 8879-8883.
Moneylending landlords, few in number 8724.
Short-term credit, should be provided by co-operative societies or moneylenders (574).
Taccavi, rate of interest on, should not be more than rate Government pays for money *plus* establishment cost (574), 8560-8562, 8890, 8891, 8951-8953.
———————, rules for, should be made more elastic (574), 8694-8698.
———————, should be distributed direct by Revenue officers not below rank of Assistant Collector (574), 8563-8565.

HOLDINGS:

Consolidation, compulsory, undesirable (578).
———————, difficulties of (575), 8729-8732.
———————, efforts towards, in Indian States 8730, 8811-8815.
———————, legislation regarding, in Bombay (575), 8574-8582, 8699-8701.
Cultivators with small holdings, pay more attention to their land than those with bigger holdings (575), 8566-8573, 8955-8959.
Hindu and Mohammedan law of inheritance, will have to be changed if consolidation is to be maintained (575).

DESAI, Rao Sahib B. M.—*concld.*

HOLDINGS—*contd.*

Sub-division, is more pronounced in poorer areas (574).
————— – –, is slowly adjusting itself (574), 8898, 8899.
————————, prevention of excessive, by Government fixing minimum below which land must not be divided (575).

IMPLEMENTS :

Labour-aiding machinery, introduction of, would materially assist cultivators 9013-9017.
Spare parts for improved implements, difficulty of obtaining (577).
Tractors, 125 now working in Gujarat (577).
————, cost of cultivating with 9018-9021.

IRRIGATION :

Agricultural officer, should be attached to Irrigation Department to see that cultivation and use of water on perennial canals is done scientifically (576).
Canals in Kaira and Ahmedabad district, can be improved by constructing more storage tanks (575).
Charges for water, should be on volumetric basis (576).
Distribution of water, should be supervised by committee of representatives of Revenue, Agricultural and Engineering Departments and non-officials (576).
Irrigation from Narbada and Tapti rivers, impracticable 8861-8869.
Perennial canals, should be aided by open drains to prevent salinity (576).
Tanks, value of (576).
Wells, advances for, should be made from Famine Reserve Fund (575, 576), 8809, 8810.
———, cost of constructing 8895, 8896.

RESEARCH :

Deputy Directors of Agriculture, should do some research 8636-8639.
Research and propaganda, close relationship between 8640.

VETERINARY :

Veterinary Service, should be under Director of Agriculture (577).

WELFARE :

Games in villages (578), 8601.
Panchayets in villages, should be revived (578), 8602-8607, 8817-8839, 8870-8878, 8917-8925.
Standard of living of cultivators 8999-9012.

EDIE, Mr. A. G., Chief Conservator of Forests, Bombay Presidency, 4222-4481 (145-147).

FORESTS :

Afforestation, aids conservation of moisture in soil (146).
————————, further, possible but not desirable at present in Bombay Presidency 4379-4384, 4407-4410.
————————, not desirable in immediate vicinity of villages (146).
————————, of hills, important for prevention of floods (145, 146).
————————————, a remedy for soil erosion (145), 4230-4237.
————————, of ravine lands, not undertaken in Bombay 4385-4390.
Budget of Forest Department, Bombay 4461-4463.
Cattle-breeders, professional, pay higher rates for grazing in forests than ordinary cultivators 4396-4399.
Charcoal, cannot be sold at average price of less than Rs. 40 per ton 4360-4362.
————, high cost of transport of, a difficulty 4365.
————, manufacture of, now being undertaken by Forest Department 4356.
————————————, lessens cost of transport of fuel 4356.
————————, methods of manufacture of 4401-4403.
————————, research regarding 4368, 4438, 4439, 4458-4460.
————————, substitution of, for cowdung 4360-4367, 4393, 4394.

EDIE, Mr. A. G.—*contd.*

FORESTS—*contd.*

Communications, effect of improved, on supply of fuel from forests (146), 4321, 4322, 4374-4376.
Conservation of moisture in soil, helped by forests (146).
Co-operation of Forest and Agricultural Departments 4225, 4226, 4332-4334.
Cowdung, provision of substitutes for 4360-4367, 4391-4394.
Cultivators, handing over of belt round fields to, in thick forest areas (145), 4243, 4299, 4301.
- - - - —, privileges of, in forests, are very valuable 4471.
————————————, need not be restricted 4400.
————————, settlement of, in forest areas, to provide labour 4342-4345.
—, their employment in forest work during slack season (146), 4252-4260, 4335-4341, 4434-4437.
————————, their utilisation of forests, usually wasteful (146).
————————————————————, might be improved by allotting definite areas to individuals (146), 4415.
Dehra Dun, Institute at, assistance given by 4404.
————————————————, must be retained as training centre for all provinces 4477-4481.
Firewood, provision of, by planting trees on borders of fields (145).
————————, supply of, from forest areas, might be increased by improved communications (146), 4321, 4322, 4374-4376.
————————————, to cultivators 4391, 4392.
————————, transport of, expensive (145), 4377, 4378.
Floods, may be prevented by afforestation of hills (145, 146).
Fodder, stored by Forest Department, against famine 4261-4277.
————————————————————————, 4,500 tons stored each year 4271.
————————————————————————, except in times of scarcity must be sold at a loss 4275-4277.
————————————————————————, grasses available for, vary in quality 4349-4352.
————————————————————————————, research into 4369, 4370.
————————————————————————————, intended only as supplementary supply 4346-4348.
————————————————————————————, is sold at cost price in times of famine 4447-4449.
————————————————————————————, methods and cost of baling hay for 4440-4446.
————————————————————————————, reserve against famine, 20,000 tons 4271.
————————————————————————————————————, may be increased in times of famine 4271, 4310-4314.
————————————————————————————, transport of, difficult 4314.
Forest guards, character of 4307-4309.
Forest land, forms one-eighth of total area of the Bombay Presidency 4293.
Forest officers, act as excise officers in certain districts in Bombay 4320.
————————————, might be attached to Agricultural Service for that purpose 4229.
————————————, their instruction in needs of agriculture desirable 4227, 4228.
Forests, in Bombay, 85 per cent. of area of open to grazing 4315.
————————————————————, 20 per cent. are under Land Revenue Department 4319.
————————, their utilisation by cultivators usually wasteful (146).
————————, village, encouragement of 4464, 4465.
————————————————, seed for, supplied free to villagers 4466-4468.
————————————————, should not be too close to villages (146).
Fuel, *see* Firewood.
Grass-cutting, allowed when grazing is prohibited 4250.
Grass in forests, sold by auction to middlemen for resale to villagers 4415-4420.
Grazing in forests, allowed in 85 per cent. of forest area in Bombay 4315.
————————————————————, classification of forests from point of view of 4251.
————————————————————, control of, likely to prove successful (146), 4244-4250, 4315-4318.
————————————————, excessive, leads to deterioration of forests and thus to soil erosion (146).
————————————————————————, fees for, being low, lead to keeping of useless cattle (145).
————————————————————————————————————, raising of, its effect on grazing (147), 4241, 4372, 4373.

EDIE, Mr. A. G.—*concld.*

FORESTS—*concld.*

Grazing in forests, fees for, might have a selective tendency 4242.
——————, 4 annas a year per animal at present 4426, 4294-4297.
——————, increase of, from 2 to 4 annas, has not restricted grazing 4371, 4421-4425.
——————, or given rise to dissatisfaction 4427-4430.
——————, increased to professional cattle breeders 4396 4399.
——————, provision of, in areas of thick forest (145).
——————, value of, in Bombay, 21 lakhs, but is provided for 5 to 6 lakhs 4325-4328.
Industries based on forest products, possibilities of developing 4405, 4406.
Kadbi, its storage against famine 4353-4355.
Kumri cultivation, area of, not great in Bombay Presidency 4285, 4286, 4289-4292.
——————, causes deterioration of forests and soil erosion (146), 4287, 4288.
——————, control of 4278-4280, 4330.
——————, period of rotation 4278, 4331.
——————, settlement of tribes practising 4281-4284.
Labour available for forest work, insufficient (146), 4252-4260, 4335-4345, 4434-4437
Prickly pear, affords cover for wild animals and should be destroyed (145).
Protection of young trees 4238-4240.
Railway rates for timber and fuel, unduly high 4377, 4378.
Rainfall, little evidence that presence of forests causes increase in (146), 4301, 4302, 4413, 4414.
Roads, bridging of 4455-4457.
——————, regular programme for construction of, by Forest Department 4322-4324.
Shrubs, planting of, on hills to prevent soil erosion 4411, 4412.
Sleepers, for metre-gauge railways, supplied in quantites from forests in Bombay 4450-4454.
Soil erosion, caused by deterioration of forests (146).
——————, kumri cultivation as a cause (146), 4287, 4288.
——————, may be prevented by afforestation (145), 4230-4237.
——————, planting of shrubs to prevent 4411, 4412.
Superior Provincial Forest Service, recruitment of officers for 4472-4475.
——————, training of officers for, must be at central Institute and not provincially 4476-4481.
Terracing on hill-sides, not carried out in Bombay 4298.
Waste lands in non-forest districts, their utilisation for grazing 4431-4433.

EDUCATION.

Administration of education, should be left to Local Boards (*Desai*) (573), 8673-8676.
Adult education, effect on education of children of (*Mann*) 2779-2881, 3366-3369 (*See also* Illiterate homes).
——————, failure of (*Mann*) 2781-2786, (*Lory*) (317), 6125, 6130, 6133, 6184.
——————, for women (*Lory*) 6137.
——————, importance of, renders further efforts necessary (*Lory*) 6125-6134.
——————, propaganda for (*Lory*) 6193.
——————, suggestions for (*Naik*) (136), (*Lory*) 6130, (*Desai*) (572).
——————, teachers for, importance of (*Lory*) (317).
——————, visual instruction for (*Patel*) (529), 8190-8192.
——————, (*Jenkins*) (442).
Agricultural bias in education, introduction of, as soon as literacy is attained (*Mann*) 3223, 3224, (*Lory*) (316), 6111, 6112, (*Rothfield*) 4591.
——————— should be introduced from fifth standard (*Salimath*) (379).
——————, should be introduced in all rural primary schools (*Patel*) (527), 8047, 8048, 8052, 8053, (*Desai*) (572), 8665.
——————, should be given to all education in India (*Naik*) (140) 4686, 4687.
——————, value of, to interest intelligentsia in agriculture (*Salimath*) (380), 6740-6745.
Agricultural bias schools, are controlled by Local Boards (*Mann*) 3361, 3362.

EDUCATION—*contd.*

Agricultural bias schools, attitude of Local Boards towards (*Salimath*) (370), 6600, 6601, 6633.
———, might be under Taluka Development Associations rather than District Boards (*Salimath*) 6659, 6660.
———, are under Education Department (*Mann*) 2966, 2967, 3364, (*Lory*) 6182, 6183.
———, cost of (*Lory*) (317).
———, curriculum of (*Lory*) (317, 318).
———, fees at, no higher than for other schools (*Mann*) 3495.
———, genesis of (*Lory*) (316).
———, may counteract tendency of education to unsettle boys for the land (*Lory*) (319), 6108, 6110.
———, need for (*Mann*) (3), 2796.
———, none now under private auspices (*Mann*) 3359, 3360.
———, numbers of (*Lory*) (316), 6106, 6107.
———, 20 to be opened each year (*Mann*) 3358.
———, popularity of (*Lory*) 6160-6163.
———, pupils at, after-careers of (*Lory*) 6164.
———, age of (*Lory*) 6163-6156.
———, attendance of, good (*Salimath*) (370).
———, drawn from agricultural classes (*Mann*) (4).
———, not likely to relapse into illiteracy (*Lory*) 6151-6155.
———, readers for (*Mann*) 3273.
———, school plots at (*q. v.*).
———, should be given preference in distribution of Government grants (*Salimath*) (371).
———, should replace ordinary primary schools (*Maxwell*) 6401, 6402.
———, teachers at, must be practical men with working knowledge of agriculture of the district (*Jenkins*) (441).
———, not altogether satisfactory (*Mann*) 3356.
———, salaries of (*Lory*) (316).
———, training of (*Mann*) 3272, 3357, 3358, (*Lory*) (316, 318), 6118-6120, (*Salimath*) (370), 6681, (*Patel*) (528), 8064, 8455, 8456.
———, value of, in keeping peasantry on the land (*Burns*) (104).
———, will not interfere with attainment of literacy (*Lory*) 6111, 6112.

Agricultural College, Poona, course at, duration of (*Mann*) 3114-3116.
———, one year course (*Patel*) (528).
———, three years course, sufficient if agriculture taught in schools (*Patel*) (528).
———, can train men for Superior Provincial Agricultural Service (*Mann*) 2823-2827.
———, has done excellent work (*Mann*) 2958.
———, high standard of living at, cannot be maintained when students return to the land (*Patel*) (529), 8070-8077.
———, may train prospective officials and farmers side by side (*Mann*) 2798.
———, need for enlargement of (*Mann*) (4), 2951-2957.
———, produces 40 to 50 graduates a year (*Mann*) 3117.
———, rural economics, teaching of (*Mann*) 3380, (*Patel*) (528), (*Patil*) (511), 7945, 7948.
———, should be able to train rural teachers (*Mann*) 3381.
———, should reflect idea of improved rural life (*Mann*) 3379, 3380.
———, standard of admission to, higher than elsewhere (*Mann*) 3116.
———, students at, come partly from other Provinces and outside India (*Mann*) 2959-2963.
———, mainly absorbed in official posts (*Mann*) (5).
———, majority of, seek official posts (*Burns*) (102), 3910-3912, (*Patel*) (529), (*Desai*) (572), 8758-8760.
———, many are sons of landlords (*Mann*) 3240.
———, 20 per cent. of, take up farming as career (*Burns*) 3911, 3938-3945.

EDUCATION—*contd*

Agricultural College, Poona, students at, 25 per cent. of, come from cultivating classes (*Burns*) (102), 3872.
———————————, require 2 years' practical training after graduation (*Desai*) 8754-8757.
———————————, 25 per cent. of important posts in Revenue Department should be reserved for (*Desai*) (572), 8749-8753.
———————————, *See also* Agricultural graduates.
———————, need for, in Sind (*Mann*) (4).
———————, should be started in each representative tract in Presidency (*Desai*) (572), 8747, 8748.
———————, training at, previous to graduation, not sufficient to produce good research workers (*Burns*) (100), 3835, 3836.
Agricultural degree, standard of, equal to B.A. (*Mann*) 3490.
———————, easier to get than B.A. (*Maxwell*) (336), 6257, 6258.
Agricultural economics, and marketing, should be included in curriculum of all agricultural colleges (*Patil*) (511).
———————, examination in, at Poona (*Patil*) 7945-7948.
———————, need for increased teaching of (*Mann*) 3160, 3161.
Agricultural engineering, is taught at Poona (*Patel*) 8223.
Agricultural graduates, after-careers of (*Mann*) (5), 3058-3062, (*Patel*) 8498-8501.
———————, employment of, in Departments other than Agriculture (*Burns*) 3975-3978, (*Desai*) (572), 8749-8753.
———————, should first be posted to Subordinate Service and if suitable then sent abroad for further training and promoted (*Mann*) 3282-3287.
———————, value of, for propaganda purposes (*Jenkins*) (443).
———————, who take farming or farm economics as special subject, should be obliged to spend definite time on Government farm before appearing for final examination (*Jenkins*) (442), 7467, 7468.
Agricultural high schools, where three-quarters of the time will be devoted to agriculture, need for (*Patel*) (529).
Agriculture, education in, its extension necessary in canal areas (*Inglis*) (234), 5317-5319, 5561, 5562.
———————, little interest taken in, by educated people (*Salimath*) (379).
———————, instruction in, for officers of Co-operative Department (*Jenkins*) 7518-7522.
———————, for officers of Forest Department (*Edie*) 4227-4229.
———————, for irrigation officers (*Inglis*) 5453-5456, (*Harrison*) 5701, 5702.
———————, for Revenue officers (*Naik*) 4803-4810, (*Knight*) 5871, 5872, 5885, 5886, 6052-6054.
———————, must be as practical as possible (*Jenkins*) (441).
———————, night classes in Elementary (*Patel*) (528).
———————, should be compulsory subject in middle and high schools (*Salimath*) (379), (*Desai*) (572).
———————, should be optional subject in Arts colleges (*Salimath*) (379).
———————, should be optional subject in Arts, Engineering and Forest colleges (*Desai*) (572).
———————, should be taught in middle and high schools (*Patel*) (527, 528).
Bhils, cess for education of (*Knight*) 6046-6051.
Board of Education, need for, with adequate representation of Agricultural Department (*Patel*) (528), 8054-8058, 8392-8395.
Calcutta University Commission, recommendations of, not applied in Bombay (*Lory*) 6146, 6147.
Child labour, demand for, interferes with primary education (*Mann*) 3486-3488, (*Maxwell*) 6263, (*Salimath*) (380), (*Patil*) (512), (*Patel*) (539), (*Desai*) (578).
Cinemas and magic lanterns, success of, in educating villagers (*Lory*) (318).
———————, *see also under* DEMONSTRATION AND PROPAGANDA.
Compulsory primary education, difficulties of giving effect to demand for (*Knight*) 5919-5921.
———————, hopeful means of securing literacy (*Lory*) 6213.
———————, good effect of, in Baroda (*Patel*) (539).

EDUCATION—*contd.*

Compulsory primary education, must be introduced if agriculture is to be improved (*Desai*) (573), 8666-8672.
——— ——— ——— ———, need for introduction of (*Patel*) (529), 8065, 8066.
——— ——— ——— ———, with agricultural bias, need for (*Salimath*) (380).
Co-operation between Provinces and with Government of India in educational matters (*Lory*) 6170-6175.
Curriculum, of higher vernacular standards, unsuitable for children of agricultural classes (*Lory*) (318).
———, of lower standards, satisfactory (*Lory*) 6190, 6191.
District Boards and education (*Mann*) 3037, 3361, 3362, (*Salimath*) (370), 6600, 6601, 6633.
District inspectors for Education Department, might with advantage be recruited from Agricultural College (*Mann*) 3489.
Educated men, examples of attempts by, to practise agriculture (*Patel*) (529, 530), 8078-8107, 8226-8236, 8299-8315, 8472-8481.
———, find it difficult to secure living by farming (*Patel*) (529, 530), 8422-8426, 8446-8454.
———, methods of attracting, to agriculture (*Desai*) (572), 8538-8541, 8702-8705, 8718-8723, 8749-8753, 8948-8950.
———, no longer interested in agriculture (*Salimath*) (380), 6740-6745.
———, prefer Government service to agriculture (*Desai*) 8705-8710.
Education, its tendency to unsettle boys for the land (*Rothfield*) 4589, (*Patel*) 8047-8053.
———, tends to make students seek Government service rather than take up agriculture (*Desai*) 8702-8710, 8719-8722.
Education Department, co-operates closely with Agricultural Department (*Mann*) 3363-3365.
———, should be under same Minister as Agricultural Department (*Mann*) 3389.
European training for officers of Agricultural Department: desirable (*Mann*) 3189, 3283, 3284, 3498, 3499, 3790, 3791, (*Burns*) 3850-3855.
———, should be given after some service in India (*Mann*) 3289, 3712-3717, (*Burns*) 3850-3855.
———, *see also* Post-graduate training *and* Study leave.
Evening classes in agriculture (*Patel*) (528).
Expenditure on different educational institutions in Bombay Presidency (*Lory*) (*Appendix*) (320, 321), 6206-6210.
———, on education in different Provinces (*Lory*) (*Appendix*) (325, 326).
Farm management, courses in, reasons for failure of (*Jenkins*) (442), 7577.
———, suggestions for popularising (*Jenkins*) (443), 7578, 7579.
———, *see also* Practical training.
Female education (*Lory*) 6135-6137, 6140-6144.
Financing of education, by means of export tax (*Patel*) (529), 8067-8069, 8242-8259, 8421, 8442-8445.
High schools, agricultural education in, *see* Agriculture.
Ignorance of parents a handicap to the spread of education (*Patel*) (539).
Illiteracy, relapse into, figures for (*Lory*) 6149, 6150, 6157, 6158.
Illiterate homes, cause relapse into illiteracy (*Mann*) 2779, 2780, (*Lory*) 6125-6128.
Indian officers for Agricultural Service, should be sent abroad for some years training after experience of practical work in India (*Mann*) 3282-3287, (*Patel*) 8351-8363, (*Desai*) 8626-8632.
Libraries and reading rooms, need for (*Patel*) (529, 539).
Literacy, the chief object of rural education (*Mann*) 2777, (*Lory*) (318), 6116, 6117.
———, may be encouraged by extension of postal facilities (*Mann*) 2848.
———, may be secured by compulsory education (*Lory*) 6213.
———, often lost after boys leave primary schools (*Mann*) 3030, 3031.
Loni-type schools, advantages of, insufficiently realised by cultivators (*Jenkins*) (441).
———, are at present educating 180 boys (*Mann*) 2790.
———, are controlled by Agricultural Department in consultation with Education Department (*Mann*) 3365.
———, caste prejudices against, do not exist (*Mann*) 2794.
———, causes of failure of, in other Provinces (*Mann*) 3278, 3279.
———, cost of, Rs. 262 per boy per annum (*Mann*) 2789, 3033.
———, provided by Provincial funds with small grants from District Boards (*Mann*) 3033-3036.
———, (*Patel*) 8063.

EDUCATION—*contd.*

Loni-type schools, cost of, free tuition and lodging necessary (*Mann*) 3157.
———————, demand for, may not be real reflection of cultivators' requirements (*Jenkins*) (441), 7281, 7545-7548, 7611.
———————, leakage from (*Mann*) 2791-2793, 3237-3239.
———————, one-third tuition directed to general education (*Mann*) 2797.
———————, policy for, one school for each district (*Mann*) 2787, (*Salimath*) (370),(*Desai*) (572), 8527-8532.
———————, pupils at, are attracted by hope of official posts (*Jenkins*) (441), 7280,7288-7290.
———————, seek Government service (*Patel*) 8059-8062.
———————, generally return to agriculture (*Mann*) 3568-3576, (*Desai*) 8533-8536, 8926, 8930.
———————, drawn from agricultural classes (*Jenkins*) (441), (*Desai*) 8931.
———————, need for recording careers of (*Desai*) 8537, 8538.
———————, free tuition and lodging necessary for (*Mann*) 3157.
———————, given facilities for further training on Government farms (*Salimath*) (371).
———————, progress of, has been slow (*Mann*) 3274-3276.
———————, provide one-fifth acre per boy (*Mann*) (5).
———————, their use for training teachers for agricultural bias schools (*Mann*) 3272, 3277, (*Lory*) 6194-6199, (*Patel*) (528), 8064, 8455, 8456.
———————, value of, for propaganda purposes (*Mann*) 3568-3572.
———————, work of (*Lory*) 6121-6124.
———————, at Devi-hosur, 60 per cent. of pupils at, go back to their farms (*Salimath*) (370).
———————, at Dhulia, after-careers of pupils at (*Jenkins*) 7283-7287.
———————, difficulty of securing full complement of boys at (*Jenkins*) (441).
———————, particulars of (*Jenkins*) (440-442).
———————, propaganda for (*Jenkins*) (441), 7282.
———————, school farm at (*Jenkins*) (442).
———————, at Godhra (*Appendix*) (*Desai*) (603).
Manual work in schools, desirability of (*Patel*) (528).
Middle schools, should give elementary practical and theoretical training in agriculture (*Patel*) (527).
Nature study (*Lory*) (318), 6115, 6116, (*Salimath*) (370), (*Jenkins*) (441), (*Patel*) (512).
Night schools, *see* Adult education.
One-man schools in Bombay (*Appendix*) (*Lory*) (323).
Patronage of education by public men, value of (*Mann*) 2775.
———————, common in Bombay (*Mann*) 2774, 2775.
Physical training and games, need for, in schools (*Patel*) (539), 8188, 8189.
Post-graduate students, have sound grounding in basic sciences (*Mann*) 2753-2755.
———————, their employment in research work (*Mann*) 3058-3060.
Post-graduate training, abroad (*Mann*) 3121, 3122, 3283, 3284.
———————, at Pusa (*Mann*) 3290.
———————, in agricultural colleges (*Desai*) (572), 8948-8950, 8988-8992.
Practical training, for prospective farmers (*Mann*) (5), 2799, 2800, 2801, 2802, 3066-3071, (*Desai*) 8754-8757, 8948-8950.
———————, in specialised forms of agriculture, for men of mukadam type, lack of (*Jenkins*) (442), 7480-7485.
Primary education budget for, in Bombay, over a crore (*Mann*) 3032.
———————, definition of, in Bombay, includes all purely vernacular education (*Lory*) (316).
———————, lack of facilities for (*Maxwell*) (336).
Primary Education Act, Bombay, effect of (*Lory*) 6178-6180.
Primary schools, number of, under District Boards (*Lory*) (*Appendix*) (323).
———————, in Southern Division (*Salimath*) (380).
Provincial Service Revenue officers, study of rural economy should be made a part of their curriculum (*Collins*) 4884.
Public opinion of agricultural education (*Mann*) 3350-3352, 3368, 3369.
Pupils in educational institutions in Bombay, classified by communities (*Lory*) (*Appendix*) (322).
Reforms, influence of, on primary education (*Lory*) 6176-6178.
Rural economics, degree in, desirability of instituting (*Mann*) 3825-3830.
———————, elementary, should be taught in all schools (*Patel*) (539).

EDUCATION—*concld.*

Rural economics, should be optional subject in Arts colleges (*Salimath*) (379).
————————, should be optional subject in Arts, Engineering and Forest colleges (*Desai*) (572).
————————, should be taught in Agricultural college (*Patel*) (528).
Rural hygiene, should be taught in all schools (*Patel*) (539).
Rural schools, need for agricultural bias in, *see* Agricultural bias.
————————, teachers in, *see* Teachers.
Rural training college fos teachers, project for (*Lory*) 6119, 6120.
School farms, essential at agricultural schools (*Jenkins*) (442).
School-going age (*Lory*) 6113, 6114, 6153.
School hours, should be adapted to needs of agricultural population (*Patel*) (539).
School plots (*Mann*) (5), 3224, 3491-3494, (*Burns*) (102), (*Lory*) (317), 6165, 6166, (*Salimath*) (370), 6759-6761, (*Jenkins*) (441, 442), 7573-7576, (*Patil*) (512), (*Patel*) (528).
Science training in Bombay schools, fairly good (*Mann*) 3280.
Secondary schools for agricultural education, need for (*Mann*) (3), 3138-3144.
Secondary education, agricultural, its provision by one year course at agricultural college (*Burns*) 3947, 3948.
————————————, separate branch of, should be established to meet needs of agricultural communities (*Maxwell*) (336), 6255, 6256.
————————————, too largely devoted to general subjects (*Maxwell*) (336).
Study leave for research workers (*Burns*) (101), 3843, 3844, 3921-3928.
Teachers, importance of (*Lory*) (318), 6190.
————, in agricultural bias schools (*q. v.*).
————, in rural areas, should be drawn from agricultural classes (*Mann*) (4), 3063-3065, (*Burns*) (102), (*Naik*) (136), (*Lory*) (318), (*Salimath*) (370), (*Jenkins*) (441), 7465, (*Patel*) (528).
————, in rural areas, should receive some instruction in agriculture (*Patel*) (512).
————, in rural areas, might receive agricultural training in vacations (*Mann*) 3496-3497.
————, low calibre of, hinders spread of education (*Patel*) (539).
————, night-school (*Lory*) (317).
————, number of, in Nasik and Khandesh, sufficient at present (*Jenkins*) (441).
————, numbers of trained and untrained, in Bombay (*Lory*) (*Appendix*) (324).
————, of agriculture and nature study, should be recruited from agricultural graduates (*Patel*) (528).
————, often ignorant of agriculture (*Mann*) 3497.
————, pay of, (*Appendix*) (*Lory*) (323).
————————————, a cause of low calibre (*Patel*) 8271-8275.
————, qualifications of (*Lory*) 6187-6189.
Teaching and research, combination of (*Mann*) 2750-2752, 3300, 3303, (*Burns*) (101).
Teaching facilities in Nasik and Khandesh, no demand for extension of (*Jenkins*) (441).
Undergraduates, desirability of using vacations for further instruction of (*Mann*) 3158-3160.
University, grants to, in Bombay (*Lory*) 6209, 6210.
Vernacular agricultural training college (*Salimath*) (370), 6681, 6682.
Vernacular books on agriculture (*Lory*) 6167, 6168, (*Salimath*) 6628-6632.
Vernacular final examination, a necessary qualification even for 'untrained' teachers (*Lory*) 6188.
————————————, boys succeeding in, rarely return to the land (*Lory*) (319).
————————————, usually taken by boys who have passed through higher vernacular standards (*Lory*) (319).
Veterinary college, percentage of passes at, high (*Farbrother*) 4170, 4171.
————————, room for improvement in course of (*Farbrother*) 4125-4128.
————————, students joining, have poor knowledge of English (*Farbrother*) 4123, 4124.
Village officials, should be trained in agriculture (*Naik*) (140).
Visual instruction, success of (*Lory*) (317, 318), 6185.

FARBROTHER, Mr. E. S., Superintendent, Civil Veterinary Department, Bombay Presidency, 4009-4192 (118-124).

ADMINISTRATION :

Board of Agriculture, necessity for veterinary representation on 4026.
Central legislation for control of cattle diseases, need for (122), 4033-4035.

FARBROTHER, Mr. E. S.—*contd.*

ADMINISTRATION—*contd.*

Civil Veterinary Department, detection, investigation and control of disease its most important work (119), 4019, 4020.
———, need not control cattle-breeding 4050-4053.
———, should not be under the Director of Agriculture (121) 4048, 4049, 4091, 4092.
———, staff of, should be separated from staff in charge of dispensaries 4093-4097, 4129-4134.
Civil Veterinary Department, Bombay, dual control of staff of, unsatisfactory (120).
———, duties of (120).
———, qualification necessary for appointment to 4015, 4016.
———, rate of recruitment to 4015.
———, staff of, present numbers of 4084-4087.
———, are allowed to take private practice 4162, 4163, 4186-4192.
———, insufficient (120).
Conferences of veterinary officers, should be held more frequently (120).
———, might take place at same time as meetings of Board of Agriculture 4021, 4022.
Co-operation of Agricultural and Veterinary Services in regard to cattle-breeding 4022-4027.
Co-ordination of provincial veterinary work (120).
Financing of veterinary research, by committee appointed by the Government of India (118), 4017, 4018.
Glanders and Farcy Act, its effect 4039, 4040.
Government of India, might control financing of veterinary research (118).
———, should have a veterinary department of its own to co-ordinate control of epidemics (119).
Indian States, and the control of contagious disease 4033-4037.
———, provision of veterinary assistance to 4073-4075.
Itinerating veterinary dispensaries (121).
Local Boards, should control veterinary dispensaries in their areas (120, 121), 4098-4102.
———, should appoint their own veterinary staff, distinct from that of Civil Veterinary Department 4063-4066.
———, would require provincial advice and support in veterinary matters 4099, 4100.
Mobile corps for combating epidemics, need for 4041-4047.
Muktesar, Director of, should be Veterinary Adviser to the Government of India 4013.
———, fulfils its purpose satisfactorily 4011, 4012.
———, necessity for whole-time Director at (118).
———, too isolated to undertake local problems (118).
Private veterinary practitioners, little opening for, at present 4015, 4158-4163.
Provincial veterinary research, clinical material for, provision of 4069-4072.
———, in Bombay, could be undertaken at Veterinary College (118).
———, must be divorced from teaching work (118).
———, necessity for (118).
Veterinary Adviser to Government of India, need for appointment of (120).
———, should act as Director of Muktesar Institute 4013.
Veterinary dispensaries, are located at taluka headquarters 4174, 4181.
———, itinerating (121).
———, need for opening further 4067.
———, number of, insufficient 4173.
———, should be controlled by local Boards (120, 121), 4068, 4069.
———, or alternatively taken over by Government (121).
Veterinary work, in Bombay Presidency, organisation of (120), 4079, 4080.
———, should be under one head 4079-4082.
———, in Great Britain, organisation of 4157.

FARBROTHER, Mr. E. S.—*concld.*

ANIMAL HUSBANDRY :

Castration, by Burdizzo method 4175.
Horse-breeding, has been discontinued 4154.
Improvement of breeds of cattle, danger of famine a handicap 4144.
———— ————, handicapped by their liability to disease (122), 4029-4031.
———— ————, is under the Agricultural Department in Bombay 4051, with veterinary assistance when required 4156.
———— ———— ————, may be under Agricultural or Veterinary Department 4050-4053, 4118-4122.
———— ———— ————, need for co-operation of Agricultural and Veterinary Services to secure 4022-4027, 4032.

DISEASES OF ANIMALS AND THEIR PREVENTION :

Cattle markets and fairs, control of disease at 4114-4116.
Contagious diseases of cattle, disposal of carcasses 4111-4113.
———— ————, measures necessary to control (122, 123).
———— ———— ————, need for mobile corps to combat 4041-4047, 4133, 4134.
———— ———— ————, need for All-India Diseases of Animals Act to control (122), 4033-4035, 4038.
———— ———— ———— ————, present arrangements for reporting 4109, 4110.
———— ———— ———— ————, prevalence of (122).
———— ———— ————, reporting and control of, need for compulsion (122), 4135-4143, 4146-4148, 4165-4169.
Inoculation, compulsory (123), 4108.
———— ————, fee for, limits use (122), 4107.
———— ————, superstition of cultivators a bar to employment of (122).
———— ————, but may be overcome by demonstration of success of (122).
Parasitic diseases, prevalence of (122).
Rinderpest, serum-alone inoculation for, necessity for continuous protection 4062.
———— ———— ———— ————, only resorted to when outbreaks occur 4061.
———— ———— ———— ————, short period of immunity an objection to (122).
———— ———— ———— ———— ————, success of reinoculation (122).
———— ———— ———— ————, use of, in Bombay Presidency 4059, 4060.
———— ————, simultaneous inoculation against, disadvantageous for small owners owing to animals having to lie up 4054, 4055.
———— ———— ———— ———— ————, use of, in Bombay Presidency 4056-4058.
———— ————, periodicity of outbreaks and causes of same 4105, 4106.
Serum, can be obtained from Muktesar in sufficient quantities (121), 4103.
———— ————, influence of cost of, on amount used (122), 4107.
———— ————, provincial manufacture of 4149-4151.
———— ————, provincial storage of (121), 4103, 4104.
————, supply of, sometimes subject to delay (121).
Surra, treatment of 4172.

VETERINARY EDUCATION :

Bombay Veterinary College, percentage of passes at, high 4170, 4171.
———— ———— ————, room for improvement in course of 4125-4128.
———— ———— ————, students joining, have poor knowledge of English 4123, 4124.

VETERINARY RESEARCH :

Financing of (118).
Provinces, should carry out research (118).

FERTILISERS.

Adulteration of manures (*Jenkins*) (451), (*Patil*) 7913-7916.
Advice to cultivators on suitable manures, importance of (*Inglis*) (235).

FERTILISERS—*contd.*

Ammonium sulphate, increase in use of (*Mann*) (5), (*Patil*) (514), 7949.
Artificial manures, cannot compete with natural except in irrigated tracts and for valuable crops (*Jenkins*) (451).
———, do not pay with dry crops (*Desai*) (576).
———, scope for, in North Kanara (*Maxwell*) (338).
Bones and blood, export and use of (*Mann*) 3072-3079.
Castor cake (*Jenkins*) (451), 7680.
Cheap fertilisers, importance of (*Inglis*) (235).
Cowdung as fuel, may be used because smouldering fuel required (*Jenkins*) 7327-7329.
———, methods of discouraging (*Desai*) (576).
———, need for propaganda to discourage (*Jenkins*) (452), 7327.
———, prohibition of (*Naik*) (138), 4669-4673, 4681-4685, 4706, 4707, 4817-4820.
———, replacement of (*Rothfield*) 4360-4367, 4391-4394, (*Inglis*) (235). (*Edie*) 4360-4367, 4391, 4394.
Decomposed waste materials, conditions for success with (*Jenkins*) (451).
Effect of manuring with artificial nitrogenous fertilisers (*Jenkins*) (452).
Effluent, high value of (*Inglis*) (233).
Green manuring (*Inglis*) (235), 5322-5330, 5383, (*Salimath*) (375).
Natural manures, need for fuller utilisation of (*Jenkins*), (450).
———, particulars of various (*Jenkins*) (451).
———, proper utilisation of, within means of every cultivator (*Jenkins*) (450).
Night soil, utilisation of crude (*Jenkins*) (451, 506), 7322, 7326.
Oil seeds, export of (*Mann*) 3106-3108.
———, hydrogenation of, to keep cake in India (*Mann*) 3109.
Overmanuring, uselessness of (*Inglis*) (231, 232).
Poona sewage effluent, distribution of (*Inglis*) (233).
Popularity of new and improved fertilisers, examples of (*Jenkins*) (452).
Prickly pear, its use as manure (*Salimath*) (375), 6607-6615, 6661-6665, 6669-6671.
Propaganda to increase use of fertilisers, not desirable till cultivation has been improved (*Jenkins*) (450).
Sangreen manuring, valuable when properly applied by Chinese method (*Desai*) (576), 8583-8587.
Sugarcane, manures for (*Mann*) 3234-3236.

FINANCE.

Agricultural banks, need for (*Desai*) (574), 8725-8728, 8806-8808.
Agriculturists Loans Act, bad effect of (*Rothfield*) 4522.
Annual requirements of cultivators, 20 to 25 crores (*Rothfield*) 4522.
———, cannot be met by taccavi (*Rothfield*) 4522.
———, *see also* Credit requirements.
Backward districts, are and must continue to be financed by money-lenders (*Knight*) (287).
Capital, amount of, available in India, small (*Patil*) (508).
———, requires high rate of interest (*Patil*) (508).
———, cheap, of no assistance unless cultivators have a surplus to permit of repayment (*Patil*) (513).
———, requires rationing (*Patil*) (513), 7989-7992.
Co-operative banks, should be provided with capital at a rate which will enable them to charge not more than 5 per cent. to cultivators (*Patel*) (530), 8108-8110.
Credit requirements of cultivators, 3 crores a year, of which 2 crores are provided by co-operative societies (*Collins*) (193), 5214-5220.
Deposits in Savings Banks and Imperial Bank, 50 per cent. of, should be set aside for lending to farmers' banks at low rate of interest (*Patel*) (530), 8111, 8427.
Financing, of cultivators, should be done through co-operative movement rather than by taccavi (*Rothfield*) 4522, 4523, (*Maxwell*) (337,340).
———, of ordinary agricultural operations, not much needed in dry tracts (*Salimath*) (372).
Government, as supreme landowner, should finance all schemes of land improvement (*Desai*) (574), 8545-8552.
———, finance by, should be available on easier terms than at present (*Inglis*) (234).
———, must finance holders of inalienable land (*Knight*) (291).
———, provision of direct financial assistance by (*Collins*) 4921-4927.
———, should aid in establishing banking facilities in outlying towns (*Collins*) (198), 5013, 5014.

FINANCE—*contd.*

Government, should not advance money at low interest for repayment of existing loans (*Collins*) 4924.
————————, should provide long-term credit (*Desai*) (574), 8879-8883.
Interest charged, by co-operative societies (*Collins*) (200), 4908, 5200-5202.
————————, by moneylenders, (*see under* **AGRICULTURAL INDEBTEDNESS**)?
————————————————, does not represent the whole cost of borrowing (*Collins*) 5074-5076.
————————, state regulation of (*Mann*) 3164.
Land Improvements Act, loans under (*Rothfield*) 4522.
Land mortgage banks, control of (*Collins*) (193), 5028.
————————————, co-operative nature of (*Collins*) (193), 4929-4932, 5029-5031.
————————————, may be organised co-operatively (*Naik*) 4730-4732.
————————————, should be developed under existing Co-operative Credit Act (*Collins*) 4984-4987.
————————————, should be provided with money at rate which will enable them to charge not more than 5 per cent. to cultivators (*Patel*) (530), 8108-8110.
Loans to cultivators, need for supervising expenditure of (*Collins*) (193), 5021-5023, 5223, 5224, (*Patil*) (513), 7989-7992, (*Patel*) (530), 8111-8123, 8401, 8402, 8427, 8428.
Loans for more than one-fifth value of land, should be given for land improvement only (*Salimath*) (373).
Long term credit, cannot be provided by primary societies (*Collins*) 4928.
————————, interest on, should be reduced (*Mann*) 2854-2859.
————————, may be defined as for anything over 5 years (*Collins*) 5161-5163.
————————, scheme for, chiefly intended for redemption of old debt and improvement of land (*Collins*) 5203-5206.
————————————, suggestions for provision of (*Rothfield*) 4524.
————————————, provision by: co-operative societies (*Mann*) (2853), (*Rothfield*) 4524, (*Knight*) (287, 288.)
————————————: Government (*Desai*) (574), 8879-8883, (*Salimath*) (373).
————————————: land mortgage banks (*Naik*) (136), 4199, 4200, 4206, 4856-4862, (*Collins*) (193), 4929.
————————————, provision for: land improvement (*Mann*) 2851, 2852. (*Salimath*) (374).
————————————: redemption of mortgages (*Patel*) (530).
————————————: rural industries (*Salimath*) (377).
————————————, *see also* Taccavi.
Short term credit, may be defined as for anything under 5 years (*Collins*) 5161-5163.
————————————, should be provided by co-operative societies (*Naik*) (136), (*Collins*) (193), (*Knight*) (287, 288).
————————————, should be provided by co-operative societies and moneylenders (*Desai*) (574).
————————————, should be very limited to prevent misuse (*Salimath*) (372).
Taccavi, cannot be given on sufficient scale to replace money-lenders (*Knight*) (287, 288)
————————, dangers of (*Collins*) (194), 5181-5183.
————————, demand for, great (*Naik*) 4724, (*Patil*) (513).
————————, for: consolidation schemes (*Maxwell*) (338).
————————: extension of irrigation (*Salimath*) (374).
————————: fencing (*Maxwell*) (338).
————————: field embankments (*Salimath*) (374, 377), 6640.
————————: land improvement (*Knight*) (288), (*Maxwell*) (337), 6274-6276.
————————: ordinary agricultural operations, should not be given (*Knight*) (288).
————————: water channel schemes (*Collins*) 5147-5151.
————————: wells (*Mann*) 3104, (*Maxwell*) (338).
————————, given to extent of 3½ lakhs a year, rising to 1½ crores in times of famine (*Collins*) 5142-5146.
————————, interest on, should not exceed rate Government pays for moneyp *plus* establishment cost (*Desai*) (574), 8560-8562, 8890, 8891, 8951-8953.
————————, money spent by Government on, would be better put into land mortgage banks (*Collins*) 4922.
————————, need for extending (*Naik*) (137), 4723.
————————, recovery of (*Maxwell*) 6323, 6324.
————————, rules for, should be made more elastic (*Maxwell*) (337), 6276, (*Desai*) (574), 8694-8698.
————————, should be distributed by co-operative societies (*Collins*) (194), 4933-4936. (*Knight*) 5913, 5914.

FINANCE—*concld.*

Taccavi, should be distributed by : Revenue staff (*Naik*) (137), 4724, 4725.
——— : Revenue staff not below rank of Assistant Collector (*Desai*) (574), 8563-8565.
———, should be given under Land Improvements Act rather than Agriculturists Loans Act (*Rothfield*) 4522.
———, should be given only in backward tracts or time of famine (*Rothfield*) 4522, 4523, 4633-4635.

FODDER—*see under* **ANIMAL HUSBANDRY.**

FORESTS.

Afforestation, aids conservation of moisture in soil (*Edie*) (146).
further, possible but not desirable at present in Bombay Presidency (*Edie*) 4379-4384, 4407-4410.
———, not desirable in immediate vicinity of villages (*Edie*) (146).
—, of hills, important for prevention of floods (*Edie*) (145, 146).
———, a remedy for soil erosion (*Edie*) (145), 4230-4237.
———, of ravine lands, not undertaken in Bombay (*Edie*) 4385-4390.
Budget of Forest Department, Bombay (*Edie*) 4461-4463.
Cattle-breeders, professional, pay higher rates for grazing in forests than ordinary cultivators (*Edie*) 4396-4399.
Charcoal, cannot be sold at average price of less than Rs. 40 per ton (*Edie*) 4360-4362.
———, high cost of transport of, a difficulty (*Edie*) 4365.
——. manufacture of, lessens cost of transport of fuel (*Edie*) 4356.
———, now being undertaken by Forest Department (*Edie*) 4356,
, methods of manufacture of (*Edie*) 4401-4403.
———, research regarding (*Edie*) 4368, 4438, 4439, 4458-4460.
———, substitution of, for cowdung (*Edie*) 4360-4367, 4393, 4394.
Communications, effect of improved on supply of fuel from forests (*Edie*) (146), 4321, 4322, 4374-4376.
Conservation of moisture in soil, helped by forests (*Edie*) (146).
Co-operation of Forest and Agricultural Departments (*Mann*) 2948, 3389, (*Edie*) 4225-4226, 4332-4334.
Cultivators, handing over of bolt round fields to, in thick forest areas (*Edie*) (145), 4243, 4299, 4301.
———, privileges of, in forests, are very valuable (*Edie*) 4471, (*Collins*) (196, 197).
———, need not be restricted (*Edie*) 4400.
———, settlement of, in forest areas, to provide labour (*Edie*) 4342-4345.
———, their employment in forest work during slack season (*Edie*) (146), 4252-4260, 4335-4341, 4434-4437.
———, their utilisation of forests, might be improved by alloting definite areas to individuals (146) 4415.
———, usually wasteful (*Edie*) (146).
–, need for relaxation of restrictions on, in forest areas (*Maxwell*) (339, 340), 6339-6346.
———, should not be allowed to carry on sporadic cultivation in valuable forests (*Maxwell*) (339, 340).
Dehra Dun, Institute at, assistance given by (*Edie*) 4404.
–, must be retained as training centre for all Provinces (*Edie*) 4477-4481.
Firewood, provision of, by planting trees on borders of fields (*Edie*) (145).
———, may be secured by encouraging planting of casuarinas, etc. (*Maxwell*) (339, 340), 6410-6412.
–, and by planting waste areas in charge of Revenue Department (*Maxwell*) (339, 340).
–, supply of, from forest areas, might be increased by improved communications (*Edie*) (146), 4321, 4322, 4374-4376.
–, might be increased by closing of forests (*Knight*) (295).
———, to cultivators (*Edie*) 4391, 4392.
———, transport of, expensive (*Edie*) (145), 4377, 4378.
Floods, may be prevented by afforestation of hills (*Edie*) (145, 146).
Fodder, stored by Forest Department, against famine (*Edie*) 4261-4277.

FORESTS—*contd.*

Fodder, stored by Forest Department, 4,500 tons stored each year (*Edie*) 4271.
———, except in times of scarcity must be sold at a loss (*Edie*) 4275-4277.
———, grasses available for, vary in quality (*Edie*) 4349-4352.
———, research into (*Edie*) 369-4370.
———, intended only as supplementary supply (*Edie*) 4346-4348.
———, is sold at cost price in times of famine (*Edie*) 4447-4449.
———, methods and cost of baling hay for (*Edie*) 4440-4446.
———, reserve against famine, 20,000 tons (*Edie*) 4271
———, may be increased in times of famine (*Edie*) 4271, 4310, 4314.
———, transport of, difficult (*Edie*) 4314.
———, supply of, can be increased by restricting grazing (*Knight*) (295, 296).
Forest guards, character of (*Edie*) 4307-4309.
Forest land, forms one-eighth of total area of Bombay Presidency (*Edie*) 4293.
Forest officers, their instruction in needs of agriculture desirable (*Edie*) 4227, 4228.
———, might be attached to Agricultural Service for that purpose (*Mann*) 2950, (*Edie*) 4229.
Forests, in Bombay, 85 per cent. of area open to grazing (*Edie*) 4315.
———, 20 per cent. are under Land Revenue Department (*Edie*) 4319.
———, should not be under Revenue Department (*Collins*) (196, 197).
———, their utilisation by cultivators usually wasteful (*Edie*) (146).
———, village, encouragement of (*Edie*) 4464, 4465, (*Collins*) (197).
———, seed for, supplied free to villagers (*Edie*) 4466-4468.
———, should not be too close to villages (*Edie*) (146).
———, outlaying, between intensively cultivated areas, scheme for in Khandesh (*Collins*) (197).
———, control of, should not be relaxed (*Knight*) (295).
———, danger of their management by village committees (*Knight*) (295).
———, suffer from excessive grazing (*Knight*) (295).
———, their influence on rainfall and conservation of moisture (*Knight*) (295).
———, should not be regarded as accessory to other cultivation (*Maxwell*) (339, 340).
Fuel, *see* Firewood.
Grass-cutting, allowed when grazing is prohibited (*Edie*) 4250.
Grass in forests, sold by auction to middlemen for re-sale to villagers (*Edie*) 4415-4420.
Grazing in forests, allowed in 85 per cent. of forest area in Bombay (*Edie*) 4315.
———, classification of forests from point of view of (*Edie*) 4251.
———, communal, unsatisfactory (*Collins*) (602) 4946-4948.
———, control of, likely to prove successful (*Edie*) (145), 4244-4250, 4315-4318.
———, excessive, leads to deterioration of forests and thus to soil erosion (*Edie*) (146, 147).
———, fees for, being low, lead to keeping of useless cattle (*Edie*) (145).
———, raising of, its effect on grazing (*Edie*) (146, 147), 4241, 4372, 4373.
———, might have a selective tendency (*Edie*) 4242.
———, 4 annas a year per animal at present (*Edie*) 4426, 4294-4297.
———, increase of from 2 to 4 annas, has not restricted grazing (*Edie*) 4371, 4421-4425.
———, or given rise to dissatisfaction (*Edie*) 4427-4430.
———, are increased to professional cattle breeders (*Edie*) 4396-4399.
———, provision of, in areas of thick forest (*Edie*) (145).
———, scheme for partial enclosure system (*Collins*) 5177-5180.
———, value of, in Bombay, 21 lakhs, but is provided for 5 to 6 lakhs (*Edie*) 4325-4328.
Industries based on forest products, possibilities of developing (*Edie*) 4405, 4406.
Kadbi, its storage against famine (*Edie*) 4353-4355.

FORESTS—*concld.*

Kumri cultivation, area of, not great in Bombay Presidency (*Edie*) 4285, 4286, 4289-4292.
———— ——, causes deterioration of forests and soil erosion (*Edie*) (146), 4287, 4288.
——— ——, control of (*Edie*) 4278-4280, 4330.
——— ——, period of rotation (*Edie*) 4278, 4331.
——— ——, settlement of tribes practising (*Edie*) 4281-4284.
——— ——, should be restricted (*Mann*) 2949.
Labour available for forest work, insufficient (*Edie*) (146), 4252-4260, 4335-4345, 4434-4437.
Minor forests, should be managed for benefit of cultivators (*Maxwell*) (339, 340), 6379 6381.
Plantations near villages, should be encouraged (*Collins*) (197).
——— ——, difficulties of (*Knight*) (295).
Prickly pear, affords cover for wild animals and should be destroyed (*Edie*) (145).
Protection of young trees (*Edie*) 4238-4240.
Railway rates for timber and fuel, unduly high (*Edie*) 4377, 4378.
Rainfall, little evidence that presence of forests causes increase in (*Edie*) (146), 4301, 4302, 4413, 4414.
Ravine lands, afforestation of (*Maxwell*) 6296-6299.
Roads, bridging of (*Edie*) 4455-4457.
——, regular programme for construction of, by Forest Department (*Edie*) 4322-4324.
Shrubs, planting of, on hills to prevent soil erosion (*Edie*) 4411, 4412.
Sleepers, for metre-gauge railways, supplied in quantities from forests in Bombay (*Edie*) 4450-4454.
Soil erosion, caused by deterioration of forests (*Edie*) (146), (*Collins*) (197), (*Maxwell*) (339, 340).
—— ——, kumri cultivation as a cause (*Edie*) (146), 4287, 4288.
——, may be prevented by afforestation (*Edie*) (145), 4230-4237.
——— ——, planting of shrubs to prevent (*Edie*) 4411, 4412.
Superior Provincial Forest Service, recruitment of officers for (*Edie*) 4472-4475.
——, training of officers for, must be at central Institute and not provincially (*Edie*) 4476-4481.
Terracing on hill-sides, not carried out in Bombay (*Edie*) 4298.
Trees which do not damage crops (*Appendix*) (*Mann*) (271).
Waste lands in non-forest districts, their utilisation for grazing (*Edie*) 4431-4433.

HARRISON, Mr. R. T., Secretary and Chief Engineer, P. W. D., Bombay Presidency, 5672-5829.

ADMINISTRATION:

Central Irrigation Board (proposed), composition and functions of 5675-5680, 5683.
——, preferable to single officer acting as Irrigation Adviser to Government of India 5681.
Central research station for Irrigation, need for 5674, 5675.
Co-operation between Agricultural and Irrigation Departments, need for further 5748-5750, 5779-5781.
Dispute between Bombay and the Punjab on irrigation matters 5682, 5683, 5792-5829.
District Local Boards, necessity for caution in handing roads over to 5694, 5751.
——, roads built by Irrigation Department, should not be handed over to 5695, 5696, 5718-5725.
Government of India, should be in position to take more active part in large schemes and more active direction when schemes concern two or more Provinces 5682.
Irrigation, must remain for many years a reserved subject 5767-5771.
Irrigation officers, value to, of instruction in agriculture 5701, 5702.
Roads, in irrigated tracts, their control by Irrigation Department 5697, 5698.
——, when made by Irrigation Department, should not be handed over to District Boards 5695, 5696, 5718-5725.
——, their control by District Boards 5694, 5751.
Superior Provincial Engineering Service, training of officers for, satisfactory 5699, 5700.

IRRIGATION:

Accumulated arrears of interest, are debited to Irrigation Department and not to Famine Insurance Fund 5763, 5764.

HARRISON, Mr. R. T.—*contd.*

IRRIGATION—*contd.*

Accumulated arrears of interest, in no case exceed capital cost of canal 5762.
————————————, on Godavari Canals 5756-5760.
————————————, on Nira Left Bank Canal 5761.
Co-operative distribution of water (*see* Distribution).
Co-operative irrigation societies, might carry out minor irrigation works 5689-5692.
Cultivators, their right to water in the Deccan 5726-5732.
Cusec, value of, about Rs. 600 in Bombay 5791.
Distribution to cultivators, control of 5712-5717.
————————————, co-operative, unsatisfactory except in one instance 5684, 5691, 5703-5710, 5734.
————————————, policy in Sind, to supply water for one-third of each holding 5733.
————————————, volumetric, unsatisfactory 5684, 5753-5755.
————————————, would decrease total crop produced 5685, 5711, 5742-5747.
Falls on canals, not utilised 5785-5787.
Irrigation officers, value to, of instruction in agriculture 5701, 5702.
Lift irrigation, objectionable 5782-5784.
Minor irrigation schemes, by co-operative societies 5689-5692.
————————————, scope for 5686, 5776-5778.
————————————, special officer and funds for 5687, 5688.
Rates for water, co-operation with Agricultural Department in fixing 5748-5750.
Rules made by Irrigation Department, regarded by cultivators as oppressive 5713-5717, 5772-5775.
Sukkur Barrage, estimate for 5735-5741.
Volumetric distribution of water (*see* Distribution).

HOLDINGS.

Acreage of land available per head in India, compared with other countries (*Patil*) (508).
————————————, insufficient (*Patil*) (508), 7952-7957.
Birth control (*Rothfield*) (165), 4582-4586, (*Knight*) (292).
Compulsion of obstinate minorities to secure consolidation (*see under* Consolidation, compulsory).
Consolidation, compulsory (*Mann*) (11, 12), (*Rothfield*) 4498-4500, (*Collins*) (195), (*Knight*) (293), (*Maxwell*) (338), 6395-6397, (*Desai*) (578).
————————, can be effected by refusing irrigation water to fields of less than 6 acres (*Inglis*) (230), 5289-5291.
————————, co-operative (*Mann*) (11), (*Rothfield*) 4496, (*Collins*) (195).
————————, difficulties of (*Knight*) (293), (*Desai*) (575), 8729-8732.
————————, efforts towards, in Indian States (*Desai*) 8730, 8811-8815.
————————, in Japan (*Patil*) 7894-7899.
————————, in Khandesh, is not keeping pace with fragmentation (*Knight*) 5853-5858.
————————, is keeping pace with fragmentation (*Mann*) (11), 2862, 2863, (*Rothfield*) 4496, 4497.
————————, legislation for (*see under* Legislation).
————————, present position, unsatisfactory (*Mann*) (11).
————————, voluntary (*Collins*) (195), 5230-5233.
Cost to cultivator of starting afresh on an economic holding (*Knight*) (290), 5849, 6031-6035.
Cultivable land, percentage of, cultivated in Bombay (*Rothfield*) 4515.
Cultivating units, need for further statistics regarding (*Mann*) 3536-3538.
————————, sizes of (*Mann*) 3520-3535.
————————, when below average, lead to great loss of bullock power (*Mann*) 3526-3530.
————————, *see also under* Holdings.
Cultivators, more numerous than owners in West Khandesh (*Knight*) 5952-5961.
————————, with small holdings, pay more attention to their land than those with larger (*Desai*) (575), 8566-8573, 8955-8959.
Economic holdings, *see under* Holdings.
Fragmentary cultivation, may be made a criminal offence involving forfeiture of land (*Knight*) (291), 5852.
Fragmentation, checking of, by refusing irrigation water to fields of less than 6 acres (*Inglis*) (230), 5289-5291.

HOLDINGS- *contd.*

Fragmentation, checking of, by free measurement and valuation of land (*Patil*) (513).
——————, in Japan (*Patil*) 7894-7899.
——————, if unchecked, will lead to pestilence and famine (*Knight*) (291).
——————, legislation against (*see under* Legislation).
——————, rectification of (*see under* Consolidation).
——————, statistics showing increase of (*Knight*) (292).
——————, undesirable from animal husbandry point of view (*Bruen*) (400).
Hindu law of inheritance, effect of (*Knight*) (291, 293), 6001.
——————, will have to be changed if consolidation is to be maintained (*Desai*) (575).
Holdings, economic, are those which can employ cultivator who has one pair of bullocks (*Knight*) 5991-5995, (*Mann*) 3520-3523.
——————, should be impartible (*Knight*) (291).
——————, size of (*Mann*) 3522, (*Salimath*) 6768-6776.
——————, inalienable, should be impartible (*Knight*) (291) 5851.
——————, size of average (*Mann*) (8-11), 3522, (*Patel*) (537).
——————, minimum *Mann*) 3241-3245.
——————, smallness of, leads to waste of bullock power (*Mann*) 3526-3530, (*Patel*) 8435-8438.
——————, statistics of, in certain Deccan villages (*Mann*) (8-11), 3504-3516.
——————, uneconomic, the principal cause of indebtedness (*Knight*) (289).
Impartibility, difficulty of enforcing (*Knight*) (291), 5946-5950.
Legislation in Bombay to check fragmentation and encourage consolidation (*Mann*) (12), (*Rothfield*) 4496-4500, 4637-4639, (*Knight*) (291), (*Maxwell*) (338) 6287, 6288 (*Desai*) (575), 8574-8582, 8699-8701, (*Inglis*) 5228, 5229, 5233.
Minimum block for irrigation, 1½ acres (*Inglis*) 5289, 5290.
Propaganda to secure consolidation, value of (*Knight*) 5962-5965.
Sub-division, does not imply fragmentation (*Rothfield*) 4632, 4636.
——————, has not caused much injury (*Rothfield*) 4496.
——————, inevitable (*Patil*) (513, 514).
——————, is more pronounced in poorer areas (*Desai*) (574).
——————, is slowly adjusting itself (*Desai*) (574), 8898, 8899.
——————, legislation concerning (*see under* Legislation.)
——————, prevention of excessive, by Government fixing minimum below which land must not be divided (*Desai*) (575).
——————, should not be prohibited (*Rothfield*) 4496, 4578-4582, 4587, (*Inglis*) (195).
Taccavi for consolidation schemes (*Maxwell*) (338).
Uneconomic holdings, *see under* Holdings.
Uneconomic landholders, should be eliminated (*Knight*) (290), 6000.
Village sites, congestion of, a cause of fragmentation (*Maxwell*) (341), 6246, 6247.
Waste land in Bombay, now being distributed on impartible tenure (*Knight*) (291) 5852.

IMPLEMENTS.

Boring machines, demand for (*Lowsley*) (357, 358).
Chaff-cutters, need for (*Jenkins*) (461, 462).
Co-operative credit societies, should stock ploughs for sale on hire-purchase system and give demonstrations (*Jenkins*) (459).
Co-operative employment of agricultural machinery (*Salimath*) (379).
Co-operative implement distribution societies (*Salimath*) (377), (*Jenkins*) (458, 459), (*Naik*) (139).
Cultivators, are interested in improved machinery but hard to convince of its advantages (*Knight*) (293).
Distribution of improved implements, (*Jenkins*) (457, 458)
——————, *see also under* Co-operative Credit Societies *and* Taluka Development Associations.
Harvesting and threshing machines, demand for (*Salimath*) (378).
Hiring of implements, by co-operative societies (*Jenkins*) (459).
——————, facilities for, necessary (*Salimath*) (377).
——————, is being taken up by private individuals (*Jenkins*) (458).
Hire-purchase system for implements (*Jenkins*) (459), 7305.
Implement manufacturers, assistance to be given to (*Jenkins*) (459).
——————, distribution problems of (*Jenkins*) 7304.
——————, foreign, should be encouraged to start factories in India (*Patel*) (531), 8132-8136, 8318, 8396-8400.

IMPLEMENTS—*contd.*

Implement manufacturers, Indian, are handicapped by lack of import duty and high railway freights (*Mann*) 2874-2877.
———————————, are making satisfactory progress (*Mann*) 2872, 2873.
———————————, Kirloskar Bros. (*q. v.*).
———————————, should do more to extend use of improved implements (*Jenkins*) (458), 7301-7303.
———————————, should work through Taluka Development Associations (*Salimath*) (377).
Importation of implements, diminishing, except in case of big machinery (*Mann*) 2878.
Improved implements, demand for, increasing (*Mann*) 2879.
———————————, demonstration of (*Jenkins*) (457).
———————————, depots for spare parts for, essential (*Maxwell*) (339).
———————————, distribution of (*q. v.*).
———————————, manufacture of, by village blacksmiths (*Naik*) (139).
———————————, manufacture of, in India (*Mann*) 2872, 2873, 2880.
———————————, proposals for extending use of (*Jenkins*) (459).
———————————, vernacular leaflets on (*Jenkins*) (459), 7343-7346.
———————————, *see also* Spare parts.
Improvement of existing implements, local inquiries into, valuable (*Jenkins*) (457), 7339-7342.
———————————, making rapid headway (*Jenkins*) (457, 458).
———————————, must be cheap and easily effected in villages (*Jenkins*) (457).
———————————, preferable to introduction of new types (*Jenkins*) (457).
———————————, scope for (*Jenkins*) (457).
Kirloskar Brothers, (*Mann*) 2873, 2875, (*Jenkins*) (458), 7727, 7728.
———————————, effect of import duty on (*Jenkins*) 7729-7731.
———————————, price of ploughs made by, during past 11 years (*Appendix*) (*Patel*) (571).
Labour-aiding machinery, *see* Power machinery.
Local inquiries into possible improvements of implements, by non-official committees, value of (*Jenkins*) (457), 7339-7342.
Ploughs, introduction of iron, depends on provision of better bullocks (*Knight*) (293).
———————, iron, largely adopted in Deccan (*Mann*) (5).
———————, Sindi, largely replaced by Egyptian in Sind (*Mann*) (5).
Power machinery, displaces labour and is unnecessary in India (*Patil*) (511), 7902-7907, 7917-7925, 8001 8007.
———————————, its introduction would materially assist cultivators (*Desai*) 9013-9017.
———————————, *see also* Tractors.
Registered seed growers, should be appointed from cultivators using improved implements (*Jenkins*) (459).
Spare parts for improved implements, depots for, essential (*Maxwell*) (339).
———————————, difficulty of obtaining (*Desai*)) (577).
———————————, inquiry into facilities for obtaining, necessary (*Jenkins*) (459).
Taluka Development Associations, are supplied by Agricultural Department with ploughs on instalment system (*Jenkins*) (458).
———————————, their part in the demonstration and supply of improved implements (*Salimath*) (377), (*Jenkins*) (458, 459), 7340, 7341.
Tractor haulage (*Knight*) (294).
———————ploughing (*Knight*) (294), 6003-6005.
Tractors, 125 now working in Gujarat (*Desai*) (577).
———————, cost of cultivating with (*Desai*) 9018-9021.
Vernacular leaflets on improved implements, should be distributed through Revenue Department (*Jenkins*) (459) 7343-7346.

INGLIS, Mr. C. C., Executive Engineer of the Special Irrigation Division, Bombay Presidency, and **SULE, Mr. R. G.,** Executive Engineer, Special Irrigation Division, Bombay Presidency, 5237-5630 (226-236, 263-265).

ADMINISTRATION :

Agricultural and Irrigation Departments, co-operation between, difficult (226, 227), 5242, 5397, 5398, 5440-5442, 5466, 5472, 5499-5511, 5593-5601, 5604-5611.
———————————————, in research 5542-5544, 5602, 5603.
———————————————, present arrangements for 5248-5257, 5519-5523.
———————————————, should be secured by forming joint department to deal with irrigated tracts 5243-5247, 5399, 5473, 5512-5518.
———————————————, should be under the same Minister 5524-5526.
Agricultural Department, lack of appreciation by, of irrigation questions (226, 227), 5242, 5257, 5274, 5282-5284, 5364-5366, 5440-5442, 5470, 5471, 5609-5611.
Board of Agriculture, Bombay, is attended by irrigation officers 5253-5256.
Central organisation for co-ordination of irrigation research, need for (228), 5276-5279.
Hydraulician, one expert sufficient for whole of India (230), 5405.
Local Boards, may be in charge of roads in dry tracts, but should not be in irrigated areas (230).
Railway communications, need for improvement of (234).
Revenue Department, relations of with Irrigation Department 5474-5476.
Roads in irrigated tracts in the Deccan, are in some cases in charge of canal staff (230).
———————————————, need for further (230, 234), 5412, 5413.
———————————————, part of District Board cess should be earmarked for (230).
———————————————, should be under control of canal staff (230), 5288.
Special Irrigation Division, problems investigated by (226, 227).

CROPS AND CROP PROTECTION :

Compulsion, use of, in newly irrigated areas to secure growing of improved varieties of crops 5292-5297, 5477-5479.
New crops, introduction of, in irrigated tracts (236).
Principal crops, grown in canal areas (236).
———————, possible replacement of, by crops giving better financial return (236).
Seed, distributing centres for good, importance of, in canal tracts (236).
Sugarcane, cultivation, extent of 5357-5361.
————, rate for water for 5354, 5362, 5363.
————, time of sowing of 5385-5387.
————, water requirements of 5364-5369, 5390-5396, 5442-5444, 5588, 5593, 5624-5630.

CULTIVATION :

Improvement of cultivation in irrigated areas, must be brought about by indirect methods (229), 5259-5265.
———————————————, compulsion may be used where possible 5292-5295.
Irrigation agriculture (*note on*) (226-228).
Tilth, importance of preserving good, in irrigated areas (231, 232), 5552.

DEMONSTRATION AND PROPAGANDA :

Canal officers, are educating cultivators in the proper utilisation of water 5262-5274.
————————, and in improved cultivation generally 5334-5336.
Demonstration farms, should pay their way or be closed down (228).
Demonstration on cultivators' own fields, care should be taken only to advertise successful (229), 5282, 5283.
———————————————, the proper method (229).

INGLIS, Mr. C. C., and SULE, Mr. R. G.—*contd.*

DEMONSTRATION AND PROPAGANDA :—*contd.*

Improvements, if giving a quick return, will always be taken up (229).
————————, in other cases, indirect methods necessary to secure their adoption (229).
Private cultivators, practical results achieved by, have the greatest effect (234), 5563.
————————, should be induced to carry out demonstrations (234), 5320, 5321.
Propaganda, examples and causes of success and failure of (229).
Psychology of cultivators, importance of studying the (228, 229).

EDUCATION :

Agricultural education, its extension necessary in canal areas (234), 5317-5319, 5561, 5562.
Agricultural students, usually enter Government service (234).
Irrigation officers, value to, of instruction in agriculture 5453-5456.

FERTILISERS :

Advice to cultivators on suitable manures, importance of (235).
Cheap fertilisers, importance of (235).
Cowdung as fuel, its replacement (235).
Effluent, high value of (233).
Green manuring, effect of, on texture of light soils (235).
————————, method of 5323-5325.
————————, practice of, being taken up by cultivators 5322, 5326-5328.
————————, rate for water for 5383.
————————, usually adopted by larger cultivators 5329, 5330.
Over-manuring, uselessness of (231, 232).
Poona sewage effluent, distribution of (233).

FINANCE :

Government finance, should be available on easier terms than at present (234).

HOLDINGS :

Fragmentation, can be checked, and consolidation effected by refusing irrigation water to fields of less than 6 acres (230), 5289-5291.
Minimum block for irrigation at present, 1½ acres 5289, 5290.

IRRIGATION :

Applications for water, must be in name of owner of the land 5530.
Canals in the Deccan, depend at present on area under sugarcane 5359, 5360.
————————, expenditure on and return 5338-5346, 5349-5353, 5484-5486, 5581-5583.
————————, with one exception are protective works 5457-5462, 5587, 5588.
Capital cost per acre irrigated 5564-5571.
Cess for irrigation, proposals for and advantages of 5347-5353, 5483, 5487-5498.
Cultivators, have no right to water in Deccan 5420-5424, 5445-5447, 5527.
Distribution to cultivators, extremely complicated in the Deccan 5284, 5406.
————————, must be done by officials 5531, 5532.
————————, necessary to look six days ahead 5285-5287, 5450-5452.
————————, present method, depending on their demands, unsatisfactory (230, 231), 5379, 5380.
————————, proposed method of regulating (230, 231, 234, 235), 5298-5300.
————————, restriction of 5381, 5382.
————————, volumetric basis for 5306-5311, 5556-5559.
Evaporation, loss by, in storing tanks 5388, 5389.
Falls on canals, not utilised 5620-5622.
Famine relief, cost of, must be considered when estimating returns given by canals 5461-5465.
Irrigation agriculture (*note on*) (226-228).
Irrigation Department, policy of, the greatest good of the greatest number (227), 5258-5269, 5439, 5480-5483, 5589-5592.

INGLIS, Mr. C. C., and Mr. SULE, R. G.—*concld.*

IRRIGATION :—*contd.*

Irrigation officers, are in contact with agricultural research 5537-5541, 5544, 5545.
————————, value to, of wide knowledge of agriculture 5453-5456.
Irrigation schemes, proposals for in Deccan (230, 231), (234, 235).
————————————, financial aspects (234, 235).
Land revenue, may be increased in canal tracts 5584-5586.
Lining of canals, not superior to natural silt 5535, 5536.
Modules, types of (230, 231), 5300, 5370-5372, 5406, 5407.
Nira right bank canal, maximum area irrigated by 5580.
Outlets, types of, required (230, 231), 5612-5615.
Over-watering, prevalent (231, 232), 5554, 5555.
————————, may be remedied by better distribution of water (231, 232).
Protection, no definite system of, laid down 5574-5578.
Rates for water, are on area basis, varying with nature of crop 5533, 5534.
————————, for various crops 5354, 5362, 5363, 5383, 5384.
————————, remission of, in case of failure of crop 5418, 5419.
Sale of water, by measurement, note on (*Appendix*) (263-265), 5300-5311.
Sugarcane, cultivation, extent of 5357-5361.
————————————, rate for water for 5354, 5362, 5363.
————————————, water requirements of 5364-5369, 5390-5396, 5442-5444, 5588, 5593, 5624-5630.
Tank irrigation, may be adopted where large works unsuitable (234, 235).
Tube wells, no possibility of extending irrigation by, in the Deccan 5560.
Utilisation of water, measures taken to secure proper 5259-5274.
Volumetric distribution of water (*see* Distribution).
Wastage of water, causes of 5549-5550.
Water requirements of crops 5400-5402, 5427-5431, *see also* sugarcane.
Well irrigation, should be introduced in areas where sub-soil water-level is fairly high (234, 235).

RESEARCH :

Central irrigation research stations, for carrying on irrigation and agricultural research concurrently, need for (228, 230).
Central organisation for co-ordination of research, need for (228).
Experimental farms, should be separated from demonstration farms (228).
Lack of understanding of factors to be met, a cause of slow progress (228).
Scientific research officer, need for special, in each Province (228).
Traditional methods of agriculture, need for research into (228).

SOILS :

Alkali soil, reclamation of (231, 232), 5373-5375, 5432-5438.
Bunding 5551.
Drainage schemes, area requiring, 150,000 acres (231).
————————, at present cover 10,000 acres (231).
————————, in contemplation, well cover 11,000 acres (231).
————————, essential for irrigated land (231), 5312.
————————, financing of (231).
————————, must be carried out by Government (232).
————————, progressive scheme for, need of (231, 232).
Gypsum, use of, in case of flooding (231, 232), 5408-5410.
Heavy soils, show tendency to deteriorate under constant irrigation (235).
Light soils, effect of green manure on their texture (235).
————, show marked improvement when carefully worked and irrigated (235).
Over-manuring, uselessness of (231, 232).
Over-watering, prevalent (231, 232), 5554, 5555.
————————, may be remedied by better distribution of water (231, 232).
Waterlogging, and salt efflorescence, area of land rendered uncultivable by (231, 232).
————————————, caused by over-watering 5554.
————————, does not necessarily lead to salt efflorescence 5313-5316.

IRRIGATION.
Accumulated arrears of interest on canals (*Harrison*) 5756-5764.
Agricultural associations, can help cultivators to secure taccavi for minor irrigation (*Lowsley*) (357).

IRRIGATION—*contd.*

Agricultural Department, lack of understanding by, of irrigation problems (*see under* ADMINISTRATION).
————————, relations of, with Irrigation Department (*see under* ADMINISTRATION).
Agricultural officer, should be attached to Irrigation Department to see that cultivation and use of water on perennial canals is done scientifically (*Desai*) (576).
Annual Irrigation Report, Bombay (*Lowsley*) 6445, 6446.
Applications for water, must be in name of owner of land (*Inglis*) 5530.
Aquatic weeds, investigation of (*Mann*) 3151.
Artesian wells, *see* Wells.
Boring machines, demand for (*Lowsley*) (357, 358).
————————, may be met by increasing staff of Boring Works Division (*Lowsley*) (357).
Canal irrigation, effect of, on habits of cultivators (*Patil*) (508), 8009-8016.
————————, objections to, largely financial (*Lowsley*) (358).
————————, scope for, by bunding rivers and nullas (*Salimath*) (374).
————————, in Gujarat (*Lowsley*) (357).
————————, in Kaira (*Maxwell*) (338).
————————, *see* also under Irrigation schemes.
Canals in the Deccan, depend at present on area under sugarcane (*Inglis*) 5359, 5360.
————————, expenditure on and return (*Inglis*) 5338-5346, 5349-5353, 5484-5486, 5581-5583.
————————, with one exception are protective works (*Inglis*) 5457-5462, 5587, 5588.
————in Kaira and Ahmedabad district, can be improved by constructing more storage tanks (*Desai*) (575).
Capital cost per acre irrigated (*Inglis*) 5564-5571.
Cess for irrigation, proposals for and advantages of (*Inglis*) 5347-5353, 5483, 5487-5498.
Co-operative construction of minor irrigation works (*Lowsley*) 6489-6494, 6521-6525, (*Harrison*) 5689-5692, (*Maxwell*) 6242-6245.
Co-operative distribution of water, *see* Distribution.
Co-operative irrigation ('phad' system) particulars of (*Jenkins*) (449), 7734-7754.
———————— ————possibilities of (*Jenkins*) (449, 450).
Co-operative irrigation societies (*Salimath*) (374), (*Harrison*) 5689-5692.
Co-operative methods of distribution and control, may be introduced (*Rothfield*) (164).
Crop production, increase in, as result of soaking land at Rahuri (*Lowsley*) 6438-6442, 6463-6467, 6543-6547, 6553-6557, 6570, 6571.
Cultivators, construction by, of minor irrigation schemes (*Lowsley*) (357) 6433-6436.
————————, have no right to water in the Deccan (*Inglis*) 5420-5424, 5445-5447, 5527, (*Harrison*) 5726-5732.
Cusec, value of about Rs. 600 in Bombay (*Harrison*) 5791.
Dispute between Bombay and the Punjab on irrigation matters (*Harrison*) 5682, 5683, 5792-5829.
Distribution to cultivators, control of (*Harrison*) 5712-5717.
————————, co-operative, should be introduced (*Rothfield*) (164).
————————————, unsatisfactory save in one instance (*Harrison*) 5684, 5691, 5703-5710, 5734.
————————, extremely complicated in Deccan (*Inglis*) 5284, 5406.
————————, must be done by officials (*Inglis*) 5531, 5532.
————————, necessary to look 6 days ahead (*Inglis*) 5285-5287, 5450, 5452.
————————, policy in Sind, to supply water for one-third of each holding (*Harrison*) 5733.
————————, present method, depending on their demands, unsatisfactory (*Inglis*) (230, 231), 5379, 5380.
————————, proposed method of regulating (*Inglis*) (230, 231, 234, 235), 5298-5300.
————————, restriction of (*Inglis*) 5381, 5382.
———————— ————, should be supervised by committee of representatives of Revenue, Agricultural and Engineering Departments and non-officials (*Desai*) (576).
————————, volumetric (*Inglis*) 5306-5311, 5556-5559, (*Harrison*) 5684, 5711, 5742-5747, 5753-5755.

IRRIGATION—*contd.*

Embankments, construction of (*see under* SOILS.)
Engineering and geological survey of river and nullah beds in Khandesh (*Jenkins*) (450), 7766-7772.
Evaporation, loss by, in storing tanks (*Inglis*) 5388, 5389.
Falls on canals, not utilised (*Inglis*) 5620-5622, (*Harrison*) 5785-5787.
Famines in Nasik and Khandesh (*Jenkins*) 7640-7642.
Famine relief, cost of, must be considered when estimating returns given by canals (*Inglis*) 5461-5465.
Indirect benefit from minor irrigation works, taken into account (*Lowsley*) 6454-6462, 6548.
Irrigation agriculture, note on (*Inglis*) (226-228).
Irrigation Department, policy of, the greatest good of the greatest number (*Inglis*) (227), 5258-5269, 5439, 5480-5483, 5589-5592.
——————, relations of, with Agricultural Department (*see under* ADMINISTRATION.)
Irrigation officers, are in contact with agricultural research (*Inglis*) 5537-5541, 5544, 5545.
——————, value to, of knowledge of agriculture (*Inglis*) 5453-5456, (*Harrison*) 5701, 5702.
Irrigation schemes, in Bijapur (*Naik*) 4649-4668, 4699, 4700, 4722, 4821-4824, 4832-4838, 4863-4871.
——————, in the Deccan (*Inglis*) (230, 231, 234, 235).
——————, from Narbada and Tapti rivers, impracticable (*Desai*) 8861-8869.
Land Revenue, may be increased in canal tracts (*Inglis*) 5584-5586.
Lift irrigation, objectionable (*Harrison*) 5782-5784.
Lining of canals, not superior to natural silt (*Inglis*) 5535, 5536.
Minor irrigation works, area which might be covered by (*Lowsley*) 6443, 6444, 6499-6507.
——————, at present carried out by Public Works Department or Local Boards (*Lowsley*) 6521, 6522.
——————, co-operative construction of (*Harrison*) 5689-5692, (*Maxwell*) 6242-6245, (*Lowsley*) 6489-6494, 6521-6525.
——————, difficulties of constructing, by villagers (*Lowsley*) 6521-6525.
——————, financing of (*Lowsley*) 6549-6557, 6591-6597.
——————, Government aid for (*Salimath*) (374).
——————, great demand for (*Lowsley*) 6501, 6508, 6509.
——————, if fully developed will make great contribution to improvement of agriculture in Bombay (*Lowsley*) 6437.
——————, increase in crop production as result of (*Lowsley*) 6438-6442, 6463-6467, 6543-6547.
——————, indirect benefit from, taken into account (*Lowsley*) 6454-6462, 6548.
——————, number of abandoned, in Khandesh (*Jenkins*) 7766-7772.
——————, present rates for, too low (*Lowsley*) (782), 6478-6482.
——————, scope for (*Harrison*) 5686, 5776-5778.
——————, special officer and funds for (*Harrison*) 5687, 5688, (*Lowsley*) (356), 6541, 6542, 6495-6498.
Modules, types of (*Inglis*) (230, 231), 5300, 5370-5372, 5406, 5407.
Nira right bank canal, maximum area irrigated by (*Inglis*) 5580.
Non-perennial canals, scope for (*Salimath*) (374).
Outlets, types of, required (*Inglis*) (230, 231), 5612-5615.
Overwatering, may be remedied by better distribution of water (*Inglis*) (231, 232).
——————, prevalent (*Inglis*) (231, 232), 5554 5555.
Perennial canals should be aided by open drains to prevent salinity (*Desai*) (576).
Possibilities of extending irrigation, limited in Bombay (*Mann*) 3175.
Protection, no definite system of, laid down (*Inglis*) 5574-5578.
Rainfall, has been decreasing in Gujarat for many years (*Lowsley*) (358).
——————, precarious in Bombay (*Mann*) 3560, 3561.
Rates for water, are on area basis, varying with nature of crop (*Inglis*) 5533, 5534.
——————, co-operation with Agricultural Department in fixing (*Harrison*) 5748-5750.
——————, for various crops (*Inglis*) 5354, 5362, 5363, 5383, 5384.
——————, remission of, in case of crop failure (*Inglis*) 5418, 5419.
Revenue Department, should co-operate with Irrigation Department (*Inglis*) 5474-5476.
Rules made by Irrigation Department, regarded by cultivators as oppressive (*Harrison*) 5713-5717, 5772-5775.

IRRIGATION —*contd.*

Sale of water, by measurement, note on (*Inglis*) (*Appendix*) (263-265), 5309-5311.
——————, should be on volumetric basis (*Rothfield*) (164), 4612-4616, (*Desai*) (576).
——————, *see also* Distribution.
Silt in tanks, an obstacle (*Lowsley*) (358).
——————, clearance of, by co-operative labour (*Lowsley*) 6489-6491.
——————, by Government, impossible (*Lowsley*) (358), 6486-6488.
——————, cost of (*Lowsley*) (358), 6432, 6449-6452.
——————, valuable for land improvement (*Lowsley*) (358), 6453, 6454, 6489, (*Salimath*) 6731-6733, but cost of carting prohibitive (*Salimath*) 6731-6733.
Soaking of land (*Lowsley*) 6438-6442, 6463-6467, 6543-6547, 6552-6571, 6587-6597.
Soil, ideal condition of, for minor irrigation (*Lowsley*) 6531.
Special agency required to work outside as well as within famine tracts (*Lowsley*) (357), 6425-6427, 6532.
Sugarcane, extent of cultivation (*Inglis*) 5357-5361.
——————, rate for water for (*Inglis*) 5354, 5362, 5363.
——————, water requirements of (*Mann*) 5641, 5658, 5659, (*Inglis*) 5364 5369, 5390-5396, 5442-5444, 5588, 5593, 5624-5630.
Sukkur barrage, estimate for (*Harrison*) 5735-5741.
Superintending officer on special duty, appointed September 1925 (*Lowsley*) (356).
——————, department of, specially created for famine tracts (*Lowsley*) 6495-6498.
——————, duties of (*Lowsley*) (356), 6541, 6542.
——————, staff of, insufficient (*Lowsley*) (356, 357).
Tacoavi for extension of irrigation works (*Salimath*) (374).
Tanks for irrigation, construction of, by co-operative effort with State help (*Lowsley*) 6492-6494.
——————, difficulties of (*Lowsley*) (358).
——————, financing of repairs to (*Salimath*) 6735-6738.
——————, may be adopted where large works are unsuitable (*Inglis*) (234, 235).
——————, principal means of Irrigation in Gujarat (*Lowsley*) (357).
——————, repair and improvement of (*Salimath*) (374), 6728-6739.
——————, schemes for, are for rabi irrigation (*Lowsley*) 6583, 6584.
——————, scope for extension of irrigation by (*Salimath*) (374), 6687-6689.
——————, should be constructed outside as well as within famine tracts (*Lowsley*) (357).
——————, silt in, *see* Silt.
——————, sites for, are being investigated (*Lowsley*) (357).
——————, value of (*Desai*) (576).
——————, water supplied from, 150 acres per cusec (*Lowsley*) 6580-6583.
Tapti river, irrigation from (*Jenkins*) 7657-7662.
Terracing (*Lowsley*) (358).
Tube-wells (*Lowsley*) 6537-6540.
——————, largely used in Upper Gujarat (*Mann*) 3006-3013.
——————, no possibility of extending irrigation by, in the Deccan (*Inglis*) 5560.
Utilisation of water, measures taken to secure proper (*Inglis*) 5259-5274.
Value of water in different tracts in the Deccan (*Lowsley*) 6483-6485, 6510-6515.
Volumetric distribution of water, *see* Distribution.
Wastage of water, causes of (*Inglis*) 5549, 5550.
Water diviners (*Lowsley*) (358), 6520.
Water requirements of crops (*Mann*) 3051, (*Inglis*) 5400-5402, 5427-5431.
——————, *see also* Sugarcane.
Waterlogging (*Mann*) 3152, 3154.
Wells, artesian, of value where there is sweet water (*Lowsley*) 6517-6519.
——————, advances for, should be made from Famine Reserve Fund (*Desai*) (575, 576), 8809, 8810.
——————, boring of, comes under Agricultural Engineer (*Lowsley*) 6468.
——————, borings for (*Jenkins*) 7722-7726.
——————, cost of constructing (*Jenkins*) 7828-7830, (*Desai*) 8895, 8896.
——————, demand for taccavi for, large (*Maxwell*) (338).
——————, depths of (*Lowsley*) 6472, 6473.
——————, in Kaira district (*Maxwell*) 6347-6361.
——————, in Khandesh, area irrigated by (*Jenkins*) 7827, 7828, 7831.
——————, large numbers have gone out of use (*Jenkins*) (450).
——————, return by (*Jenkins*) 7828-7830.
——————, provision of credit for (*Naik*) (137).

IRRIGATION—*concld.*

Wells, re-boring of, increases the supply (*Lowsley*) 6469, 6470.
——, scope for (*Maxwell*) (338), 6362, (*Jenkins*) (374).
——, should be introduced where subsoil water-level is fairly high (*Inglis*) (234, 235).
——, uncertainty of success the chief obstacle to (*Lowsley*) (358).

JENKINS, Mr. W. J., M.A., B.Sc., I.A.S., Officiating Secretary of the Indian Central Cotton Committee, Bombay, 7236-7867 (438-469, 506).

ADMINISTRATION :

Central organisation, financing of 7409-7412, 7414.
——, for co-operative work (448), 7314-7316.
——, ideal system of, on lines of Indian Central Cotton Committee 7402-7404, 7413, 7414.
——, need for well-equipped, to supplement work of provincial departments (447), 7250-7252.
——, provincial representation on 7405.
——, research by, should not be concentrated at one large central station (447).
——, should be conducted by small investigation committees in tracts where results will be of greatest benefit to cultivators (447), 7405.
——, trade representation on 7407, 7408.
Co-operation between Provincial Agricultural Departments, by conferences of research workers 7311-7313.
——, instances of value of (447).
——, need for further (446, 447).
——, value of Board of Agriculture as providing means for (447).
Co-operation of Agricultural and Co-operative Departments, need for close (464).
Crop conferences, desirability of 7311, 7312.
Financing of research (438), 7246, 7247, 7540-7542.
Indian Central Cotton Committee, methods of (439), 7245-7249, 7402, 7403, 7413, 7422.
——, propaganda by 7415-7421.
——, research resulting from activities of 7424-7430.
Institute of Plant Industry, Indore (447, 448).
Provincial basis for research, danger of unsupplemented (448).
Provincial organisation of research (*see under* RESEARCH, Organisation of research).
Provincial research committees, need for (438, 439).
Revenue Department, distribution of leaflets on improved implements by (459), 7343-7346.
——, importance of co-operation with (443), 7464.
——, should co-operate in inducing cultivators to adopt better system of cultivation (456), 7858-7864.
Roads, lack of, in Khandesh 7817.
Rural Development Department, need for, to absorb all duties of Agricultural Department except research and of Co-operative Department except urban co-operation (464), 7847-7852.

AGRICULTURAL INDEBTEDNESS :

Causes of borrowing (448).
Co-operative credit societies, do not so far afford adequate finance 7761-7763.
Cotton-growers in Khandesh, are not so hampered by indebtedness as is sometimes believed (448).
Failure of crops, the chief cause of non-repayment (448).
Investigation of ten typical cotton-growing villages in Khandesh (448, 449).
Scources of credit (448).

JENKINS, Mr. W. J.—*contd.*

AGRICULTURAL INDUSTRIES:

Agriculture, should be where possible the whole-time occupation of cultivators 7822, 7824-7826.
Development of subsidiary industries, directly dependent on co-operative movement (462), 7826.
Fruit cultivation and preservation, research into (440).
Hiring of carts and bullocks, principal subsidiary occupation of cultivators in Khandesh (462), 7819-7821.
Weaving, not altogether suitable as occupation for cultivators 7822, 7826.

ANIMAL HUSBANDRY:

Breeding farms run by non-official organisations in Bombay (460), 7776, 7777.
Breeds of cattle in Nasik and Khandesh (459).
Castration of inferior bulls 7504-7506.
Cattle-breeding, a practicable proposition in Khandesh 7865-7867.
————————, *see also* Improvement of breeds.
Cattle Committees (divisional) (460).
Chaff-cutters, provision of (461, 462).
Co-operative cattle-breeding societies, area required for, in forests 7630-7634.
————————————————, in Poona 7842-7844.
————————————————, objections to, by Forest Department (460), 7630-7634, 7784.
————————————————, scheme for, in Khandesh 7347-7352, 7780, 7781.
————————————————, should be encouraged by granting forest grazing areas on concession terms (460), 7347, 7500, 7782-7784.
Co-operative fodder storage (461), 7836, 7837.
Co-operative grazing schemes in forest areas (462), 7500-7502, 7591, 7592.
————————————————, *see also* Co-operative cattle-breeding.
Dual purpose breeds 7778, 7779.
Enclosed pastures, may not lead to any considerable increase in fodder (461), 7357.
————————————, not common in Khandesh (461).
————————————, *see also* Grazing grounds.
Fodder, crops, intensive cultivation of (462), 7507-7510.
————, perennial (*q. v.*).
————, problem of, in Khandesh, suggestions for meeting (461, 462).
————, shortage of, in Khandesh, lasts 12 to 14 weeks (461).
Grazing, co-operative (*q. v.*).
————, in forest areas, preferable to stall-feeding, 7788-7790.
————————————, co-operative (*see* Co-operative cattle-breeding societies).
————, on grass borders of tilled fields (461).
————, value of control of 7357, 7358.
————, value of introducing rotational, and better grasses (461).
Grazing grounds, enclosure of, can be undertaken only with general assent 7359-7361.
————————————————, essential for cattle-improvement 7355, 7356.
Green fodder, absence of, injurious to cattle (461).
————————, silage as substitute for (461).
Groundnut, its use as fodder (461).
Improvement of breeds, action necessary for: castration of inferior bulls 7504-7506.
————————————————: cattle-breeding societies (460).
————————————————: control of grazing 7355-7361.
————————————————: Divisional Cattle Committees (460).
————————————————: increasing staff of livestock expert (460).
————————————————: increasing supply of trained cattlemen of kamgar type (460).
————————————————: investigation of sources of supply of breeding bulls (460).

JENKINS, Mr. W. J.—*contd.*

ANIMAL HUSBANDRY—*contd.*

Improvement of breeds, action necessary for : premium bull system (460).
————————, obstacles to : disease 7503.
————————————————: no adequate source of breeding bulls (460).
————————————————: overstocking of common pastures (461).
Intensive cultivation of fodder crops (462), 7507-7510.
Kadbi and other dry fodders, 25 per cent. wasted because fed to cattle without being threshed or chaffed (461).
Perennial fodders (guinea grass, etc.) may be planted on borders of water-channels (461).
Premium bull system (460).
Salt, the giving of, to cattle (461).
Sheep-breeding (460), 7260-7266, 7677, 7678.
Silage (461).
Wool, marketing of (462), 7317-7321.

ATTRACTING CAPITAL :

Cash rent *versus* Batai 7686-7692.

CO-OPERATION :

Better-farming societies, should be encouraged 7490-7494.
Bombay Central Co-operative Institute, good work done by (464, 465).
————————————————, propaganda by 7594, 7595.
Cattle-breeding societies, should be encouraged by being granted forest grazing areas on concession terms (460), 7347-7352, 7500, 7630-7634, 7780-7784.
Compulsion of obstinate minorities in improvement schemes, inadvisable (469).
Co-operation between Agricultural and Co-operative Departments, need for close (464).
Co-operative movement, educational value of 7300, 7528.
————————————, success of, in Khandesh 7469, 7470.
————————————, the only hope of raising the standard of living of rural India (464).
Cotton Sale Societies (464, 468, 469), 7511-7515.
Credit societies, distribution of seed by (454).
————————, do not at present afford adequate finance 7761-7763.
————————, educative value of, even greater than financial value 7300, 7528.
————————, should organise field demonstrations for their members (444), 7294-7300.
————————, should stock ploughs for sale on hire-purchase system and give demonstrations (459).
Denmark, co-operation in 7531-7537.
Factions in villages, a hindrance to co-operative movement (464, 465).
Fencing societies, difficulties of (469).
Fodder storage, co-operative (461), 7836, 7837.
Government, can help co-operative movement : by assisting non-official co-operative bodies in management and supervision in initial stages (464).
————————————————: by allotting larger funds for development (464), 7791-7793.
————————————————: by collecting and diffusing information (464).
————————————————: by enabling officers in rural communities to obtain more knowledge of the movement (464).
————————————————: by encouraging cultivators to join by granting concessions (but not money) to societies (464).
————————, should not take active part in organisation of co-operative societies (464, 465), 7523-7528, 7558-7560.
Grazing, co-operative, in forest areas (462), 7500-7502, 7591, 7592.
————————————, *see also* Cattle-breeding societies.

JENKINS, Mr. W. J.—*contd.*

CO-OPERATION—*contd.*

Implement distribution societies (458, 459).
Irrigation, co-operative ("phad" system) (449, 450), 7734-7754.
Marketing, co-operative, inquiry into (462), 7317-7321.
Non-official agencies, help which can be given to co-operative movement by (464,465).
Officers of Co-operative Department, courses in agriculture for 7518-7522.
———, should have some knowledge of agriculture (464), 7516, 7517.
Purchase societies, suggestions for encouraging (464-468), 7400, 7401.
Rural Development Department, need for, to absorb all duties of Agricultural Department except research and of Co-operative Department except urban co-operation (464), 7847-7852.
Seed, co-operative distribution of (454, 455), 7472-7475, 7586.
Subsidiary industries, co-operative development of (462), 7826.
Supervising Unions and the distribution of pure seed 7587.
Supply and maintenance of improved materials, co-operative organisation of (444).
Taluka Development Associations, co-operative grazing in forest areas by 7591.
———, co-operative purchase and sale by 7581, 7582.
———, distribution of implements by (458, 459), 7340—7341.
———, distribution of seed by (454), 7586.
———, Government subsidy should be replaced by provision and payment of agricultural graduate for 7448, 7460, 7564, 7565, 7794-7809.
———, impetus for organisation of, comes from within 7447-7451, 7561-7563, 7845, 7846.
———, organisers of 7452-7458, 7588-7590.
———, should not deal in agricultural products 7583-7585.
———, type of paid employees of, not satisfactory 7801-7804, 7815, 7816.
———, value of, for propaganda 7444, 7445, 7451, 7580.
Votes in co-operative societies, their attachment to the share rather than the member (467), 7400, 7401, 7529, 7530.

CROPS AND CROP PROTECTION:

Better quality crops, cotton, seed for, slightly more expensive 7332.
———, cost of cultivation, not increased 7331.
———, may involve reduction in yield per acre 7333.
———, importance of securing higher price for, when marketing (453), 7330.
———, measures necessary to introduce (453, 454).
Co-operative credit societies and seed distribution (454).
Cotton, profit to cultivators per acre of, Rs. 30 (456), 7691, 7838, 7839.
———, seed, improved, better price for 7336, 7337.
———, sowing of inferior, prohibited by certain Indian States 7334, 7335.
———, varieties of and yield in Khandesh 7692-7707, 7733.
———, *see also* Better quality *and* Higher-yielding crops.
Cotton Ginning and Pressing Factories Act, success of 7338.
Cotton Transport Act, success of 7338, 7619-7622, 7810, 7811.
Fencing societies, difficulties of (469).
Food crops, their replacement by commercial crops 7566-7569.
Higher-yielding crops, cotton, extra profit derived from (453), 7495, 7496, 7499.
———, do not require better cultivation than ordinary varieties 7498.
———, importance of organising supply of sufficient seed for (453).
———, the easiest form of improvement to popularise (453).
Improvement of existing crops, depends on general adoption by cultivators of improved varieties produced (453).
——— examples of (455).
———, factors making greatest appeal to cultivators (453).
———, importance of maintaining standard of improvement (453).
———, first stage in, work of plant breeder and experimental station (453).
———, second stage in, work of district demonstrator and organiser (453).

JENKINS, Mr. W. J.—*contd.*

CROPS AND CROP PROTECTION—*contd.*

Methods of technical crop improvement likely to prove successful (454).
New crops, their introduction unimportant (454).
Organisers, function of, in introducing improved varieties (454).
Plant breeders, function of, in introducing improved varieties (454).
Registered seed growers, should be appointed from cultivators using improved implements (459).
Seed, supply of pure, to cultivators, by Supervising Unions, 7587.
———————————, by Taluka Development Associations (454), 7586.
———————————, importance of organising (453, 454), 7471.
———————————, present methods of (454, 455).
———————————, should be left as far as possible to co-operative unofficial bodies (454, 455), 7472-7475, 7586.
Taluka Development Associations and seed distribution (454), 7586.
Vegetables grown in Bombay 7708-7718.
Wheat, export of 7683-7685.
———, its substitution for millets and bajri in Bombay 7623-7629.
———, method of cultivation and yield of 7643-7652.
———, profit to cultivator per acre of 7840, 7841.

CULTIVATION :

Better quality crops, do not require more expensive cultivation 7331.
Cotton cultivation, comparison of yields by existing and improved methods (456).
———————, existing practice (455, 456).
———————, improvements in, sought to be introduced by Agricultural Department (455), 7331.
Demonstration and propaganda for improvement of cultivation, need for (456).
———————————, difficulties of (457).
Higher-yielding crops, do not require more expensive cultivation 7498.
Improvement of tillage and crop cultivation, the primary method of securing increased yield (455), 7497, 7498.
Power cultivation in Khandesh, research into (440).
Revenue Department, should co-operate in inducing cultivators to adopt better system of cultivation by good tillage certificates giving rebate on assessment fees (456), 7858-7864.
Rotation of crops, advantages of, appreciated by cultivators in irrigated tracts (457).
———————, present, at Jalgaon farm (456-457).
———————————, cotton 7832-7835.
———————, should be improved by increasing part played by leguminous plants (456).
Suitable tillage implements, need for (456).
Wheat, methods of cultivation of 7643-7652.

DEMONSTRATION AND PROPAGANDA:

Advertising of demonstrations, importance of (444).
Agricultural graduates, their value for propaganda purposes (443).
Agricultural patels, need for appointment of (445), 7306.
———————, status of 7461-7463, 7549-7557, 7814.
———————, use of revenue patels for, undesirable 7554-7556.
———————, work suggested for (445), 7812, 7813.
Agricultural shows (small district), ineffective (444).
Backward tribes and the adoption of improved agriculture 7612-7618.
Bombay Central Co-operative Institute and propaganda 7594, 7595.
Cinemas, ineffective (443), 7290-7293.
Concentration of propaganda, preferable to dispersion 7486.
———————————, success of 7486-7489.
Co-operative credit societies, should organise field demonstrations for their members (444), 7294-7300.
Demonstration and propaganda, financing of 7441, 7755-7757.
———————————, for improved implements (457).
———————————, for improvement of cultivation (456), 457.
———————————, lack of funds for (446), 7433, 7596-7599, 775[illegible].
———————————, money spent on, disproportionately small to that spent on research (446), 7309, 7310, 7432.
———————————, non-official help in (*q. v.*)

JENKINS, Mr. W. J.—*contd.*

DEMONSTRATION AND PROPAGANDA—*contd.*

Demonstration campaigns, essentials for success of (443).
Demonstration on cultivators' own fields, accurate records of, no value (446), 7307, 7308.
———— ———— ————, are the only effective method (443).
———— ———— ————, conditions for success of (444-446).
———— ———— ————, fieldmen for, their efficiency low (445).
———— ———— ————, supervision of (445).
———— ———— ————, must be closely followed up (445).
———— ———— ————, must be conducted by practical demonstrators (445).
———— ———— ————, must be efficient (445).
———— ———— ————, present methods capable of improvement (444).
———— ———— ————, suggested programme for (445).
Economic value of improvements, importance of demonstrating to cultivators (444).
Fieldmen, classes for (445).
————, have little training in improved agricultural methods (445).
————, lack of training of, hinders wider extension of non-official agencies for agricultural improvement (445).
————, need for agricultural education to provide 7433-7435.
————, supervision of, difficult owing to shortage of staff (445).
Financing of propaganda 7441.
Knowledge of improvements, does not filter downwards from large to small cultivators 7438-7440.
Lectures, ineffective except to attract cultivators to demonstrations (443).
Local facilities for adopting improvements, importance of (444).
Magic lanterns, ineffective (443), 7290.
Medals and certificates, value of, 7853-7857.
Non-official help in demonstration and propaganda, value of (443), 7436, 7437, 7442-7445, 7538, 7539, 7594, 7595.
Organisation of sources of supply and maintenance, in case of improved materials, importance of (444).
———— ———— ————, must be official to start with, becoming non-official later (444).
———— ———— ————, scope for co-operative societies in regard to (444).
———— ———— ————, work of Agricultural Department with regard to (444).
Research, of no value unless results are incorporated in general agricultural practice (446), 7309, 7310.
Revenue Department, importance of co-operation of (443), 7464.
Shetki patels, *see* Agricultural patels.
Supervision and direction in case of improved methods, importance of (444).
———— ———— ————, work of Agricultural Department in regard to (444).
Taluka Development Associations, value of, for propaganda 7444, 7445, 7451, 7580.
Vernacular leaflets on improved implements, should be distributed through Revenue Department (459), 7343-7346.

EDUCATION :

Adult education (442).
Agricultural bias schools, are doing good work (441).
———— ————, school plots at (*q. v.*)
———— ———— ————, teachers in, must be practical men with working knowledge of the agriculture of the district (441).
Agricultural graduates, their value for propaganda purposes (443).
———— ————, who take general farming or farm economics as special subject, should be obliged to spend definite time on a Government farm before appearing for their final examination (442), 7467, 7468.
Agriculture, classes in, for officers of Co-operative Department 7518-7522.
————, must be as practical as possible (441).
Farm management, courses in, reasons for failure of (442), 7577.
———— ————, suggestions for popularising (443), 7578, 7579.
Loni-type schools, advantages of, insufficiently realised by cultivators (441).

JENKINS, Mr. W. J.—*contd.*

EDUCATIONAL—*contd.*

Loni-type schools, demand for, may not be real reflection of cultivators' requirements (441), 7281, 7545-7548, 7611.
———— ——, pupils at, are attracted by hope of official posts (441), 7280,7288, 7290.
———— ——, drawn from agricultural classes (441).
———— —, at Dhulia, after-careers of pupils at 7283-7287.
———— ——, difficulty of securing full complement of boys at (441).
———— ——, particulars of (440-442).
———— ——, propaganda for (441), 7282.
———— ——, school farm at (442).
Nature study (868).
Practical courses in specialised forms of agriculture for men of mukadam type, lack of (442), 7480-7485.
School farms, essential at agricultural schools (442).
School plots (441, 442), 7573-7576.
Teachers, in agricultural bias schools (*q.v.*).
————, in rural areas, should be drawn from agricultural classes (441), 7465.
—— ——, number of, in Nasik and Khandesh, sufficient at present (441).
Teaching facilities in Nasik and Khandesh, no demand for extension of (441).

FERTILISERS:

Adulteration of manures (451).
Artificial fertilisers, cannot compete with natural manures except in irrigated tracts and for valuable crops (451).
Castor cake (451), 7680.
Cowdung as fuel, may be used because smouldering fuel is required 7327-7329.
———— ————, need for propaganda to discourage (452), 7327.
Decomposed waste materials, conditions for success with (451).
Effect of manuring with artificial nitrogenous fertilisers (452).
Natural manures, need for fuller utilisation of (450).
———— ————, particulars of various (451).
————————, their proper utilisation within means of every cultivator (450).
Night soil, utilisation of crude (451), 7322-7326.
———— ——, manufacture of, into manure (506).
Popularity of new and improved fertilisers, examples of (452).
Propaganda (intensive) to increase use of fertilisers, not desirable till cultivation has been improved (450).

FORESTS:

Co-operative cattle-breeding societies, area required for, in forests 7630-7634.
———— ————————————, objections to, by Forest Department (460), 7630-7634, 7784.
———— ———— ————, scheme for, in Khandesh 7347-7352, 7780, 7781.
———— ———— ————————, should be encouraged by being granted forest grazing areas on concession terms (460), 7347, 7500, 7782-7784.

IMPLEMENTS:

Chaff-cutters, need for (461, 462).
Co-operative credit societies, should stock ploughs for sale on hire purchase system and give demonstrations (459).
Co-operative implement distribution societies (458, 459).
———— ————————————, their work largely done by Taluka Development Associations (458).
Demonstration of improved implements (457).
Hire of agricultural implements, by co-operative societies (459).
————————————, is being taken up by private individuals (458).
Hire-purchase system for implements 7305.
Implement manufacturers, assistance to be given to (459).
———— ————————, distribution problems of 7304.
———— ————————, Kirloskar Bros. (*q.v.*).

JENKINS, Mr. W. J.—*contd.*

IMPLEMENTS—*contd.*

Implement manufacturers, should do more to extend use of improved implements (458), 7301-7303.
Improvement of existing implements, local inquiries into (*q.v.*).
———, making rapid headway (457, 458).
——, must be cheap and easily effected in villages (457).
——, preferable to introduction of new types (457).
——, scope for (457).
Inquiry into facilities for obtaining spare parts, etc., necessary (459).
Kirloskar Bros. (458), 7727, 7728 : effect of import duty on 7729-7731.
Local inquiries into possible improvements of implements, by non-official committees, value of (457), 7339-7342.
Organisation of supply of implements to cultivators (457, 458).
Proposals for extending use of improved implements (459).
Registered seed growers, should be appointed from cultivators using improved implements (459).
Suitable tillage implements, need for (456).
Taluka Development Associations, are supplied by Agricultural Department with ploughs on instalment system (458).
——, makes of plough supplied to (458).
——, their part in the demonstration and supply of improved implements (458, 459), 7340, 7341.
Vernacular leaflets on improved implements, should be distributed through Revenue Department (459), 7343-7346.

IRRIGATION :

Co-operative irrigation ("phad" system), particulars of (449), 7734-7764.
———, possibilities of (449, 450).
Engineering and geological survey of river and nullah beds in Khandesh (450), 7766-7772.
Famines in East Nasik and East Khandesh 7640-7642.
Minor irrigation schemes, numbers of abandoned, in Khandesh 7766-7772.
Tapti river, irrigation from 7657-7662.
Wells in Khandesh, area irrigated by 7827, 7828, 7831.
——, borings for 7722-7726.
——, cost of and return by 7828-7830.
——, large numbers have gone out of use (450).

MARKETING :

Analysis of price structure of crops exported and consumed in India, need for 7390-7399.
Better quality crops, importance of securing higher price for, when marketing (453), 7330.
Co-operative cotton marketing societies (464, 468, 469), 7511-7515.
Co-operative ginning and sale of lint (464).
Co-operative marketing, inquiry into (462), 7317-7321.
Cotton marketing in Khandesh, present methods of, unsatisfactory (462).
———, particulars of (462).
——, suggestions for improvement of (463, 464).
Cotton markets in Khandesh, 35 in number (463).
——, allowances and deductions at (463).
——, charges at 7376-7385.
——, charges at, for national school, not objected to 7379-7382.
——, disputes after weighment at, lead to loss by cultivators (463), 7369-7375.
——, methods of (463).
——, middlemen at (463), 7366-7368, 7374, 7375.
——, prices at, methods of fixing (463), 7368.
——, storage facilities at (463), 7386-7388.
——, weighments at (463).
Daily market prices, not posted up in cotton areas 7681, 7682.
Middlemen, functions and methods of (463).
Octroi charges 7385, 7389.

JENKINS, Mr. W. J.—*contd.*

MARKETING—*contd.*

Village sale of cotton, not rendered obligatory by financial indebtedness of cultivators (462).
Weights and measures, need for standardising (463) 7362-7365.
Wool, marketing of (462), 7317-7321.

RESEARCH :

Central organisation of research (447, 448), 7405 (*see also under* ADMINISTRATION).
Conferences of research workers 7311-7313.
Financing of research (438), 7246, 7247, 7540-7542.
Indian Central Cotton Committee, research resulting from activities of 7424-7430.
Money spent on research, disproportionately large to that spent on propaganda (446), 7309, 7310, 7432.
Non-officials wishing to conduct research, should be encouraged and subsidised (440), 7274-7279, 7600-7607.
Organisation of research : central organisation (*see under* ADMINISTRATION, Central Organisation).
——: Provincial organisation : ideal system, on lines of Indian Central Cotton Committee (439), 7245-7250, 7253, 7259, 7758-7760.
: need for further facilities for district research (438), 7240-7244, 7476-7479.
——: in Bombay, satisfactory (438).
——: by crops 7253-7259.
Overlapping of research work, not necessarily harmful 7423.
Provincial basis for research, danger of unsupplemented (448).
Provincial Research Committee, need for (438, 439).
Research, is of no value unless results are incorporated in general agricultural practice (446), 7309, 7310.
Research Committees for different crops, value of (439).
Research workers, should be in closer touch with district problems and workers (439).
Subjects suggested for research : ground-nut harvesting in Khandesh (430).
: fruit cultivation and preservation (440).
: improvement of inferior millets (440).
: power cultivation in Khandesh (440).
: sheep-breeding for wool production (440), 7260-7266, 7677, 7678.
: wheat crop in Tapti Valley (439), 7240-7244, 7476.

TARIFFS :

Import duty on implements, effect of 7729-7731.

WELFARE :

Factions in villages, a hindrance to co-operative movement (464, 465).
Investigation of 10 typical cotton-growing villages in Khandesh (448, 449).
Standard of living in rural India, the co-operative movement the only hope of raising (464).

KNIGHT, Mr. H. F., I.C.S., Collector of West Khandesh, Bombay, 5830-6103 (286-296).

ADMINISTRATION :

Agricultural staff in West Khandesh 5873-5876.
District Boards, etc., apathy of cultivators with regard to 5845-5848, 5911, 5912.
Revenue officers and rural problems 5883-5889.
——, their advice sought by cultivators 5888, 5889.
——, collaboration of, with Agricultural Department (286), 5907-5909, 6055-6059.
Roads, condition of, in West Khandesh (287), 6091-6096.
——, construction of, by forced labour, undesirable 6037-6046.
——, importance of made, to agriculturists (287), 5835.
——, *kutcha*, cannot be improved by village agency 5836, 5837.

KNIGHT, Mr. H. F.—*contd.*

ADMINISTRATION—*contd.*

Roads, *kutcha*, Government funds for 5843, 5869.
——————, improvement of, by District Boards, hindered by lack of money 5838-5845, 5910, 6060-6065.
——————, in backward areas might be managed by Revenue Department 5868.
——————, maintenance and transport charges on made and *kutcha* 5932-5934.
——————, provision of, by loans to meet non-recurring costs 5930, 5931.
——————, the primary need in rural areas 6090.

AGRICULTURAL INDEBTEDNESS :

Backward tribes, should not have the right to alienate land (290, 291).
Bhils, sometimes repay debt by working as labourers for their creditors 5945, 6097-6100.
Causes of indebtedness (habits of the people, uncertainty of the season, the judicial system, uneconomic holdings) (289).
Cost to cultivator of starting afresh on an economic holding (290), 5849, 6031-6035.
Credit as a cause of debt 5936-5940.
Deccan Relief Act 5979-5982.
Economic holdings, should be inalienable and impartible (291).
Education against wasteful expenditure (290).
Execution proceedings against cultivators, defects of (289), 5983-5990.
Inalienability, conditions for (291).
Monsoon, effect of bad, in causing indebtedness, should be combated by extension of dry farming (289), 5850.
Problem of indebtedness, of old standing (288, 289).
Restriction of credit, prevents wasteful expenditure (290, 291).
Unsecured loans, mean higher rate of interest 5942-5945.

AGRICULTURAL INDUSTRIES :

Provision of, difficult (295), 6067-6089.
Weaving, by local Mahars, decaying in West Khandesh 6072-6075, 6081-6083.
——————, teaching of 6080.

ANIMAL HUSBANDRY :

Bullocks, area cultivable with pair of 5991-5995, 6016-6020.
——————, provision of better, essential for introduction of iron ploughs (293).
Cultivators, find it economical to sell their bullocks at end of one cultivating season and buy new ones before the next (294), 5860-5863.
——————, will never improve their cattle unless present system is made unprofitable (294).
Enclosure and reservation of grazing areas 6024, 6028.
Fodder, its supply from forests may be increased by restricting grazing (295).
——————, shortage of, acute in certain areas from April to July (294).
——————, need not occur if available grass could be distributed (294).
Grazing facilities on Government lands, should be drastically reduced to get rid of useless animals (294), 6020-6022.
Grazing in forest areas, low fee for, encourages the keeping of worthless animals (294).
Stall-feeding, must be introduced if tillage is to be improved (294).
Traditional methods of keeping cattle, encouraged by provision of free grazing (294).
——————, responsible for much of the bad agriculture prevalent (294).

CO-OPERATION :

Co-operative societies, backed by co-operative banks, should give short and long term credit (288).
——————, can progress in more advanced areas (288).
——————, in advanced areas, may distribute taccavi 5913, 5914.
Taluka Development Associations, are voluntary associations receiving a Government grant 5879-5882.

KNIGHT, Mr. H. F.—*contd.*

CO-OPERATION—*contd.*

Taluka Development Associations, do not undertake adult education work 5897.
————————————, good work done by (286).
————————————, hold demonstrations on cultivators' lands 5832.
————————————, require outside stimulus 5881, 5893.
————————————, should be granted more funds (286), 5902-5905.
Village panchayets and rural reconstruction 5966-5978.

CULTIVATION :

Dry farming, may discount failure of monsoon 5850.
Tractor ploughing (293, 294), 6003-6005.

DEMONSTRATION AND PROPAGANDA :

Co-operation of Agricultural, Co-operative and Revenue Departments in propaganda work, value of (286), 5907-5909.
Cultivators, are very conservative (286), 5890-5892.
————, small, are not reached by Agricultural Department 5951.
Demonstration farms, of little value in backward areas 5866, 5867.
Demonstrations by non-official agencies, carry more weight (286).
Demonstrations on cultivators' own fields, difficulties of 5834, 5867.
————————————, only form likely to be successful 5832-5834.
Field demonstrations, value of (286).
Financial success, the greatest inducement to adopt improvements (286).
Medals, presentation of, to good cultivators, would be valuable 6101-6103.
Propaganda, examples of success of (286).
————, to secure consolidation of holdings, value of 5962-5965.
Taluka Development Associations, good work done by (286).
————————————, should be granted more funds (286).
Village patels, their attitude to demonstrations (286), 5898-5901.

EDUCATION :

Agricultural course for Assistant Collectors at Poona College, 5871, 5872, 6052-6054
———— — education for revenue officers 5885, 5886.
Bhils, cess for education of 6046-6051.
Compulsory primary education, difficulties of giving effect to demand for 5919-5921.

FINANCE :

Backward districts, are and must continue to be financed by moneylenders (287, 288).
Co-operative societies, backed by co-operative banks, should give long and short term credit (288).
————————————, can progress in more advanced areas (288).
Government, must make arrangements by taccavi or co-operative societies to finance holders of inalienable land (290-291).
Moneylenders, methods of (287, 288).
————————, perform a useful part in rural economy (287).
Taccavi, cannot be given on sufficient scale to replace moneylenders (288).
————, in advanced areas, may be distributed through co-operative societies 5913, 5914.
————, may be given for land improvement, in backward areas and where tenure is inalienable (288).
————, should not be given for the financing of ordinary agricultural operations (288).

FORESTS :

Firewood from forests, amount available can be increased by closing of forests (295).
Fodder, its supply from forests can be increased by restricting grazing (295).
Forests, control of, should not be relaxed (295).
————, danger of their management by village committees (295).
————, suffer from excessive grazing (296).
————, their influence on rainfall and conservation of moisture (295).
Tree planting in neighbourhood of villages, difficulties of (295).

KNIGHT, Mr. H. F.—*concld.*

HOLDINGS :

Birth control (291, 292).
Consolidation, compulsory, as a remedy (293).
————————, in Khandesh, is not keeping pace with fragmentation 5853-5858.
————————, obstacles to (293).
Cost to cultivator of starting afresh on an economic holding (290), 5849, 6031-6035.
Cultivators, more numerous than owners in West Khandesh 5952-5961.
Economic holding, is one which can employ a cultivator who has one pair of bullocks 5991-5995.
Economic holdings, should be impartible (291).
Fragmentary cultivation, may be made a criminal offence involving forfeiture of land (291), 5852.
Fragmentation, if unchecked, will lead to pestilence and famine (292).
————————, statistics showing increase of (292).
Hindu law, effect of (291, 293), 6001.
Impartibility, difficulty of enforcing (291), 5946-5950.
Inalienable holdings, should be made impartible (291), 5851.
Legislation, to deal with dissentients and minors, imperative (293).
————————, to prevent fragmentation and encourage consolidation, under consideration by Bombay Government (291).
Propaganda to secure consolidation, value of 5962-5965.
Uneconomic holdings, the principal cause of indebtedness (289, 290).
Uneconomic landholders, should be eliminated (290), 6000.
Waste land in Bombay, now being distributed on impartible tenure (291), 5852.

IMPLEMENTS :

Cultivators, are interested in improved machinery but hard to convince of its advantages (293).
Iron plough, introduction of, depends on provision of better bullocks (293).
Tractor haulage (293, 294).
Tractor ploughing, need for further experiments (293, 294), 6003-6005.
————————, would reduce number of bullocks (294).

SOILS :

Decline in fertility (alleged), due to fact that in times past only the better lands were cultivated (295), 5864, 5865.

STATISTICS :

Areas under crops, statistics of, fairly accurate in Bombay (719).
Estimates of yield, difficulty of preparing (296).

WELFARE :

Birth control (291, 292).
Castes in West Khandesh 6026, 6027.
District and other Boards, apathy of villagers with regard to 5845-5848, 5911, 5912.
Drinking water in villages, importance of pure (296).
Malaria, vitally affects welfare of agriculturists (296).
Non-official social service associations in West Khandesh 5925-5929.
Rural improvements by forced labour, undesirable 6042-6046.
Village panchayats and rural reconstruction 5966-5978.

LORY, Mr. F. B. P., I.E.S., Director of Public Instruction, Bombay Presidency (316-326), 6104-6213.

EDUCATION :

Adult education, by means of night schools, difficulties of 6130, 6133.
————————————————————, generally a failure in Bombay (317), 6125.
————————————————————, causes of failure of 6184.
————————————————————, schemes for 6130.
————————, for women 6137.

LORY, Mr. F. B. P.—*contd.*

EDUCATION—*contd.*

Adult education, importance of teachers for (317).
————————, importance of, renders further efforts necessary 6129-6134.
————————————, to prevent relapse into illiteracy 6125-6131.
————————, propaganda for 6193.
Agricultural bias in education, is not introduced until literacy is attained (316), 6111, 6112.
Agricultural bias schools, after-careers of pupils at 6164.
————————————, age of boys at 6153-6156.
————————————, agricultural teachers in, training of (316, 318), 6118-6120.
————————————————————, salaries of (316).
————————————, are controlled by Education Department 6182, 6183.
————————————, cost of (317).
————————————, curriculum of (317, 318).
————————————, genesis of (316).
————————————, may counteract tendency of education to unsettle boys for the land (319), 6108, 6110.
————————————, numbers of (316), 6106, 6107.
————————————, popularity of 6160-6163.
————————————, pupils at, are not likely to relapse into illiteracy 6151-6154.
————————————, will not interfere with attainment of literacy 6111, 6112.
Calcutta University Commission, recommendations of, not applied in Bombay 6146, 6147.
Cinemas and magic-lanterns, success of, in educating villagers (318).
Compulsory education, a hopeful means of securing literacy 6213.
Co-operation between Provinces and with Government of India in educational matters 6170-6175.
Curriculum, of higher vernacular standards, unsuitable for children of agricultural classes (318).
————————, of lower standards, satisfactory 6190, 6191.
Expenditure on different educational institutions in Bombay Presidency (*Appendix*) (320, 321), 6206-6210.
Expenditure on education in different Provinces (*Appendix*) (325, 326).
Female education, lack of sufficient teachers an impediment to 6140, 6141.
————————————, position of, in Bombay 6135-6137.
————————————, progress of, in Gujarat, unsatisfactory 6135, 6142-6144.
Illiteracy, relapse into, figures for 6149, 6150, 6157, 6158.
————————————, partly due to illiterate homes 6125-6128.
Literacy, the chief aim of education (318), 6116, 6117.
————————, may be secured by compulsory education 6213.
Loni type schools, 6121-6124.
————————————, their use for training teachers for agricultural bias schools 6194-6199.
Nature study, taught in primary schools where trained teachers are available (318), 6115, 6116.
Night schools (*see* Adult Education).
One-man schools in Bombay, numbers of (*Appendix*) (323).
Primary Education Act, Bombay, effect of 6178-6180.
Primary education in Bombay, includes all purely vernacular education (316).
Primary schools, number of, under District Local Boards (*Appendix*) (323).
Pupils in educational institutions in Bombay, classified by communities (*Appendix*) (322).
Reforms, influence of, on primary education 6176-6178.
Rural training college for teachers, project for 6119, 6120.
School-going age 6113, 6114, 6153.
School plots (317), 6165, 6166.
Teachers, importance of (318), 6190.
————————, in agricultural bias schools, training of (316, 318), 6118-6120, 6194-6199.
————————, in night schools (317).
————————, numbers of trained and untrained in Bombay (*Appendix*) (324).
————————, pay of (*Appendix*) (323).

LORY, Mr. F. B. P.—*concld.*

EDUCATION—*concld.*

Teachers, qualifications of 6187-6189.
————, should be drawn where possible from agricultural classes (318).
University, grants to, in Bombay 6209, 6210.
Vernacular books on agriculture 6167, 6168.
——nacular final examination, a necessary qualification even for "untrained" teachers 6188.
———————— ——, boys, succeeding in, rarely return to the land (319).
———— —— ————, usually taken by boys who have passed through higher vernacular standards (319).
Visual instruction, success of (317, 318), 6185.

LOWSLEY, Mr. C. O., Superintending Engineer (on Special Duty), Bombay Presidency, 6425-6597 (356-359).

MINOR IRRIGATION WORKS :

Agricultural associations, can help cultivators to secure taccavi (357).
Annual Irrigation Report, published in Bombay 6445, 6446.
Artesian wells, of value where there is sweet water 6517-6519.
Boring machines, demand for (357, 358).
—— —— —, may be met by increasing staff of Boring Works Division (357).
Canal schemes, objections to, largely financial (358).
—— ————, scope for large, in Gujerat (357).
Co-operative construction of minor irrigation works 6489-6494, 6521-6525.
Co-operative societies, do useful work in demonstration and propaganda (356).
Crop production, increase in, as result of soaking land at Rahuri 6438-6442, 6463-6467, 6543-6547, 6553-6557, 6570, 6571.
Cultivators, require and will adopt (when available) expert advice (357).
————, are able to design and construct schemes on very small scale 6433-6436; now receive help from Agricultural Department for this purpose 6434.
Demonstration and propaganda, by co-operative societies (356).
———— ——, by model schemes (*q. v.*).
———— ———— ————, by Taluka Development Associations (356).
Embankments (*bunds*), for preventing soil erosion (358).
—— ————, as at present constructed are capable of great improvement (358).
———— ———, small, constructed by cultivators, with advice of Agricultural Department 6433-6435.
———————————————————, usually at field boundaries, even at sacrifice of efficiency 6436.
—— ————, are under special duty branch 6574-6579.
Indirect benefit from minor irrigation works, taken into account 6454-6462, 6548.
Land development officer, appointment of, in Deccan (356).
Minor irrigation schemes, area which might be covered by 6443, 6444, 6499-6507.
———— ——, at present carried out by P. W. D. or Local Boards 6521, 6522.
———— ——, difficulties of constructing, by villagers 6521-6525.
—— —— ——, finance of 6549-6557, 6591-6597.
———————, great demand for 6501, 6508, 6509.
———— ——, if fully developed, will make great contribution to improvement of agriculture in Bombay 6437.
———————, increase in crop production as result of 6438-6442, 6463-6467, 6543-6547.
———————, indirect benefit from, taken into account 6454-6462, 6548.
———— ——, present rates for, too low (357), 6478-6482.
———————, *see also* Soaking of land, Tanks *and* Wells.
Model schemes for land improvement and water utilisation, should be constructed (356)
————————————————, after construction, may be placed under Agricultural Department (356), 6429.

LOWSLEY, Mr. C. O.—*contd.*

MINOR IRRIGATION WORKS—*contd.*

Model scheme for land improvement and water utilisation, being carried out in Ahmednagar district (356).
———— ———— ————————————, should be financed by Government 6428, 6430, 6431.
Rainfall, has been decreasing in Gujarat for many years (358).
Silt in tanks, an obstacle (358).
———— —, clearance of, by co-operative labour 6489-6491.
———— ————, by Government, impossible (358), 6486-6488.
————, cost of clearing (358), 6432, 6449-6452.
———— ————, valuable for land improvement and might be removed by cultivators (358), 6453, 6454, 6489.
Soaking of land, assessment of land so treated, may be increased by voluntary agreement 6587-6597.
———— ————, average area commanded by nullahs 6563-6567.
———— ————, cost of 6546, 6547, 6552-6557, 6568-6571.
————————, increase in crop production caused by 6438-6442, 6463-6467, 6543-6545.
————————, limiting factors of, monsoon flow in nullah and level area commanded 6558-6562.
Soil, ideal condition of, for minor irrigation 6531.
Soil surveys, not carried out by Special Duty branch 6475-6477.
Special agency required to work outside as well as within famine tracts (357), 6425-6427, 6532.
Superintending Officer on Special Duty to investigate Minor Irrigation Works, appointed in September 1925 (356).
———— ———— ————————————, department of, specially created to, deal with famine tracts 6495-6498.
———— ———— ———— ————————————, duties of (356), 6541, 6542.
———— ———— ———— ————————————, staff of, insufficient (356, 357).
Taccavi, agricultural associations can help in arranging (357).
————, should be given on easy terms for recommended land improvements (357).
Tals, *see* Embankments.
Taluka Development Association, do useful work in demonstration and propaganda (356).
———— ———— ————————, organisers of, should have some training 6533-6536.
Tanks for irrigation, construction of, by co-operative effort with state help 6492-6494.
———— ————, difficulties of (358).
———— ————, principal means, in Gujarat (357).
———— ————, schemes for, are for rabi irrigation 6583, 6584.
———— ————, should be constructed outside as well as within famine tracts (357).
———— ————, silt in (*see* Silt).
———— ————, sites for, are being investigated (357).
———— ————, water supplied from, 150 acres per cusec 6580-6583.
Terracing, for prevention of soil erosion (358).
———— ——, as carried out by average cultivator, is good (358).
———— —, features of good (358).
Tube wells 6537-6540.
Value of water in different tracts in Deccan 6483-6485, 6510-6515.
Water diviners (358), 6520.
Water supply for villages, importance of (358, 359), 6537-6540.
Wells, artesian, of value where there is sweet water 6517-6519.
————, boring of, comes under Agricultural Engineer 4668.
————, depths of 6472, 6473.
————, reboring of, increases the supply 6469, 6470.
————, uncertainty of success the chief obstacle to (358).

MANN, Dr. HAROLD H., D.Sc., Director of Agriculture, Bombay Presidency, 2747-3830 and 5631-5671 (1-16 and 271, 272).

ADMINISTRATION :

Agricultural Department, Bombay, expenditure of, one-third on research and two-thirds on demonstration and propaganda 3332, 3333.
———————————, organisation of (1).
———————————, staff of, necessity for increasing 3620-3625.
———————————, do not attract best European research workers 2757-2759, 3293-3295.
———————————, higher posts in, can be filled by Indians 2756.
Board of Agriculture, is at present unwieldy 3815, 3816.
———————————, might be made a body to consider the agricultural problem as a whole 3815.
———————————, should become consultative committee of specialists 3782.
———————————, with sections dealing with different crops, etc. 3783.
———————————, Bombay, (*Appendix*) (271, 272).
———————————, as co-ordinating body between different departments, has not been a success 5632.
———————————, composition and functions of 5631.
———————————, necessity for smaller (divisional) boards acquainted with local conditions 5643-5650.
———————————, possible reconstruction of, as provincial counterpart to proposed central organisation 5633-5639.
———————————, should meet more frequently and have a standing committee 5635, 5663, 5664.
———————————, standing committee of, might co-ordinate Irrigation and Agricultural Departments 5646, 5647.
———————————, useful as advisory body 5632.
Boards of Agriculture, divisional 5643-5645.
Branch and feeder railway lines, a great asset to agriculture 2829-2831.
Cattle, arrangements for their transport by rail unsatisfactory 3247-3249, 3770.
Centralisation, danger of 3390-3397.
Central Agricultural Research Board for financing research, with series of committees dealing with specific branches of research, suggestion for (3,7), 3193-3195, 3202, 3203, 3253-3266, 3318, 3319, 3549-3552, 3704-3711.
Central Organisation, need for 3777, 3778.
———————————, might have inspecting and consultative committees 3779-3781.
———————————, *See also under* Board of Agriculture, Central Agricultural Research Board and Central Rural Development Board.
Central Rural Development Board, a, not a suitable body to undertake rural development 3390-3397.
———————————, but a Board for financing it would be welcome 3390.
Communications, improvement of, important to secure alternative markets 2928.
———————————, would extend area of intensive cultivation 3408, 3409.
Concessions (railway) for agricultural shows, etc., fairly liberal 3454, 3455.
Departments allied to Agriculture (Education, Forest, Irrigation and Veterinary) should come under same Minister as Agriculture 3389.
District Boards, their control of roads leading to deterioration 2839-2841, 3759-3763, 3812-3814.
———————————, have been handicapped by lack of funds 2844, 2845.
Divisional Boards of Agriculture 5643-5645.
Education Department, co-operates closely with Agricultural Department 3363-3365.
Exchange of information with workers in other Provinces and at Pusa 3315, 3316.
Financing of research, by grants from Central Government 2770, 3127-3130, 3193-3197, 3202, 3203, 3253-3266, 3390.
———————————, by Indian Central Cotton Committee 2975-2979, 3198-3201.
———————————, by means of an export cess 3026, 3053, 3054.
———————————, by Sassoon David Trustees 2975-2979.
———————————, desirability of permanent provincial fund to ensure continuity (2), 3613.
———————————, proposals for (2).

MANN, Dr. HAROLD H.—*contd.*

ADMINISTRATION—*contd.*

Forest Department, should be in closer co-operation with Agricultural Department 2948.
Freight rates and facilities, complaints regarding, brought to attention of railways by Agricultural Department 2833-2835.
Freight rates on railways, obstacle of high, to marketing of agricultural products (8).
Government of India, may usefully co-operate with, but not direct, Provincial Agricultural Departments (2, 7), 3193-3195.
———————, must always interest itself in agriculture 2766-2769, 3549.
———————, scientific staff of, no need for large increase in (7).
———————, suggestions for action by (7), 2770, 2771, 3127-3130, 3320, 3321.
Indianisation 2756, 2964.
Indian Central Cotton Committee (2, 3), 2765, 2975, 2976, 3025, 3128-3130, 3198-3201, 3256, 3267, 3268, 3551.
———————desirability of similar organisations for other crops (3), 2765, 3254, 3257-3266.
Indian officers, their aptitude for research work 2755, 2756, 3178-3186.
Irrigation Department, co-operation of Agricultural Department *vide* (*see under* IRRIGATION).
Meteorological Department opportunities for collaboration with 3148-3150.
———————, problems requiring study by (8).
———————, should be in close co-operation with Agricultural Department (8).
Organisation of research by crops (3), 2765, 3254, 3257-3266.
Postal facilities, their extension desirable 2847, 2848.
Roads, bridging of 3741, 3742.
———, condition of 2838.
———, control of, by District Boards, has led to deterioration 2839-2841, 2844, 2845, 3759-3763, 3812-3814.
———, from agricultural point of view are of paramount importance 2847.
———, in certain cases are controlled by Irrigation Department 2842, 2843.
Servants of Rural India Society (*see* Welfare).
Superior Provincial Agricultural Service, officers for, can be trained at agricultural colleges and under men now doing the work 2823-2827.
———————, except (at present) for such posts as mycologist and plant pathologist 2826, 2964.
Tramways, possibilities of 3040-3044.
Veterinary Department, organisation and position of (*see under* VETERINARY).

AGRICULTURAL INDEBTEDNESS :

Credit of cultivators, increase in, may increase their indebtedness 3502, 3503.
Deccan Agriculturists' Relief Act as an example or State regulation of interest 3164.
Indebtedness, due more to misdirection than shortage of capital 3500-3502, 3562-3564.
———————, influence on of precariousness of rainfall 3562-3567.
Insolvency laws, little use made of, by cultivators 3671-3673.

AGRICULTURAL INDUSTRIES :

Cottage industries, usually skilled occupations 3468.
Factories using agricultural products, might be subsidised by Government 3463-3465, 3467.
Government assistance for subsidiary industries 3463, 3465, 3469, 3473, 3474, 3476-3478.
Lac cultivation 3098.
Spare-time industries for cultivators, must be distinguished from industries using agricultural products 3466.
———————, necessity for encouraging and organising 3581-3586.
———————, need not be subsidised by Government 3469.
Weaving, teaching of, to cultivators 3471-3474, 3767-3769.

MANN, Dr. HAROLD H.—*contd.*

AGRICULTURAL LABOUR :

Labour for wages, becoming subsidiary occupation of small holders in the Deccan (9).
Shortage of labour, causes of 2939-2944, 3173.
———— - ————, disease and faulty diet as causes 3427.
———— - ————-, does not necessarily imply a higher standard of living 2938, 2940.
———— ————, due to shortage of labour power rather than of individuals 3425, 3426.
- ———— - ————, has not yet led to increased use of labour-saving machinery 2936-2937.
———— - ————-, is seasonal 3423, 3424.
———— ————, the chief cause of rise in agricultural wages 2935.
Wage rates, in Bombay 3751-3753.

ANIMAL HUSBANDRY :

Animal Improvements Section, Bombay Presidency 2882.
Cattle insurance 3685-3691.
Clover, substitutes for 3731-3736.
Cross-breeding 3001-3003.
Draught animals, importance of improvement of 2993.
Fodder crops in Bombay Presidency 3093, 3094, 3417-3421.
Gopi breed, milk yield of 3001.
Grass lands, improvement of 3412-3416.
- ————, introduction of exotic grasses 3417.
———— -, scope for improvement of 3422.
Herd books of chief herds of Indian cattle, should be maintained by the Government of India (7).
Improvement of breeds, publication of handbook on 3764.
- ———— - ————-, to improve milk yield 2992, 2994, 3000, 3001.
———— ———— ——, to secure good animals for ploughing the primary necessity 2993.
Kankrej breed, improvement of, at Surat 3000.
Milk supply, very important for cities 2994.
————, scheme for Ahmedabad 2995.
———— —, scheme for Bombay 2995-2999.
Milk yield, importance of improvement of 2992.
- ————, of Gopi cows 3001.
Molasses, use of, for fodder 3722-3730.
Transport of animals by rail, arrangements for unsatisfactory 3247-3249, 3770.

ATTRACTING CAPITAL :

Capital employed in land improvement, considerable 3758.
Inamdars take little interest in the improvement of their estates 2969-2974.
Improvements, exemption of, from taxation, encourages application of capital to land 3757.
Landlords, their part in the advancement of agriculture 2968, 3347.
- ————, large, do not exist in Bombay apart from Sind 2776, 2968.
———— -, take little interest in agricultural improvements 3347, 3348.
Larger cultivators, the mainstay of the Agricultural Department 3347.

CONSOLIDATION OF HOLDINGS — *see under* HOLDINGS

CO-OPERATION :

Co-operative methods, should be used to consolidate fragmented holdings (11).
———— ———— ——, necessity for legislation to coerce obstinate minorities (11).
Co-operative movement, its chief value the development of rural leadership 3378.
———— ———— ———, should not be aided by exemption from local taxation 3701-3703.
Cotton sale societies 3681-3683.
Marketing, co-operative (15).
Middlemen, might be replaced by co-operative societies 3576, 3579,

MANN, Dr. HAROLD H.—*contd.*

CO-OPERATION—*contd.*

Preference in supply of materials, etc., should be given to cultivators organised in co-operative societies 3811.
Rural reconstruction and co-operative societies 3557, 3591.
Taluka development associations, at present depend on outside stimulus 2806, 2807, 3208, 3642.
———————————, conditions for membership of 3227, 3398.
———————————, failures, usually in landlord areas 3810.
———————————, financial help given to 3212, 3213, 3800-3802.
———————————, may be used to replace direct Government agency 3626.
———————————, may fail from lack of rural leadership 3378.
———————————, members of, are themselves cultivators 3207.
———————————, need for smaller bodies than 3214, 3215.
———————————, non-official support for, increasing 3377.
———————————, organisation of 3792-3799.
———————————, procedure for starting 3795.
———————————, promise to become important factor in agricultural advance (7), 2806, 2810-2812, 3167-3170, 3205-3207, 3226, 3636-3644.
———————————, registration of, as co-operative societies 3399, 3627-3635.
———————————, should become self-dependent in a short time 2808, 2809, 3209.
———————————, supervision of 3803-3806.
———————————, utilised for co-operative propaganda (6), 3377.
Villages, should be organised on co-operative lines 3431.

CROPS AND CROP PROTECTION :

Bajri, research into 2981-2984, 3228, 3322-3325.
———————————, hindered by lack of money and men 2985.
Canadian fencing, its use for keeping out wild pigs, 3737, 3766.
Commercial crops, effect of their increase on food crops 3607-3612.
Cotton, grading of, should be done by Government (13, 14), 3683.
Cotton seed, improved, area covered by 3432.
———————————, organisation to secure supply of pure (13, 14).
———————————, principal varieties of 3269-3271.
———————————, inferior, sowing of, prohibited by certain Indian States (14).
———————————, but could not be prohibited by Provincial Government 3353, 3354.
Deterioration of seed, cultivators' methods of avoiding, satisfactory 3445, 3446.
Germination percentages 3447-3453.
Grapes, now invariably sprayed for mildew (5).
Groundnut, improved seed for, has replaced whole of old seed 3435, 3446.
Improved seed, distribution, by Taluka Development Associations (6).
———————————, keeping of large stocks of 3674.
———————————, methods adopted to supply 3442-3444.
———————————, now covers over 30 per cent. of crop area 3432-3436.
———————————, supply of, through District Central Banks 3679, 3680.
Improvements introduced by Agricultural Department, money value of 3600-3603.
Insurance of crops, importance of 3788, 3789.
Juar, research into, 2981-2984, 3228, 3322, 3325.
———————————, hindered by lack of money and men 2985.
———————————, smut in (*see* Smut).
Molasses, use of, for fodder 3722-3730.
Nets as protection against grasshoppers 3231, 3232.
Rice, area of, sown with improved seed 3438.
Smut in juar, breeding of resisting varieties 3331.
———————————, causes great loss 3326, 3327.
———————————, inquiry into 3328.
———————————, use of sulphate of copper to control 3300, 3720, 3721.
———————————, use of treatment for, increased by propaganda (5).

MANN, Dr. HAROLD H.—*contd.*

CROPS AND CROP PROTECTION—*contd.*

Sugarcane, prospects of, in the Deccan 3817-3821.
————, water requirements of 5641, 5658, 5659.
Tobacco 3747-3750.
Vegetable oil, possibility of using thickened, as substitute for imported grease 3111-3113.
Wheat, growing of, in rabi juar area 3045-3050.
Wild animals, protection of crops against 3177, 3736, 3737.

CULTIVATION :

Dry farming, improvement of 3596-3599, 3785-3787.
Kumri cultivation, should be restricted 2949.
Intensive cultivation, found near big towns 3407.
———— ——might be extended by improved communications 3408, 3409.

DEMONSTRATION AND PROPAGANDA :

Broadcasting, not an immediate possibility 2849, 2850.
Compulsion, of obstinate minorities when common action required, need for (7), 2815-2820.
———— ——, its use in certain Indian States, to enforce growing of improved seed (14), 3457-3461.
———————————————, not yet expedient to introduce it in British India 3456-3458.
Concentration of propaganda preferable to dispersion 3429.
Cultivators, confidence of, in Agricultural Department, significant growth of (2,7), 2762-2764.
———— ——, needs of, necessity for ascertaining (5).
————, their conservatism not excessive (5), 3348.
Demonstrators, must possess confidence of cultivators (6).
Demonstrations on cultivators' own fields, are usually with guarantee against loss (6), 3338-3340.
————————————————, carried out on hundreds of plots 3131-3133.
————————————————, desirability of further 3135-3137.
————————————————, essential to supplement propaganda (5).
————————————————, method of conducting 3337-3344, 3439-3441.
————————————————, no cost accounts of taken 3345, 3346.
————————————————, usually confined to one single factor of improvement 3337.
———————————————— value of (6), 2803, 2805.
Demonstration farms, ineffectiveness of (6), 2803, 2804, 3348, 3349.
————————, abandoned in Bombay 3131.
Improvements, their recommendation undesirable unless they will give increased out-turn of 15 to 20 per cent. 3400-3402.
Intelligentsia, importance of interesting them in agriculture 3539-3542.
Knowledge of improvements, spreads outwards rather than down from large to small cultivators 3462.
Legislative Councils, their attitude towards agriculture 3541-3546.
Local study, village by village, importance of (6).
Non-official agencies, should be preferred to official for propaganda (6), 2813, 2814, 3217-3222.
Officers employed on propaganda work, salaries of 3210, 3211.
Propaganda, concentration of, preferable to dispersion 3429.
————————, conditions necessary for its success (6).
————————, in Bombay, organisation of (7).
————————, must be supplemented by demonstration (5).
————————, carried out jointly by Agricultural and Co-operative Departments (7).
————————————, success of (5).
Research, making results of, known to cultivators 3163, 3226.
Taluka Development Associations (*see under* CO-OPERATION

MANN, Dr. HAROLD H.—*contd.*

EDUCATION (1) AGRICULTURAL :

After-careers of agricultural students (4), 3058-3062.
Agricultural bias in education, may be introduced as soon as literacy is attained 3223, 3224.
Agricultural bias schools, are controlled by Local Boards 3361, 3362.
———, are under Education Department 2966, 2967.
———, fees at, no higher than for other schools 3495.
———, have approval of Education Department 3364.
———, need for (4), 2796.
———, none now under private auspices 3359, 3360.
———, pupils of, drawn from agricultural classes (4).
———, provide sound basis for rural educational structure 3355.
———, readers for, suitable 3273.
———, school plots at (4).
———, teachers at, training of 3272, 3357, 3358.
———, quality of 3356.
———, twenty to be opened each year 3358.
Agricultural College, at Poona (*q.v.*)
———, may train prospective officials and farmers side by side 2798.
———, need for, in Sind (4).
———, students at, mainly absorbed in official posts (4).
Agricultural economics, need for increased teaching of 3160, 3161.
Agricultural graduates, should first be posted to Subordinate Service 3283, 3284, 3287.
———, if suitable, should then be sent abroad for training and posted to superior Service 3284-3286.
———, (*see also* European Training).
Business farming (*see* Practical Training).
Education Department, co-operates closely with Agricultural Department 3363-3365.
———should both be under the same Minister 3389.
European training for officers of Agricultural Department, desirable 3189, 3283, 3284, 3498, 3499, 3790, 3791.
———should be given after some service in India, 3289, 3712-3717.
Loni type schools (3),2796.
———, are at present educating 180 boys 2790.
———, are controlled by Agricultural Department in consultation with Education Department 3365.
———, causes of failure of, in other Provinces 3278, 3279.
———, cost of, Rs. 262 per boy per annum 2789, 3033.
———, free tuition and lodging necessary 3157.
———, leakage from 2791-2793, 3237-3239.
———, majority of boys from, go back to the land 3568-3776.
———, money for, provided by provincial funds with small grants from District Boards 3033-3036.
———, no caste prejudices against 2794.
———, one-third of tuition directed to general education 2797.
———, policy of Government to have one such school for each district 2787.
———, progress of, has been slow 3274-3276.
———, provide 1/5th acre of land per boy (4).
———, train teachers for agricultural bias schools 3272, 3277.
———, value of, for propaganda purposes 3568-3572.
Patronage of education by public men, value of 2775.
———, common in Bombay 2774, 2775.
Poona Agricultural College, can train men for Superior Provincial Agricultural Service 2823-2827.
———, degree of, B.Ag. equal to B.A. 3490.
———, duration of course at 3114-3116.
———, has done excellent work 2958.
———, many students at, are sons of landlords 3240.
———, obtains students from other Provinces and from outside India 2959-2963.
———, overfull (4).
———, produces 40 to 50 graduates a year 3117.

MANN, D . HAROLD H.—*contd.*

EDUCATION (1) AGRICULTURAL—*contd.*

Poona Agricultural College, rural economics, great importance paid to teaching of 3380.
———————, scheme for enlargement of 2951-2957.
———————, should be able to train rural teachers 3381.
———————, should reflect idea of improved rural life 3379, 3380.
———————, standard of admission to, higher than elsewhere 3116.
Post-graduate students, have sound grounding in basic sciences 2753-2755.
———————, their employment in research work 3058-3060.
———————. training, abroad 3121, 3122, 3283, 3284.
———————, at Pusa 3290.
Practical training for prospective farmers, need for 2799-2802.
———————, methods adopted to afford, have not been popular (5), 2801, 2802.
———————, setting aside of Government lands for 3066-3071.
Public opinion of agricultural education 3350-3352, 3368, 3369.
Purposes of agricultural education (3).
Rural economics, degree in, desirability of instituting 3825-3830.
———————, should be qualification for service in Departments other than Agriculture 3828.
Rural schools, need for agricultural bias in 2778.
———————, teachers in, might receive agricultural tuition in vacations 3496, 3497.
School plots (4) 3224, 3491-3494.
Science training in Bombay schools, fairly good 3280.
Secondary schools for agricultural education, need for (3) 3138-3144.
Teachers, should be drawn when possible from agricultural classes (4), 3063-3065.
———————, often ignorant of agriculture 3497.
———————, in agricultural bias schools, training of 3272.
———————, in rural schools, might receive agricultural tuition in vacations 3496, 3497.
Teaching and research, combination of, desirable 2750-2752, 3300, 3303.
Undergraduates, desirability of utilising vacations for further instruction of 3158-3160.

EDUCATION (2) GENERAL:

Adult education, demand for, may be stimulated by greater necessity for literacy 2786.
———————, effect of, on education of children 2779-2881, 3366-3369.
———————, present failure of 2781-2786.
Child labour, demand for, influences parents in withholding children from school 3486-3488.
District Boards, finance all education under Education Department 3037.
District Inspectors for Education Department, might with advantage be recruited from agricultural College 3489.
Illiterate homes, cause relapse into illiteracy 2779, 2780.
Literacy, is the primary object of rural education 2777.
———————, may be encouraged by extension of postal facilities 2848.
———————, often lost after boys leave primary schools 3030, 3031.
Primary education, budget for, over a crore 3032.

FERTILISERS:

Bones and blood, export and use of 3072-3079.
Oil seeds, export of 3106-3108.
———————, hydrogenation of, to keep cake in India 3109.
Sugarcane, manures for 3234-3236.
Sulphate of ammonia, growing utilisation of, in Deccan canal tracts (5).

FINANCE:

Long-term credit, essential for land improvement 2851, 2852.
———————, at present provided by Government through co-operative societies 2853.
———————, interest on, should be reduced 2854-2859.
Taccavi, frequently given for sinking wells 3104.

MANN, Dr. HAROLD H.—*contd.*

FORESTS :

Agricultural and Forest Departments, co-operation between, still insufficient 2948.
————————————, should be under same Minister 3389.
Forest officers, might with advantage be attached temporarily to Agricultural Department 2950.
Kumri cultivation, should be restricted 2949.
Trees which do not damage crops (*Appendix*) (271).

HOLDINGS :

Compulsion of obstinate minorities, need for legislation for to facilitate consolidation (11).
Consolidation, in last ten years has kept pace with fragmentation (11), 2862, 2863.
due to non-increase of population 2861.
present position unsatisfactory (11).
Co-operative methods, should be used to encourage consolidation (11).
Cultivating units, average, 8 to 15 acres, 3520-3532.
————————————, differ in different parts of Presidency 3534, 3535.
————————————, larger than those of land held (11).
————————————, need for further statistics regarding 3536-3538.
————————————, when below average, lead to great loss of bullock-power 3526-3530.
Holdings, minimum size desirable 3241-3245.
————————, maximum size for small owner, fixed by land cultivable by pair of bullocks 3520-3523.
————————————————————, usually 12 to 20 acres 3522.
Legislation, to prevent further fragmentation (11).
————————, to compel obstinate minorities to fall into line (11).
Non-cultivating owners, cannot be induced to farm 3524, 3525.
Statistics of holdings, in certain Deccan villages (8-11), 3504-3516.
————————————, change in number of land fragments, 1771 to 1926 (8).
————————————, number of holdings of different sizes (9).
————————————, number of fragments of different sizes (10).
————————————, number of holdings and area of cultivation held by one man (10).
————————————, number of men holding and cultivate, various number of fragments (11).
Tenants, do not take so much interest in their land as landowning-cultivators 3517-3519.

IMPLEMENTS :

Demand for improved, increasing 2879.
Importation of, diminishing except in case of big machinery 2878.
Indian implement manufacturers, are making satisfactory progress 2872, 2873.
————————————————————, are handicapped by lack of import duty and high railway freights 2874-2877.
Kirloskar Bros. 2873, 2875.
Manufacture of implements in India 2872, 2873, 2880.
Ploughs, iron turnwrest, largely adopted in Deccan (5).
Egyptian, has replaced Sindhi plough in large areas in Sind (5).

IRRIGATION :

Alkali land, difficult to reclaim 3152-3155.
Aquatic weeds, investigation of 3151.
Co-operation of Agricultural, and Irrigation Departments 2864-2867, 3156.
aims of the two, different 2865.
should both be under the same Minister 3389.
Possibilities of extension of irrigation, limited in Bombay 3175.
Rainfall in Bombay, precarious 3560, 3561.
Tube-wells, largely used in Upper Gujarat 3006-3013
Waterlogging 3152, 3154.
Water requirements, of crops, known 3051.
———————————— of sugarcane 5641, 5658, 5659.

MARKETING :

Adties, *see* Middlemen.
Alternative markets, their provision dependent on improved communications 2928.
———————————— lack of pack animals a handicap in Sind 2929.

MANN, Dr. HAROLD H.—*contd.*

MARKETING—*contd.*

Aratyas, *see* Middlemen.
Bombay, its effect on the cultivation of the hinterland 3407.
Charity cess at markets, not objected to 2915-2918.
Containers for produce, unsatisfactory 2925-2927.
————————, question of improved, now under investigation 2926.
Co-operative marketing, the hope of the future (15).
but must be better organised than in the past (15).
Cotton, difficulty of getting fair price for improved (12).
———, giving of samples of 2920.
———, Government grading of improved, for auction (13), 3683.
———, importance of internal market for 2896, 2897.
———, marketing, inquiry into (12).
———, markets, in the Bombay Presidency, no Government control of 2919.
————————, proposed Bill to secure 2903, 2919.
———, steps taken to safeguard purity and quality of (13).
Cotton-growers, their dependence on money lenders for marketing in Khandesh at any rate a myth (12).
————————, prefer to sell in village owing to bad market practices (12)
Dalals, *see* Middlemen.
Facilities for marketing, no lack of in Bombay (12).
but sometimes difficulty in case of new or improved products (12).
Gul, marketing of (13).
——, grading of (14).
Mangoes, marketing of (13).
Market practices, unsatisfactory (12).
————————, statutory regulation of, possible 2903, 2904.
Middlemen, excessive number employed (13), 2912-2914.
————————, cannot be entirely eliminated 3573-3579.
————————, have no official position 3250-3252.
————————, might be replaced by co-operative societies 3576, 3579.
Potatoes, marketing of 2912-2914.
Regulation of producer's output, essential to secure value for quality 2921-2924.
Standardisation of weights and measures, importance of 2905-2911.
System of marketing, details of (13).
————————, need for further data regarding (12, 13), 2898, 2899.
————————, proposals for investigation 2899, 2900.

RESEARCH:

Agricultural economics, need for further study of 3162.
Bajri, research into 2981-2985, 3228, 3322-3325.
————————hindered by lack of money and men 2985.
Board of Agriculture (*see under* ADMINISTRATION).
Central Agricultural Research Board, suggestion for (*see under* ADMINISTRATION).
Continuity of research work, importance of 2760, 2761.
Exchange of information with workers in other Provinces and at Pusa 3315, 3316.
Financing of Research (*see under* ADMINISTRATION).
Government of India and Provincial research (*see under* ADMINISTRATION).
Indian officers, their aptitude for research work 2755, 2756, 3178-3186.
Juar, research into 2981-2985, 3228, 3322-3325.
————————, hindered by lack of money and men 2985.
Local centres for research, need for 3145, 3190-3192.
Object of research: to improve yield, quality and immunity from disease 3229.
Organisation of research by crops (3), 2765, 3254, 3257-3266.
Overlapping of research work 2988-2990.
Post-graduates, their employment in research work 3058-3060.
Provincial research, must be free from central control 3309-3314.
Pusa co-operation of officers at, with provincial research 2988-2991.
——, work which can be undertaken by 3320, 3321.
——, work done at, its effect on Provinces (2).
————————, depends for its effect on prestige of workers 2772.
————————, has been of value to Provinces 3317.
Research, in the Bombay Presidency, development of, a matter of money rather than men 2821, 2822.
————————, facilities for at Poona satisfactory 3296-3299.

MANN, Dr. HAROLD H.—*contd.*

RESEARCH—*contd.*

Research, in Bombay Presidency, need for extending (2) 3304-3308.
———————, organisation of (1, 2).
———————, suggestions for further (1).
Research staff, rate of recruitment for 3125, 3126.
Research stations, 20 in Presidency 3123.
———————, 5 devoted to rice and 2 to sugarcane 3228.
Research work, should be classified by subject rather than by science (2).
———————, must be accommodated to local conditions and the resources of the people 3187.
Research workers, need to be in sympathy with cultivators 3187.
———————, need not be drawn from cultivating classes 3188.
———————, European training of, after some service in the Department 3189, 3283, 3284, 3289, 3498, 3499, 3712-3717, 3790, 3791.
Rewards (financial) to research workers for successful work, undesirable 3822-3824.
Teaching and research, combination of desirable 2750-2752, 3300, 3303.

SOILS:

Alkali land, difficult to reclaim 3152-3155.
Nitrogen in soil, its removal by crops 3080, 3090.
———————, its fixation 3081-3085.
———————, its replenishment 3081-3089.
Reclamation of riparian lands, importance of 3479-3485.
Soil survey, desirable in Sind 2868.
———————, is expensive undertaking 2869.
———————, already exists as regards depth 2870, 2871.
Waterlogging 3152, 3154.

TARIFFS AND SEA FREIGHTS:

Cess on exported agricultural produce 3025-3027, 3053, 3054.
Import duty on implements, lack of, affects Indian manufacturers 2875-2878.

VETERINARY:

Animal Improvements Section, Bombay Presidency 2882.
Co-operation between Provinces to check infectious cattle disease, should be organised by Government of India (8).
Muktesar, carries on research for all Veterinary Departments in India 2885, 3614.
———————, its prestige high 2886.
Rinderpest, simultaneous inoculation against, dangerous at present 3002-3005.
Sera, its manufacture in Provinces 3616-3619.
Veterinary college, Bombay, should be in closer touch with agricultural college 2889.
Veterinary Departments, need not be under Director of Agriculture but should be under same Minister as Agricultural Department 2881, 2889-2891.
Veterinary Department, Bombay, deals only with diseases of animals and horse breeding 2882.
———————, does little research 2885.
———————, is not under same Minister as Agricultural Department 2881.
———————, should be in closer touch with Agricultural Department 2883, 2884.
Veterinary research, should be conducted in Provinces as well as at Muktesar 3614, 3615.

WELFARE:

Agricultural problem, largely psychological 3165.
Co-operative Societies and rural reconstruction 3557, 3591.
District Boards, etc., can help in work of rural reconstruction 3388.
Economic surveys of villages, difficult but important 2931.
———————, a year required for one village 2931.
———————, danger of generalising from 2932, 2933.
———————, better conducted by non-Government agency 3592 3594.
Housing in rural areas 3694-3700.

MANN, Dr. HAROLD H.—*concld.*

WELFARE—*contd.*

Local development associations, need for (16).
———————— will fail if rural leadership lacking 3378.
Rural hygiene, better than is sometimes imagined 2945.
————, promotion of, by Taluka Development Associations 2946.
Rural leaders, importance of 3378.
————, training of, at Poona College 3381.
————, by Bombay Central Co-operative Institute 3382.
————, by Servants of India Society 3382, 3383.
————, by Co-operative movement, 3378.
Servants of Rural India Society, suggestion for (16), 3549, 3556-3559.
————, possibility of organising 3384, 3385.
————, should develop co-operative movement 3557.
Standard of living of cultivators 2938, 2940, 3171, 3172, 3176, 3604-3606.
Taluka Development Associations, their part in furthering rural hygiene 2946.
(*See also under* CO-OPERATION.)
Talukas form, the best unit of organisation possible 3372, 3373, 3553-3555.
Village problems, necessity for dealing with as a whole (16), 2947, 3591.
Villages should be organised on co-operative lines 3431.
Water supply, importance of pure 2946.
Welfare work in villages, suggested directions for (16).
————, need for missionary effort (15), 3217-3222.
————, Government aid for, (16).
————, should eventually be withdrawn 2930

MARKETING.

Adties, *see* middlemen.
Agricultural economics and marketing, should be included in curriculum of all agricultural colleges (*Patil*) (511).
Alternative markets, their provision dependent on improved communications (*Mann*) 2928.
Analysis of price structure of crops exported from and consumed in India, need for (*Jenkins*) 7390-7399.
Aratyas, *see* middlemen.
Better-quality crops, importance of securing higher price for, when marketing (*Jenkins*) (453), 7330.
Bombay, its effect on the cultivation of the hinterland (*Mann*) 3407.
Charity cess at markets, not objected to (*Mann*) 2915-2918.
Communications, need for improved, to facilitate marketing (*Patil*) (510, 511).
Containers for produce, unsatisfactory (*Mann*) 2925-2927.
————, question of improving, being investigated (*Mann*) 2926.
Co-operative control of markets, desirable (*Rothfield*) 4598.
———— cotton marketing societies (*Jenkins*) (464, 468, 469), 7511-7515.
———— ginning and sale of lint (*Jenkins*) (464).
———— marketing, cannot be properly organised in absence of data (*Collins*) (197), 4996.
————, inquiry into (*Jenkins*) (462), 7317-7321.
————, the hope of the future (*Mann*) (15).
————, but must be better organised than in the past (*Mann*) (15)
———— sale societies, *see under* CO-OPERATION.
Cost of farming in Khandesh and Broach, figures for (*Patel*) (529, 530), 8078-8107, 8226-8236, 8299-8315, 8472-8481.
Cost of production of agricultural produce, if charged at market rates, leaves no profit for cultivators (*Patil*) (509), 7976-7988, 8024.
————, increase in, since the war has outstripped rise in prices (*Patil*) (509).
————, necessity for studying (*Patil*) (509), 7870-7879.
Cotton, difficulty of getting fair price for improved (*Mann*) (12).
————, giving of samples of (*Mann*) 2920.
————, Government grading of improved, for auction (*Mann*) (13, 14), 3683.
————, importance of internal market for (*Mann*) 2896, 2897.
Cotton growers, their dependence on money-lenders for marketing in Khandesh at any rate a myth (*Mann*) (12).
————, perfer to sell in village owing to bad market practices (*Mann*) (12).
Cotton marketing, in Khandesh (*Jenkins*) (462-464).
————, inquiry into (*Mann*) (12).

MARKETING—*contd.*

Cotton markets, in the Bombay Presidency, no Government control of (*Mann*) 2919.
————————, proposed Bill to secure control (*Mann*) 2903, 2919.
————————, in Khandesh, details regarding (*Jenkins*) (463), 7366-7388.

Dalals, *see* Middlemen.
Daily market prices, not posted up in cotton areas (*Jenkins*) 7681, 7682.
Data regarding marketing, cannot be obtained through co-operative marketing societies (*Collins*) 4994, 4995.
————————, lack of (*Collins*) (197).
————————, must be obtained before effective action can be taken (*Collins*) 4949-4952.
————————, *see also* Research on marketing.
————————, value of further (*Mann*) (12, 13), 2898, 2899.

Facilities for marketing, improvement of, a chief necessity of rural development (*Collins*) (197).
————————, no lack of, in Bombay (*Mann*) (12).
————————, but sometimes difficulty in case of new or improved products (*Mann*) (12).
————————, present, unsatisfactory (*Collins*) (197).

Grading of produce, by Government for auction (*Mann*) (13, 14), 3683.
————————, knowledge of advantages of, spreading amongst cultivators (*Collins*) 4912, 4913.
————————, of gul (*Mann*) (14).
Gul, marketing of (*Mann*) (13).

Mangoes, marketing of (*Mann*) (13).
Marketing sections, should be attached to Central and Provincial Agricultural Departments (*Patil*) (511).
Markets, facilities at (*see* Facilities.)
————, open, should be provided for chief forms of produce (*Collins*) (197).
————, practices at, unsatisfactory (*Mann*) (12).
————————, statutory regulation of, possible (*Mann*) 2903, 2904.
————, system of, details of (*Mann*) (13).
————————, need for further data regarding (*Mann*) (12, 13), 2898, 2899 (*see also* Data).
————————, proposals for investigation (*Mann*) 2899, 2900.
————, *see also* Cotton markets.
Middlemen, at cotton markets (*Jenkins*) (463), 7366-7368, 7374, 7375.
————, excessive number employed (*Mann*) (13), 2912-2914.
————, functions and methods of (*Jenkins*) (463).
————, have no official position (*Mann*) 3250-3252.
————, impossible entirely to eliminate (*Mann*) 3573-3579.
————, too many between producer and cultivator (*Patil*) (510).
————, might be replaced by co-operative societies (*Mann*) 3576, 3579.
————, struggle of, with co-operative societies (*Collins*) (199), 4955-4960.

Octroi charges (*Jenkins*) 7385, 7389.

Perishable goods, markets for, require assistance of Government, municipalities and railways (*Patil*) (510).
Potatoes, marketing of (*Mann*) 2912-2914.

Quality of crops, importance of maintaining (*Patil*) (510).

Regulation of producer's output, essential to secure value for quality (*Mann*) 2921-2924.
Research on marketing and agricultural costings generally, necessity for (*Patil*) (511), 7870-7879.

Standardisation of weights and measures, importance of (*Mann*) 2905-2911, (*Jenkins*) (463), 7362-7365, (*Patil*) (510).

Village sale of cotton, not rendered obligatory by financial indebtedness of cultivators (*Mann*) (12), (*Jenkins*) (462).

Warehouses, need for (*Patil*) (510).
————————, co-operative (*Patil*) (510).
Weights and measures, standardisation of, *see* Standardisation.

Wool, marketing of (*Jenkins*) (462), 7317-7321.

MAXWELL, Mr. R. M., M.A., C.I.E., I.C.S., Collector of Kaira, Bombay Presidency, 6214-6424, (336-341).

AGRICULTURAL INDEBTEDNESS :

Causes of indebtedness (337).
Credit as a cause of debt 6224.
Execution proceedings by Revenue Department 6231, 6323-6331.
Land Revenue Code, Bombay, Section 86, effect of (337, 338) 6228-6232, 6300-6302, 6323-6338, 6421, 6422.
———— ———— ————, should be repealed (337, 338) 6409.
———— ———— ————, effect of repeal of, on co-operative societies 6303-6307.
Monsoon, uncertainty of, not a principal cause of indebtedness 6221-6224.
Navadari tenure, does not affect alienation 6308-6317.
Non-terminable mortgages, should be prohibited (338), 6285, 6286.
Peasant proprietors, decline of (337), 6225-6228.
Remedies for indebtedness (337, 338).
Remission of revenue 6318-6322.
Usurious Loans Act, little use made of 6278-6281.

AGRICULTURAL INDUSTRIES :

Little scope for, in Kaira district 6404-6408.

AGRICULTURAL LABOUR :

Areas available for colonisation (339).
Colonisation, methods adopted and suggestions for (339).
Increased wages, have encouraged absenteeism (339).
Medical facilities and more generous forest policy, might prevent land going out of cultivation in North Kanara (339).
Shortage of labour, mainly seasonal (339).

ANIMAL HUSBANDRY :

Annual buying and selling of cattle, not practised in Kaira district 6241.
Bajri crop, largely depended on for fodder 6391, 6392.
Cattle in Kaira district, causes of good quality of 6237, 6382-6390.
Enclosure, its effect on improvement of cattle 6387-6391.
Fodder, shortage of, occurs only in May and June (339).
———— ————, may be overcome by growing fodder crops by well irrigation (339).
Grass on field borders, utilisation of 6392-6394.
Graziers, professional, rôle of 6239-6241.
Grazing grounds, insufficiently protected 6253, 6254.
Grazing in Kaira district, adequate (339).
———— ———— ————, but too much land given out for cotton cultivation (339).
Pedigree bulls, no shortage of, in Kaira district 6294, 6295.
Stacking of fodder as famine reserve, well understood in Kaira district (339), 6237-6239, 6398-6400, 6416-6420.
———— ———— ———— ————, will only be undertaken where cattle are worth it 6291-6293.
Stall-feeding, carried out in Kaira (339).

ATTRACTING CAPITAL :

Competition for land and responsiveness of soil as factors (341).
Liability of assessment to periodical revisions, acts as a deterrent to capital (341).
Rainfall, uncertainty of, a deterrent (341).

CO-OPERATION :

Compulsion of obstinate minorities (340).
Financing of cultivators, should be done through co-operative movement rather than by taccavi loans (337, 340).
Interest charged by co-operative societies, should be reduced if possible (340).
Land Revenue Code, Bombay, effect of repeal of section 86 of, on co-operative societies 6303-6307.

MAXWELL, Mr. R. M.—*contd.*

CO-OPERATION —*contd.*

Minor irrigation schemes, their execution by co-operative effort 6242-6245.
Protection and improvement of lands, need for co-operative schemes for (340).
———————, causes of present lack of (340).
Taluka Development Associations 6423, 6424.

CROPS AND CROP PROTECTION :

Crops grown in Kaira district 6366-6372.
Fencing as protection against wild animals, cost of 6378.
———————, effect of protective duty on price of 6289, 6290.
———————, importance of, becoming recognised by cultivators (338).
———————, minimum height of, 5 feet 6375-6377.
———————, should be made available at cheaper rates (338), 6233-6236.
———————, taccavi for (338).
Monkeys, do great damage to crops but are regarded as sacred (338).

DEMONSTRATION AND PROPAGANDA :

Demonstration farms and plots, are not but should be run on commercial lines (336).
Demonstration plots, on cultivators' own fields, the most successful method 6219, 6220.
———————, profit and loss accounts of, should be kept (336).
———————, should be leased in different villages instead of using permanent plots (336), 6373, 6374.
Demonstrators, cannot be trained under District Boards 6249
———————, lack of sufficient (337).
———————, unless properly trained are of little use 6249, 6250.
District agricultural shows 6251, 6252.
Lantern lectures, value of (337).
Propaganda, lack of sustained (337).
———————, must be brought to doors of cultivators (337), 6269, 6270.
Small cultivators, not reached by Agricultural Department 6268.

EDUCATION :

Agricultural bias schools, should replace ordinary primary schools 6401, 6402.
Agricultural degree, standard of, lower than B.A. (336), 6257, 6258.
Agricultural education, taken chiefly with the hope of entering Government service (336), 6216-6218.
Child labour, demand for, prevents parents sending their children to school 6263.
Primary education, lack of facilities for (336).
Secondary education, separate branch of, should be established to meet needs of agricultural communities (336), 6255, 6256.
———————, too largely devoted to general subjects (336).

FERTILISERS :

Scope for artificial manure in North Kanara (338).

FINANCE :

Cultivators should be financed through co-operative movement rather than by taccavi (337, 340).
Government, should carry out land improvement schemes (337), 6273, 6395, 6396.
———————, but is prevented from doing so by Land Revenue Code 6228.
Taccavi, for consolidation schemes (338).
———————, for fencing (338).
———————, for land improvement, demand for exceeds supply (337), 6274, 6275.
———————, use of would be stimulated by eliminating formalities (337), 6276.
———————, for well irrigation (338).
———————, recovery of 6323, 6324.

MAXWELL, Mr. R. M.—*concld.*

FORESTS :

Cultivators, need for relaxation of restrictions on, in forest areas (339, 340), 6339-6346.
————, should not be allowed to carry on sporadic cultivation in valuable forests (339, 340).
Deterioration of forests, leads to soil erosion and floods (339, 340).
————, remedies for (339, 340).
Firewood, provision of, may be secured by encouraging planting of casuarinas, etc. (339, 340), 6410-6412.
————, and by planting waste areas in charge of Revenue Department (339, 340).
Forests, should not be regarded as accessory to other cultivation (339, 340).
Minor forests, should be managed for benefit of agriculturists (339, 340), 6379-6381.
Ravine lands, afforestation of 6296-6299.

HOLDINGS :

Consolidation, should not be enforced by Government (338), 6395-6397.
Legislation proposed in Bombay to deal with fragmentation, difficulties of (338), 6287, 6288.
Taccavi for consolidation schemes (338).
Village sites, congestion of, a cause of fragmentation (341), 6246, 6247.

IMPLEMENTS :

Depôts for repairs and spare parts, essential (339).

IRRIGATION :

Canal irrigation, scope for further in Kaira district (338).
Minor irrigation works, their execution by co-operative effort 6242-6245.
Water diviners 6365.
Well irrigation, demand for taccavi for, large (338).
————, position of, in Kaira district 6347-6361.
————, scope for expansion of (338), 6362.

SOILS :

Land improvement schemes, should be carried out by Government (337), 6273, 6395, 6396.
————, but cannot be at present owing to provisions of Land Revenue Code 6228.
————, taccavi for (337), 6274-6276.
Soil erosion, caused by deterioration of forests (339-340).

TARIFFS :

Import duty on fencing, restricts use 6289, 6290.

MELHUISH, Lt.-Col. H. M. H., D.S.O., I.M.S., Director of Public Health, Bombay Presidency, 6798-6882 (391-393).

Cattle, the keeping of, in living rooms, owing to congestion of village sites (393), 6845 6847, 6874, 6875.
Contagious disease, control of, rests with village officers (392).
————, notification of (392).
District health associations, might be organised on co-operative basis 6800.
————, need for (391, 393), 6801, 6860-6863.
————, should be subsidised 6864.
District health officers, need for (392, 393).
Hookworm, does not exist in Bombay 6848.
Housing (393), 6876.
Hygiene, in rural areas, obstacles to (391).
————, measures suggested to promote (393).
————, should be taught in all schools (391), 6802-6804, 6877.
————, teachers of, must have special training (391).
Milk, necessary for infants but not for adults 6859.
Night soil, forms valuable manure if properly treated (392), 6840-6844.
————, need for proper conservation of (392), 6833-6839.

MELHUISH, Lt.-Col. H. M. H.— *contd.*

Notification of contagious diseases (392).
Propaganda for health purposes, methods suggested for (391).
————————————, so far chiefly confined to towns (391).
Public Health Act, eventual need for comprehensive (393), 6865-6868.
Public Health Department, activities of, curtailed through lack of funds 6856, 6857.
Underfeeding, its effect on health 6858.
Village officers, responsible for control of contagious disease (392).
————————, classes for instruction of (391), 6829-6832.
————————, need for instruction of, in elementary medical matters (391).
Village Panchayet Act 6854, 6855, 6878-6882.
Village panchayets 6869-6873.
Village sanitary committees 6849-6855, 6871-6873.
Village sanitation (391).
Vital statistics (391).
Water supply, importance of pure (392), 6805-6823, 6825-6828.
Water supply, parasitic diseases caused by impure 6824.

NAIK, Mr. V. H., M.A., Bar.-at-Law, Collector of Bijapur, Bombay Presidency 136-142, 4193-4221 and 4649 to 4878.

ADMINISTRATION :

Agricultural Department, work of, in Bijapur district 4692-4694.
Agricultural overseers, work of 4694.
Collectors, should be charged with general oversight of agricultural work in their district (141), 4724, 4725, 4727-4729, 4788-4794, 4877.
Communications, improvement of, important to provide markets for fruit, etc. (139), 4213-4215.
Port, need for a, between Bombay and Colombo (136), 4741-4743.
Roads, importance of provision of (140).
————, present state of, in Bijapur, satisfactory 4843-4847.

AGRICULTURAL INDEBTEDNESS :

Damdopat, application of rule of 4735-4737.
Moneylenders, rate of interest charged by, 12 to 18 per cent. 4861.
————————————, has been reduced by activity of Co-operative Societies (140).
————————, supply bulk of loans required by cultivators in Bijapur district 4701-4704.
Relief of indebtedness, by loans from Government or land mortgage banks at low rate of interest to enable cultivators to repay their debts (137), 4199-4207, 4744-4751, 4856-4862.
Usurious Loans Act, not applied in Bijapur district 4734, 4735.

AGRICULTURAL INDUSTRIES :

Co-operative organisation of (139).
Suggestions for (139).

ANIMAL HUSBANDRY :

Kadbi, its storage for fodder, 4708-4711.
————————————, Government scheme for, in Bijapur, a success (138), 4208-4212, 4674-4676.
Prickly pear, its use for fodder 4850-4852.

CO-OPERATION :

Central Co-operative Institute, Bombay, work of (139), 4739, 4775-4782.
Co-operative movement, is progressing in Bijapur 4701-4705.
————————————, supervision of 4768-4770.
Credit societies, establishment of, has lowered rates of interest charged by moneylenders (140).
————————, might make loans in kind instead of cash 4766, 4767.
Export and import business, might be conducted by co-operative societies 4772.
Government (paid) organisers for co-operative societies, desirability of (139), 4713, 4738, 4739, 4783-4787.

NAIK, Mr. V. H.—*contd.*

CO-OPERATION—*contd.*

Non-official agencies, are not capable of organising and developing co-operative societies (139).
Purchase societies, single large society for each district desirable, with branches in each taluka (139), 4716, 4717, 4877, 4878.
Sale societies, suggestions for (140).
Seed, its supply through co-operative societies 4771.
Short-term credit, should be provided by co-operative societies (136).
Taluka Development Associations, present work and possibilities of 4715-4721, 4759-4765, 4873-4878.
Village industries, co-operative organisation of (139).

CROPS AND CROP PROTECTION :

Crops grown in Bijapur district 4695-4698.
Prickly pear, harbours pigs and should be destroyed (138), 4850-4852.
Seed, distribution of pure, suggestions for (138).
——, its supply through co-operative societies 4771.

DEMONSTRATION AND PROPAGANDA :

Examples of success of (136).

EDUCATION :

Adult agricultural education, suggestions for popularising (136).
Agricultural bias, should be given to all education in India (140), 4686, 4687.
Agricultural training for officers of I.C.S., advantages of 4803-4810.
Teachers, should be draws as far as possible from agricultural classes (136).
Village officials, should be trained in agriculture (141).

FERTILISERS :

Cow-dung, its use as fuel should be prohibited (138), 4669-4673, 4681-4685, 4706, 4707, 4817-4820.

FINANCE :

Land mortgage banks, may be organised on co-operative principles 4730-4732.
Long-term credit, should be provided by land mortgage banks with State-aid (137), 4199, 4200, 4206, 4856-4862.
Short-term credit, should be provided by co-operative institutions (136).
Taccavi loans, are popular in Bijapur 4724.
————, need for extending (137), 4723.
————, should be given by Collector's staff (137), 4724, 4725.

IMPLEMENTS :

Distribution of, by co-operative societies (139).
Manufacture of, by village blacksmiths (139).

IRRIGATION :

Irrigation in Bijapur district, present position of 4699, 4700, 4832-4838.
————, suggestions for 4649-4668, 4722, 4821-4824, 4863-4871.
Wells, provision of credit for construction of (137).

RESEARCH :

Bijapur, desirability of research station at (136), 4194-4197.
Conservation of moisture, need for research into, to facilitate dry farming (136), 4195.

SOILS :

Field embankments, construction of, by cultivators (137).
Land improvements, provision of credit for (137).

WELFARE :

Chavdis in villages, improvement of (141), 4795-4802.
Collectors, should take a personal interest in rural reconstruction 4752, 4753.

NAIK, Mr. V. H.—*concld.*

WELFARE—*contd.*

Faction, the bane of village life (141).
Housing conditions in villages in Bijapur district, bad (141).
Parliament, should pass a statute for the development of agriculture in India (142), 4219-4221, 4825-4827.

PATEL, Mr. B. S., N.D.D., N.D.A., C.D.A.D., Professor of Agriculture, Agricultural College, Poona, 8025-8524, (527-540, 571).

ADMINISTRATION :

Board of Agriculture, no Indian representative on, appointed by Bombay (540), 8373, 8374.
Board of Education, need for, with adequate representation of Agricultural Department (528), 8054-8058, 8392-8395.
Indian agricultural officers, advantages of employing (540).
———————, should be sent abroad for further training after some experience of practical work 8351-8363.

AGRICULTURAL INDEBTEDNESS :

Causes of borrowing (smallness of holdings, ignorance of cultivators, lack of subsidiary occupations) (530).
Litigation, avoidance of, by legislation setting up local bodies to decide disputes 8027-8029.
— ———, causes much waste of money by cultivators 8026.
Loans to cultivators, must be given for productive purposes only (530).
—— ————, need for supervision of 8111-8123, 8401, 8402, 8427, 8428.
Long-term cheap credit, needed for redemption of mortgages (530).

AGRICULTURAL INDUSTRIES :

Cultivators, number of days worked by (537, 538), 8476.
Dairying, need for introduction of, as a subsidiary industry (538).
Fruit-growing, limited by lack of irrigation facilities and organisation for marketing (538).
Poultry-rearing, caste prejudices against 8439-8441, 8515-8521.
—— ————, need for improvement in (538).
Propaganda to encourage subsidiary industries, may be carried out by graduates in their vacations (539).
Secondary occupations, essential if lot of farmer is to be improved (538), 8472-8476.
Spinning and weaving (538), 8330-8342.
Vegetable drying and canning (538).

ANIMAL HUSBANDRY :

Anand central creamery, results of, should be published 8492, 8493.
———————— ——, should be used to organise production and sale of butter on commercial lines (537), 8160-8163, 8196-8210.
Animal nutrition, importance of studying 8382-8391.
Breeders, professional, need for training of, in farming and cattle-breeding (531).
Buffaloes, are superseding cows as milk producers 8140.
——— —, average yield of milk by (535), 8153.
— ———, distribution of milch, in Bombay Presidency (532).
———, milk of, preferred to cows' milk 8144, 8145, 8280-8284.
—— —, need for cattle-farm for improving (532).
———, need for more care of (531).
Bullock power, waste of, on small holdings 8435-8438.
Butter, central factories for (535).
———, export to foreign countries of (535).
———, melting point, importance of 8146-8148.
———, need for uniformity and high quality of (534), 8168-8174.
———, should be made locally (535), 8152-8154.
———, trade in, Government assistance for (535), 8166-8175.
———— —, in northern Gujarat (533).
— ———— —, organisation of in India and other countries compared (534).
Butter fat test basis, should be employed in paying for milk 8180-8187.
Cattle-improvement and milk recording societies, need for (537).

PATEL, Mr. B. S.—*contd.*

ANIMAL HUSBANDRY—*contd.*

Co-operative dairying, possibilities of (532-535, 537), 8155-8176.
——————————, *see also* Butter, trade in.
Cultivators, as a rule keep one or two buffaloes and no cows 8153, 8291-8293.
Dairy industry, advantages of, as cottage industry 8462-8466.
——————————, causes of failure of, in Gujarat 8294.
——————————, need for introduction of, as subsidiary industry (538), 8265-8270.
——————————, possibilities of, in the Deccan 8457-8461.
Dairy produce, value of (532).
Dual-purpose breed, need for developing (531), 8138-8143, 8278, 8279, 8489.
Elimination of useless animals 8429-8434.
Enclosure, its effect on cattle-breeding 8124-8127, 8289.
Ghee, production of (535), 8238-8241.
Gorakshans 8285, 8286.
Government breeding farms 8487, 8488.
Grading, fundamental importance of, for cattle-breeding 8407.
Improvement of breeds, at Poona 8403-8407.
——————————, by enclosure 8124-8127.
——————————, grading and milk recording of fundamental importance in 8407.
——————————, suggestions for effecting (531).
——————————, will have good effect on crop production (537), 8297, 8298.
Melting point of cow and buffalo butter, importance of 8146-8148.
Milch cattle, numbers of (532).
——————————, production per head of Gujarat and Sind breeds (532).
——————————, value of milk produced by (533).
Military dairy farms, should be under civil department 8029.
——————————, their use for improvement of dairy farming and cattle-breeding 8029-8033, 8494-8497.
Milk production in India and foreign countries compared (536).
Milk recording, societies for, (535, 536).
——————————, Government assistance for (537).
——————————, value of (535), 8177-8187, 8327-8329, 8407.
Milk supply in cities, is mostly adulterated and insanitary (533).
——————————, present price and consumption of (533).
——————————, present system of, is sending animals to the slaughter-house (531), 8408-8415.
——————————, schemes for (533, 534).
——————————, too much stress must not be laid on sanitary side to start with (534), 8149-8151.
Pinjrapoles 8285, 8286.
Premium bull system 8285-8288.

ATTRACTING CAPITAL :

Renting of land, pays better than management (529, 530) 8422-8426.

CULTIVATION :

Broad-ridge method of growing crops on irrigated land (530, 531), 8316, 8317.
Cost of farming in Khandesh and Broach, figures for (529, 530), 8078-8107, 8226-8236, 8299-8315, 8472-8481.

DEMONSTRATION AND PROPAGANDA :

Cinemas, their use for propaganda 8191, 8192, 8276, 8277.
Subsidiary industries, propaganda to encourage (539).

EDUCATION :

Adult education by means of visual instruction (529), 8190-8192.
After-careers of agricultural students, need for following 8498-8501.
Agricultural bias, should be introduced in all primary schools (527), 8047, 8048, 8052, 8053.
——————————, will not prejudice literacy 8049, 8050.
Agricultural College, 3 years' course as sufficient if agriculture is taught in schools (528).

PATEL, Mr. B. S.—*contd.*

EDUCATION—*contd.*

Agricultural College, high standard of living at, cannot be maintained when students return to the land (529), 8070-8077.
———————, one-year course at (528).
———————, should teach rural economics (528).
———————, students at, usually seek official posts (529).
Agricultural engineering, is taught at Poona 8223.
Agricultural high schools, where three-quarters of the time will be devoted to agriculture need for (529).
Agriculture (elementary), evening classes in (528).
———————, should be taught in high schools (528).
———————, in middle schools (527).
Board of Education, need for, with adequate representation of Agricultural Department (528), 8054-8058, 8392-8395.
Child labour, effect of demand for, on attendance at school (539).
Compulsory education, good effect of in Baroda (539).
———————, need for introduction of (529), 8065, 8066.
Educated men, examples of attempts by, to practice agriculture (529, 530).
———————, find it difficult to secure living by farming in Bombay (529, 530), 8422-8426, 8446-8454.
Education, its tendency to unsettle boys for the land 8047-8053.
Evening classes in agriculture (528).
Financing of primary education, by means of export tax (529), 8067-8069, 8242-8259, 8421, 8442-8445.
High schools, teaching of agriculture in (528).
Ignorance of parents a handicap to the spread of education (539).
Indian agricultural officers, should be sent abroad for further training after some experience of practical work 8351-8363.
Libraries and reading rooms, need for (529, 539).
Loni-type schools, cost of 8063.
———————, pupils at, prefer to seek Government service 8059-8062.
———————, should be converted into training schools for teachers of agriculture in primary schools (528), 8064, 8455, 8456.
Manual work in schools, desirability of (528).
Middle schools, should give elementary practical and theoretical training in agriculture (527).
Physical training and games, need for, in schools (539), 8188, 8189.
Primary schools, should have agricultural bias (527).
Rural economics, elementary, should be taught in all schools (539).
———————, should be taught in Agricultural College (528).
Rural hygiene, should be taught in all schools (539).
School hours, should be adapted to needs of agricultural population (539).
School plots (528).
Teachers, in rural areas, should be drawn from agricultural classes (528).
————, low calibre of, hinders spread of education (539).
————, of agriculture and nature study, should be recruited from agricultural graduates (528).
————, salaries of, a cause of low calibre 8271-8275.

FINANCE:

Co-operative and land mortgage banks, should be provided with money at a rate which will enable them to charge not more than 5 per cent. to cultivators (530), 8108-8110.
Deposits in Savings Banks and Imperial Bank, 50 per cent. of, should be set aside for lending to farmers' banks at low rate of interest (530), 8111, 8427.
Loans to cultivators, need for providing for proper expenditure and punctual repayment of (530), 8111-8123, 8401, 8402, 8427, 8428.
Long-term credit, needed for redemption of mortgages (530).

HOLDINGS:

Size of average holding in Bombay (537).
Smallness of holdings, leads to waste of bullock power 8435-8438.

IMPLEMENTS:

Foreign implement manufacturers, should be encouraged to start factories in India (531), 8132-8136, 8318, 8396, 8400.
Kirloskar ploughs, price of, for last eleven years (*Appendix*) (571).

PATEL, Mr. B. S.—*concld.*

MARKETING :

Cost of farming in Khandesh and Broach, figures for (529, 530), 8078-8107, 8226-8236, 8299-8315, 8472-8481.

RESEARCH :

Animal nutrition, need for research on (527), 8045, 8046.
Board of Agriculture, no Indian representative on, appointed by Bombay (540), 8373, 8374.
Crop production, need for comprehensive study of factors of (527).
Fund for research, desirability of raising, partly by public subscription (527), 8044.
Indian officers, advantages of employing (540).
———— ——, study leave for (540), 8467-8471.
————, their aptitude for research work (540).
Research work in Provinces, should be under Joint Director to receive more attention (527), 8041-8043, 8364-8366.
Study leave in foreign countries for Indian research workers, need for (527).
———— should be given after they have acquired some knowledge of local problems 8034-8040.
Training facilities for research workers, need for (527).
Understudies for research workers, need for training of (539, 540), 8367-8372.

SOILS :

Soil analysis, teaching of 8213-8222.

TARIFFS :

Financing of primary education by means of export tax (529), 8067-8069, 8242-8259, 8421, 8442-8445.

WELFARE :

Rural hygiene, should be taught in all schools (539).
Social service (unofficial) organisation for rural work, need for encouraging (539), 8343-8350, 8416-8420.
————————————————————, state help for 8344.

PATIL, Rao Bahadur P. C., L.Ag., M.Sc. (in Agri. Econs.), Professor of Agricultural Economics and Acting Principal, Agricultural College, Poona, 7868-8024, (507-517).

ADMINISTRATION :

Central Agricultural Department, suggested functions of (512, 513).
Communications, need for improved, to facilitate marketing (510).
Indian officers of Agricultural Department, are doing as good work as Europeans (512).
————————————————, should be given facilities for getting in touch with similar officers in other Provinces (512).
Meteorological Department, is not of great assistance to cultivators (513).
Provincial Agricultural Departments, should be independent of outside assistance (512, 513).
————————————, should include section dealing with marketing (511).
Railway freights for agricultural produce, higher in India than elsewhere (510).
————————————, should be reduced (513).
Railways, need for further (513).
Roads (second-class), need for extending (513).

AGRICULTURAL INDEBTEDNESS :

Causes of indebtedness (513).
Causes preventing repayment (513).
Cultivators, agriculture being a marginal industry, are not benefitted by cheap capital unless they have a surplus to permit of repayment (508, 509, 513).

PATIL, Rao Bahadur P. C.—*contd.*

AGRICULTURAL INDEBTEDNESS—*contd.*

Cultivators, capital for, should be provided at cheap rates and rationed (513), 7989-7992.
Right of sale, some limitation of, desirable (513).
Rural debt extent of, in Bombay 7958-7963.
Sources of credit (513).

AGRICULTURAL INDUSTRIES :

Number of days worked by average family of five, 180 days each per annum (514).
———————————————, varies greatly in different districts 7900, 7901.
Poultry keeping, need for improvement of (514).
Power machinery, merely displaces men and is of no assistance (514), 7902-7907, 8001-8007.

AGRICULTURAL LABOUR :

Colonisation of new lands (*Appendix*) (515-517), 7907, 7911.
Shortage of labour (alleged due to inability of farmers to pay market rate of wages (508) 7912, 7921-7925, 7964-7972.

CO-OPERATION :

Credit societies, cheap capital provided by, will be of no assistance unless cultivators have a surplus to permit repayment (513).
Sale societies, scope for (510, 511).
Warehouses, co-operative (510).

CROPS :

Commercial crops, are replacing but should not be allowed to replace food crops in dry tracts (511), 7885-7893, 7938-7944, 7973-7975, 8001-8007, 8017-8023.
Food crops, production of, in Bombay 7973-7975, 8017-8023.
Quality of crops, importance of maintaining (510).

CULTIVATION :

Power machinery, displaces labour and is unnecessary in India (511), 7902-7907, 7917-7925, 8001-8007.

DEMONSTRATION AND PROPAGANDA :

Area of Presidency which has come under influence of Agricultural Department, 10 per cent. 7950, 7951.
Cultivators, are not conservative but eager to adopt remunerative improvements (507), 7949-7951.
Demonstration and propaganda, examples of success of (512).
Demonstrators, should be drawn from community to whom the demonstration is given (512).

EDUCATION :

Agricultural economics, and marketing, should be included in curriculum of all Agricultural Colleges (511).
————————, examination in, at Poona College 7945-7948.
Child labour, demand for, an obstacle to primary education (512).
Nature study, essential (512).
School plots, essential (512).
Teachers in rural areas, should receive some instruction in agriculture (512).

FERTILISERS :

Adulteration of manures, leaflet on, has checked 7914-7916.
———————————, statute against, desirable 7913.
Ammonium sulphate, increase in use of (514), 7949.

FINANCE :

Capital, amount of, available in India, small (508).
———————————————, and requires high rate of interest (508).

PATIL, Rao Bahadur P. C.—*concld.*

FINANCE—*contd.*
Cheap capital, of no assistance unless cultivators have a surplus to permit of repayment (513).
——————, requires rationing (513), 7989-7992.
Taccavi, great demand for (513).

HOLDINGS:
Acreage of land available per head in India, compared with that in other countries (508).
——————, is insufficient (508), 7952-7957.
Fragmentation, may be checked by free measurement and valuation of land (513, 514).
——————, steps adopted to check, in Japan 7894-7899.
Sub-division of holdings, inevitable (513, 514).

IMPLEMENTS:
Power machinery, displaces labour and is unnecessary in India (511), 7902-7907, 7917-7925, 8001-8007.

IRRIGATION:
Effect of canal irrigation on habits of cultivators (508), 8009-8016.

MARKETING:
Agricultural economics and marketing, should be included in curriculum of all agricultural colleges (511).
Communications, need for improved, to facilitate marketing (510).
Co-operative sale societies, scope for (510, 511).
Cost of production of agricultural produce, if charged at market rates, leaves no profit for cultivators (509), 7976-7988, 8024.
——————, increase in, since the war, has outstriped rise in prices (509).
——————, necessity for studying (509), 7870-7879.
Marketing sections, should be attached to Central and Provincial Agricultural Departments (511).
Middlemen, should be eliminated as far as possible (510).
Perishable goods, markets for, require assistance of Government, municipalities and railways (510).
Quality of crops, importance of maintaining (510).
Research on marketing and agricultural costings generally, necessity for (511), 7870-7879.
Warehouses, need for (510).
——————, co-operative (510).
Weights and measures, need for standardising (510).

RESEARCH:
Marketing, need for research on (511), 7870-7879.

WELFARE:
Economic surveys of typical villages, should be undertaken (514).
Luxuries, should be discouraged in India (511), 7880-7884, 7935-7937.
Standard of living in India, is rising beyond the limits the country can afford (511), 7880-7884.

RESEARCH.
Agricultural economics, need for study of (*Mann*) 3162.
Animal nutrition, need for research on (*Patel*) (527), 8045, 8046.
Bajri, research on (*Mann*) 2981-2985, 3228, 3322-3325.
Bijapur, desirability of research station at (*Naik*) (136), 4194-4197.
Central Agricultural Research Board
Central organisation for agricultural research
Central Rural Development Board.
} *See* ADMINISTRATION.

RESEARCH—*contd.*

Central irrigation research stations, for carrying on agricultural and irrigation research concurrently, need for (*Inglis*) (228, 229).
Conferences of research workers (*Jenkins*) 7311-7313.
Conservation of moisture, need for research on (*Naik*) (136), 4195.
Continuity of research work, importance of (*Mann*) 2760, 2761.
Crop production, need for comprehensive study of factors of (*Patel*) (527).
Departmental research committees in Bombay, organisation of (*Burns*) (100), 3856, 3857.
Deputy Directors of Agriculture, should do some research (*Desai*) 8636-8639.
Exchange of information with workers in other Provinces and at Pusa (*Mann*) 3315, 3316, (*Burns*) (102, 103), 3873, 3874, 3888, 4001-4008.
Experimental farms, should be separated from demonstration farms (*Inglis*) (228).
Financing of research, *see* **ADMINISTRATION.**
Fund for research, desirability of raising by public subscription (*Patel*) (527), 8044.
Government of India, role of, in research, *see* **ADMINISTRATION.**
Indian Central Cotton Committee, research resulting from activities of (*Jenkins*) 7424-7430.
Indian officers, their aptitude for research (*Mann*) 2755, 2756, 3178-3186, (*Patel*) (540).
Juar, research on (*Mann*) 2981-2985, 3228, 3322-3325.
Local centres for research, need for (*Mann*) 3145, 3190-3192, (*Jenkins*) (438), 7240-7244, 7476-7479.
Marketing, need for research on (*Patil*) (511), 7870-7879.
Money spent on research, disproportionately large to that spent on propaganda (*Jenkins*) (446), 7309, 7310, 7432.
Non-officials wishing to conduct research, should be encouraged and subsidised (*Jenkins*) (440), 7274-7279, 7600-7607.
Organisation of research, by crops (*Mann*) (3), 2765, 3254, 3257-3266, (*Burns*) 3840-3842, (*Jenkins*) 7253-7259.
———————————, by permanent staff as nucleus and temporary staff for particular pieces of research (*Burns*) (101), 3840, 3908.
———————————, need for further facilities for local, *see* Local centres for research.
———————————, on lines of Indian Central Cotton Committee (*Jenkins*) (439), 7245-7250, 7253, 7259, 7758-7760.
———————————, in Bombay (*Mann*) (1, 2).
Overlapping of research (*Mann*) 2988-2990, (*Jenkins*) 7423.
Post-graduates, their employment in research (*Mann*) 3058-3060.
Programmes of research, importance of planning (*Burns*) (101).
Provinces, should carry out veterinary research (*Fatbrother*) (118).
Provincial research, danger of unsupplemented (*Jenkins*) (448).
———————————, must be free of central control (*Mann*) 3309-3314.
Provincial research committees, need for (*Jenkins*) (438, 439).
Pusa, co-operation of officers at, with provincial research (*Mann*) 2988-2991.
——, work done at, its effect on Provinces (*Mann*) (2).
———————————, depends for its effect on prestige of workers (*Mann*) 2772.
———————————, has been of value to Provinces (*Mann*) 3317.
——, work which can be undertaken by (*Mann*) 3320, 3321.
Research staff, financial rewards for successful work by, undesirable (*Mann*) 3822-3824.
———————————, must have working knowledge of sciences underlying agriculture and of agriculture itself (*Burns*) (100).
———————————, must not be overburdened with administrative work (*Burns*) (101), 3837-3839.
———————————, rate of recruitment for, in Bombay (*Mann*) 3125, 3126.
———————————, should be in closer touch with district problems and workers (*Jenkins*) (439).
———————————, should be in sympathy with cultivators (*Mann*) 3187, 3188.
———————————, should be provided with understudies (*Burns*) (101), (*Patel*) (539, 540), 8367-8372.
———————————, study leave for, importance of (*Burns*) (101), 3843, 3844, (*Patel*) (527).
———————————, rules for, sufficiently liberal (*Burns*) 3922, 3924.
———————————, should be encouraged (*Burns*) 3923, 3925-3928.
———————————, should be given after they have acquired some knowledge of local problems (*Patel*) 8034-8040.
———————————, training of, in Europe, after some service in India (*Mann*) 3189, 3283, 3284, 3289, 3498, 3499, 3712-3717, 3790, 3791, (*Burns*) (100), 3850-3855.
Research stations, 20 in Bombay (*Mann*) 3123.

RESEARCH—*concld.*

Research stations, 5 devoted to rice and 2 to sugarcane (*Mann*) 3228.
Research work, in Bombay, development of, a matter of money rather than men (*Mann*) 2821, 2822.
——— ——— ——— ——— , need for extending (*Mann*) (2), 3304-3308.
——— ——— ——— ——— , suggestions for further (*Mann*) (1).
——— ——— ——— , is of no value unless results incorporated in general agricultural practice (*Jenkins*) (446) 7309, 7310.
——— ——— , must be classified by subject rather than science (*Mann*) (2).
——— ——— , must be accommodated to local conditions and resources of the people (*Mann*) 3187.
——— ——— , in Provinces, should be under Joint Director to receive more attention (*Patel*) (527), 8041-8043, 8364-8366.
——— ——— ———, subjects suggested for (*Jenkins*) (439, 440).
Teaching and research, combination of (*Mann*) 2750-2752, 3300, 3303, (*Burns*) (101).
Traditional methods of agriculture, need for research on (*Burns*) (102), 3909, (*Inglis*) (228).
Understudies for research workers, *see* Research staff.

ROTHFIELD, Mr. OTTO, Khairpur Mir, Khairpur State, Sind. (Examined at Poona) 4482-4648 (163-165).

ADMINISTRATION :

Agricultural Department, past defects of (163).
Departmental Joint Boards for securing co-operation between Agricultural and allied departments, success of in Bombay 4540.
Departments allied to Agriculture (Co-operative, Veterinary and Forests) should come under same Minister as Agriculture 4540-4544.
Railway administrations, no means of bringing popular pressure to bear on (163).
Railway rates, are sometimes manipulated to prejudice of agriculturists (163), 4490, 4491, 4545, 4608-4611.
Secretariat system, should be replaced by system of Ministries organised as in other countries (163), 4487-4489, 4533, 4534, 4540.
Veterinary Service, is too small and neglected to do effective work (163).

AGRICULTURAL INDEBTEDNESS :

Honesty of cultivators in repayment of loans, excessive (163), 4492-4494, 4573-4577.
Insolvency Act, need for propaganda to explain uses of (164), 4492-4495, 4573-4577.
Lack of other investments for capital as a cause of agricultural indebtedness (163).
Legal privileges for cultivators, special, undesirable (164), 4569.
Moneylending landlords, worse than ordinary moneylenders 4571, 4572.
Mortgage and sale, right to, should be restricted in backward areas (164).
Mortgage of lands, rarely undertaken to provide funds for land improvement 4551.
Non-terminable mortgages, should be prohibited (164).
Profits made by cultivators, increase in by improving marketing, punishing fraud and giving them a voice in Imperial policy, a remedy for insolvency (164).
Repayment of loans by cultivators, difficulty of (163).
Sources of credit (the village shopkeeper, the taluka money-lender and the co-operative movement) (163).
Usurious Loans Act, not applied in Bombay 4550.

AGRICULTURAL LABOUR :

Shortage of (164), 4519, 4617-4623.

ATTRACTING CAPITAL :

High rate of interest an obstacle to investment of money in land improvements (165).

CO-OPERATION :

Audit of co-operative societies, must remain in hands of Government 4511, 4527-4532, 4556, 4566, 4567.
——— ——— ——— , should be strengthened by appointment of more auditors 4501, 4502.
Banking, field of, must be occupied to the utmost by co-operative movement (164).
Compulsion of obstinate minorities (164), 4496-4500.

ROTHFIELD, Mr. OTTO—*contd.*

Co-operation—*contd.*

Co-operative methods, may be employed to secure fencing of fields (164).
————————, should be used to consolidate fragmented holdings 4496.
Co-operative societies, control of, in Bombay 4526, 4558-4560.
————————, can never dispense entirely with outside assistance and advice 4512-4514.
District banks, control of 4557.
Financing of cultivators, should be done through co-operative movement rather than by taccavi loans 4522, 4523.
Government, must always exercise some degree of supervision over co-operative societies, but as little as possible (164), 4503, 4509, 4553-4556.
————————, should place experts at disposal of co-operative societies (164), 4503-4506.
Irrigation societies (164), 4552.
Leadership in co-operative societies 4561-4566.
Long-term credit, its provision through co-operative societies 4524.
Marketing, co-operative 4598.
Non-official agencies, should be preferred to official for founding, encouraging and guiding co-operative societies 4503, 4547-4549.
Privileges for co-operative societies, undesirability of special 4596-4599.
Propaganda through co-operative agencies 4537-4539.
Taluka Development Associations, are doing good work 4640, 4641.
————————————, possibility of similar societies for smaller units than the taluka 4643, 4644.
————————————, provide the best agency for propaganda 4642.
————————————, should be registered under Co-operative Societies' Act 4600-4607.

Crop Protection:

Fencing of fields on co-operative basis, has been successful in Bombay (164).
————————————, Government should contribute share of cost of (164).

Demonstration and Propaganda:

Concentration of propaganda preferable to dispersion (163).
Demonstrations, effectiveness of, would be increased if full accounts were published (163), 4484-4486.
Knowledge of improvements, does not filter down from big landlords to small cultivators 4535, 4536.
Personal influence, importance of (163).
Propaganda, examples of success of (163).
————, in Bombay, carried out jointly by Agricultural and Co-operative Departments 4538.
————, its concentration preferable to dispersion (163).
————, should be directed to small holders 4537.
————, through co-operative societies 4537-4539.
————, through Taluka Development Associations 4640-4642.

Education:

Agricultural education, should be given after a certain stage in primary education is reached 4591.
Education, has tendency at present to increase drift of rural population to towns 4589.

Finance:

Agriculturists Loans Act, bad effect of 4522.
Annual requirements of cultivators, 20 to 25 crores 4522.
————————————, cannot be met by taccavi loans 4522.
Cultivators, should be financed through co-operative movement rather than by taccavi 4522, 4523.
Land Improvements Act, loans under 4522.
Long-term credit, suggestions for provision of 4524.
Taccavi, should be given under Land Improvements Act rather than Agriculturists Loans Act 4522.
————, should only be given in backward tracts or in times of famine 4522, 4523, 4633-4635.

ROTHFIELD, Mr. OTTO—*concld.*

HOLDINGS:

Birth-control as a remedy for excessive sub-division 4582-4586.
Compulsion of obstinate minorities, need for, to facilitate consolidation of holdings 4498-4500.
Consolidation, has tendency to keep pace with fragmentation 4496, 4497.
Cultivable land, percentage of, cultivated in Bombay 4515.
Fragmentation, legislation to prevent, under consideration in Bombay 4496-4500, 4637-4639.
————————, should be rectified where possible by co-operative effort 4496.
Sub-division, does not imply fragmentation 4632, 4636.
————————, has not caused much injury 4496.
————————, should not be interferred with by legislation 4496, 4578-4582, 4587.

IRRIGATION:

Co-operative methods of distribution and control, should be introduced (164).
Payment, should be by water and not by area (164), 4612-4616.

MARKETING:

Co-operative control of markets, desirable 4598.

WELFARE:

Birth-control, need for (165), 4582-4586.
Cultivators, increase in number of, may be due to sub-division and to greater prosperity 4519, 4520.
Drift of rural population to towns 4589, 4593, 4594.
Economic surveys of villages, desirable (165).
————————————, better conducted by non-Government agency (165).
Housing in rural areas, need for improved (165).
Non-official agencies and rural reconstruction 4643-4648.
Political "country party", need for in India (164), 4546.
Standard of living of cultivators 4515-4521, 4627-4631.
Water supply, importance of pure (165).

SALIMATH, Mr. S. S., B.Ag., Deputy Director of Agriculture, S. D., Dharwar, Bombay Presidency 6598-6797 (370-380).

AGRICULTURAL INDEBTEDNESS:

Absentee landlordship, is increasing and must be discouraged (373, 380), 6725-6727.
Causes of indebtedness (failure of monsoon, high rentals, over-expenditure, litigation) (373).
Cultivators, should not be allowed to contract debts of more than one-fifth the value of their land, except for land improvement (373).
Poverty of agriculturists, causes of 380), 6787-6791.
Rental values, need for reduction of (373), 6792-6794.
Right of sale, its limitation not important (373).
Usurious Loans Act, its application may help cultivators to some extent (373).

AGRICULTURAL INDUSTRIES:

Caste prejudices to subsidiary occupations (377).
Co-operative societies of producers of raw materials, may attract industries to rural areas (377).
Cultivators, can make their own cloth (377), 6649-6658.
— — — —, number of days worked by, in different districts (377), 6616-6620.
Field Embankments, should be constructed by cultivators in spare time with help of taccavi loans (377).
Government, should give technical advice regarding rural industries (377).
————— —, and long-term loans to co-operative societies formed to establish them (377).
— — — —, should maintain rural weaving classes (377).
Propaganda, necessary to induce villagers to employ spare time in improving health conditions of their environment (378).
Rural industries, need for study of (377).

SALIMATH, Mr. S. S.—*contd.*

AGRICULTURAL INDUSTRIES :—*contd.*

Spinning and weaving, cloth produced and marketing arrangements, 6650-6657.
———————————————————————————, scope for improvement in 6658.
———————————————————, Government classes for (377).
———————————————————, importance of (377).
———————————————————, no caste prejudice against 6647-6649.
Suggestions for subsidiary industries (377).

AGRICULTURAL LABOUR :

Land in Dharwar and Belgaum districts, has gone out of cultivation owing to attacks by wild pigs, and malaria (374).
Propaganda to induce labourers to settle in cultivable uncultivated tracts conditions for success of (378).
Shortage of labour, seasonal (378).

ANIMAL HUSBANDRY :

Cattle-breeding societies (379).
Prickly pear, not ordinarily used as fodder 6777, 6778.

ATTRACTING CAPITAL :

Absentee landlordism, discourages land improvement (380).
———————————————————, is increasing and must be discouraged (373, 380), 6725-6727.
Agricultural bias in general education, necessary to interest intelligentsia in agriculture (380).
Annual rental system, discourages land improvement (380).
Men of capital and enterprise, no longer interested in agriculture (380), 6740-6745.

CO-OPERATION :

Agricultural requisite societies (377).
Cattle-breeding societies (379).
Co-operative employment of agricultural machinery (379).
Co-operative societies, and propaganda (372).
———————————————————, for establishment of rural industries (377).
———————————————————, of producers of raw materials, may attract industries to rural areas (377).
Cotton sale societies (378).
Credit societies, need for supervision of expenditure of loans by (378).
Fencing societies, difficulties in way of (379), 6622-6624, 6634-6636.
———————————————————, need for compulsion of obstinate minorities (378), 6625-6627.
———————————————————, schemes executed by (378).
———————————————————, scope for (378).
Irrigation societies (374).
Taluka Development Associations, demonstration of manures by (375).
———————————————————, might be responsible for agricultural bias schools 6659, 6660.
———————————————————, organisation and work of (371, 372), 6666-6668.
———————————————————, should keep implements for sale and hire, and give demonstrations (377).
———————————————————, value of propaganda by (371, 372).
Village co-operation for propaganda purposes (372).

CROPS AND CROP PROTECTION :

Cotton, extra profit from improved (376), 6747-6749.
———, Kumta used in heavier soil and Dharwar-American in lighter 6784-6786.
———, schemes for increasing use of improved (376).
———, seed, arrangements for distribution of selected (376).
Fencing, co-operative effort for (378, 379), 6625-6627.
———, difficulties in way of (379), 6622-6624, 6634-6636.

SALIMATH, Mr. S. S.—*contd.*

CROPS AND CROP PROTECTION—*contd.*

Fencing, effect of tariff on imported 6690-6692.
——— ——, value of as protection against wild pigs (374, 375), 6605, 6606, 6722-6724.
Food crops, improvement of (376).
Groundnut (376).
Hunting parties to keep down wild animals, under consideration (376).
Juar, yield of rabi, in Dharwar district 6752-6758.
Principal crops in Southern Division (376).
Wild pigs, damage done by (374), 6714-6721.
———, fencing against (*q. v.*).
———, necessity for guarding crops against, injuriously affects health of cultivators (374), 6603, 6604.

CULTIVATION :

Harrowing 6773-6776.
Ploughing, not done at all in dry tracts in Bijapur and Dharwar districts 6773.
Rotation of crops, suggestions for improvement of (376, 377), 6795-6797.

DEMONSTRATION AND PROPAGANDA :

Advertising of demonstrations, importance of adequate (372).
Continuity of demonstration and propaganda, essential (372).
Co-operation and propaganda (372).
Cultivators, methods of influencing (371), 6683-6686.
Demonstrations, of manures (375).
———, or cultivators' own fields, showing all improvements introduced by Agricultural Department, value of (371).
———, simple farm accounts of, should be kept (371).
Needs of different localities, necessity for studying (372).
Propaganda, by Taluka Development Associations, value of (371, 372).
———, need for intensive (371).
——— ——, sufficient, cannot be carried out by Agricultural Department (371).
——— ——, to induce labourers to settle in cultivable uncultivated tracts (378).
———, to induce villagers to undertake sanitary schemes (378).
Staff of Agricultural Department in Dharwar district 6762-6765.
Village co-operation for propaganda purposes (372).

EDUCATION :

Agricultural bias in education, necessary to interest intelligentsia in agriculture (380), 6740-6745.
———, should be introduced from fifth standard (379).
Agricultural bias schools, attendance at, good (370).
———, attitude of District Local Boards towards (370), 6600, 6601, 6633.
———, might be under Taluka Development Associations rather than District Boards 6659, 6660.
———, should be given preference in distribution of Government grants (371).
———, training of teachers for, at present inadequate (370).
———, should be conducted at separate vernacular agricultural training college (370), 6681, 6682.
Agriculture, little interest taken in, by educated people (379).
———, should be compulsory subject in middle and high schools (379).
———, and rural economics, should be optional subjects in Arts Colleges (379).
Child labour, demand for, an obstacle to primary education (380).
Compulsory primary education with agricultural bias, need for (380).
District Local Boards, their attitude towards agricultural bias schools (370), 6600, 6601, 6633.
Loni type schools, one for each district sufficient at present (370).
———, pupils at, given facilities for further training on Government farms (371).

SALIMATH, Mr. S. S.—*contd.*

EDUCATION—*contd.*

Loni type schools, at Devi-hosur, 60 per cent. of pupils at, go back to their farms (370).
———————————, has trained 150 boys in last 12 years (370).
Nature study (370).
Primary Schools in Southern Division, handicapped by demand for child labour (380).
———————————, often teach only up to 3rd standard (380).
———————————, pupils passing through 4th standard, have often to go to other villages (380).
School plots (370), 6759-6761.
Teachers, in agricultural bias schools (*q.v*).
————, in rural areas, should be drawn from agricultural classes (370).
Vernacular agricultural training college (370), 6681, 6682.
Vernacular school books on agriculture, provision of 6628-6632.

FERTILISERS :

Adulteration of manures, prevention of (375).
Ammonium sulphate as top-dressing for sugarcane (375), 6779-6781.
Bonemeal as top-dressing for paddy (375), 6782.
Cowdung, its replacement as fuel difficult (375, 376).
Dealers in fertilisers, should be licensed and subject to inspection (375).
Demonstrations of manures, by Agricultural Department and Taluka Development Associations (375).
———————————, manufacturers should give free samples for (375).
Districts in which various manures are used (375).
Farmyard manure, need for better preservation of (375).
Green-manuring in irrigated tracts (375).
Prickly pear, its use as manure (375), 6607-6615, 6661-6665, 6669-6671.
Sunn-hemp, used in black soil with murum soil below 6783.

FINANCE :

Finance for ordinary agricultural operations, not much needed in dry tracts (372).
Loans for more than one-fifth value of cultivator's land, should only be allowed for land improvement and should be long-term (373).
Long-term credit, for establishment of rural industries (377).
————————, necessary for construction of field embankments (374).
————————, should be provided by taccavi loans (373).
Short-term credit, should be very limited, to prevent misuse (372).
Taccavi loans, for extension of irrigation (374).
————————, for field embankments (374, 377), 6640.

HOLDINGS :

Economic holding (employing one pair of bullocks), sizes of, in Dharwar district 6768-6776.

IMPLEMENTS :

Co-operative agricultural requisite societies, may be started when demand for implements increases (377).
Co-operative employment of agricultural machinery (379).
Harvesting and threshing machines, demand for (378.)
Hiring of implements, facilities for, necessary (377).
Implement manufacturers, should work through Taluka Development Associations (377).
Taluka Development Associations, should keep implements for sale and rehi (377).
———————————, and give demonstrations (377).

IRRIGATION :

Canal irrigation, scope for extension of, by bunding rivers and nullas (374).
Co-operative irrigation societies (374).
Government aid for minor irrigation schemes (374).
Green-manuring in irrigated tracts (375).

SALIMATH, Mr. S. S.—*concld.*

IRRIGATION—*contd.*

Non-perennial canals, scope for (374).
Silt from tanks, valuable for land improvement, but cost of carting prohibitive 6731-6733.
Taccavi loans for extension of irrigation (374).
Tanks, financing of repairs to 6735-6738.
———, repair and improvement of (374), 6728-6739.
———, scope for extension of irrigation by (374), 6687-6689.
Well irrigation, scope for (374).

SOILS :

Embankments on contour lines, cost of 6639.
———————————, financing of 6640.
———————————, 120 schemes for, carried out by Agricultural Department in 1926 6638.
———————————, long-term taccavi loans for (374), 6640.
———————————, may be constructed by cultivators in their spare time, with help of taccavi loans (377).
———————————, need for expert advice for (374).
———————————, only those costing less than Rs. 5,000 dealt with by Agricultural Department 6637.
———————————, prevent soil erosion (374).
———————————scope for 6643, 6644.
———————————, special officer to prepare schemes for, in Southern Division, value of (374).
Productivity of land, is increasing through adoption of improved methods 6697-6700.
Soil erosion, prevention of, by embankments on contour lines (374).

TARIFFS :

Imports duty on imported fencing, should be abolished 6690-6692.

WELFARE :

Deputy Directors of Agriculture, must take an interest in rural economics and village welfare 6704-6710.
Drinking water in villages, importance of pure (380).
Economic surveys of typical villages, should be conducted by Government (380), 6711-6713.
Malaria and depopulation (374).
Standard of living of cultivators 6695-6703.
Village schools, should be centres of enlightenment (380).
Village Panchayats 6869-6873.
Village sanitary committees 6849-6855, 6871-6873.
Village sanitation (391).
Vital statistics (391).
Water-supply, importance of pure (392), 6805-6823, 6825-6828.
————————, parasitic diseases caused by impure 6824.

SEED—*see under* **CROPS.**

SOILS.

Alkali land, reclamation of (*Mann*) 3152-3155, (*Inglis*) (231, 232), 5373-5375, 5432-5438.
Bunding (*Inglis*) 5551.
Conservation of moisture in soil, helped by forests (*Edie*) (146).
Decline in fertility of soil, alleged, due to fact that in times past only better lands were cultivated *Knight* 295, 5864,5865.
Drainage schemes (*Inglis*) (232), 5312.
Embankments, as at present constructed capable of great improvement (*Lowsley*) (358).
————————, cost of (*Salimath*) 6639.
————————, construction of, by cultivators (*Naik*) (137), (*Lowsley*) 6433-6435, (*Salimath*) (377).
———————————, usually at field boundaries, even at sacrifice of efficiency (*Lowsley*) 6436.

SOILS—*contd.*

Embankments, financing of (*Salimath*) 6640.
———— ——, for preventing soil erosion (*Lowsley*) (358), (*Salimath*) (374).
— — ————, only those costing less than Rs. 5,000 dealt with by Agricultural Department (*Salimath*) 6637.
—— ——— —, schemes for, 120 carried out by Agricultural Department in 1926 (*Salimath*) 6638.
——— ———— ——, expert advice for (*Salimath*) (374).
——— ——, scope for (*Salimath*) 6643, 6644.
—— ——— —, special officer to prepare schemes for, in Southern Division, value of (*Salimath*) (374).
——— ———— , taccavi for (*Salimath*) (374, 377), 6640.
Gypsum, use of, in case of flooding (*Inglis*) (231, 232), 5408-5410.
Heavy soils, show tendency to deteriorate under constant irrigation (*Inglis*) (235).
Land development officer, appointment of, in Deccan (*Lowsley*) (356).
Land development, credit for (*Naik*) (136, 137).
———— ————, should be carried out by Government (*Maxwell*) (337), 6273, 6395, 6396.
—— ——— ——, but cannot be at present owing to provisions of Land Revenue Code (*Maxwell*) 6228.
——— ——— ——, taccavi for (*Maxwell*) (337), 6274-6276, (*Lowsley*) (357).
Light soils, effect of green manure on their texture (*Inglis*) (235).
— ———, show marked improvement when carefully worked and irrigated (*Inglis*) (235).
Nitrogen in soil (*Mann*) 3080-3090.
Over-manuring, uselessness of (*Inglis*) (231, 232).
Over-watering (*Inglis*) (231, 232), 5554, 5555.
Productivity of land, is increasing through adoption of improved methods (*Salimath*) 6697-6700.
Reclamation of riparian lands, importance of (*Mann*) 3479-3485.
Soil analysis teaching of (*Patel*) 8213-8222.
Soil erosion, causes of: deterioration of forests (*Edie*) (146), (*Maxwell*) (339, 340).
——— ——— ———kumri cultivation (*Edie*) (146), 4287, 4288 unrestricted grazing (*Burns*) (103).
— ———, prevention of, by: afforestation (*Edie*) (145), 4230-4237.
—— ——— ——— ———embankments on contour lines (*Salimath*) (374).
——— ——— ———planting of shrubs (*Edie*) 4411, 4412 rational system of grazing (*Burns*) (103).
———— ————sand binding (*Burns*) 3930-3934.
———— ——— ————terracing (*Lowsley*) (358).
Terracing (*Lowsley*) (358).
Soil survey, already exists as regards depth (*Mann*) 2870, 2871.
— ————, desirable in Sind (*Mann*) 2868.
————, is expensive (*Mann*) 2869.
Waterlogging (*Mann*) 3152, 3154, (*Inglis*) (231, 232), 5313-5316, 5554.

STATISTICS.

Area under crops, statistics of, fairly accurate (*Knight*) (296).
Censu statistics of agricultural population, need for further sub-heads in (*Collins*) (201)
Crops and rents, statistical information regarding (*Collins*) (201).
Estimates of yield, difficulty of preparing (*Knight*) (296). of principal crops (*Collins*) (201).
Statistician, value of a, in Agricultural Department (*Burns*) (104), 3846. 3847.
Statistics, importance of interpretation as well as collection of (*Burns*) (104).
— ——, of agricultural population, often show as labourers those who are really landowners (*Collins*) 4945.

SULE, Mr. R. G., *see under* **INGLIS, Mr. C. C.**

TALUKA DEVELOPMENT ASSOCIATIONS, *see under* **CO-OPERATION.**

TARIFFS.

Cess on exported agricultural produce (*Mann*) 3025-3027, 3053, 3054.
Financing of education by means of export tax (*Patel*) (529), 8067-8069, 8242-8259, 8421, 8442-8445.
Import duty, on fencing, restricts use (*Maxwell*) 6289, 6290.
———— ———— ———— , should be abolished (*Salimath*) 6690-6692.

TARIFFS—*contd.*

Import duty, on implements, effect of (*Jenkins*) 7729-7731.
———————————, lack of, affects Indian manufacturers (*Mann*) 2875-28.

VETERINARY.

Board of Agriculture, necessity for veterinary representation on (*Farbrother*) 4026.
Cattle markets and fairs, control of disease at (*Farbrother*) 4114-4116.
Central legislation for control of cattle diseases, need for (*Farbrother*) (122, 123), 40[illegible] 4035.
Conferences of Veterinary officers, might take place at same time as meetings of of Agriculture (*Farbrother*) 4021, 4022.
———————————, should be held more frequently (*Farbrother*) (1
Contagious diseases, attack poor animals first, so that cultivators are justified in k[illegible] ing better animals (*Bruen*) 7181-7183.
———————, disposal of carcases (*Farbrother*) 4111-4113.
———————, effect of (*Bruen*) (406), 6894.
———————, importance of hereditary and congenital characteristics in cor ferring immunity from (*Bruen*) 6899.
———————, measures necessary to control (*Farbrother*) (122, 123).
———————, need for All-India Diseases of Animals Act to control (*Farbrother* (122, 123), 4033-4035, 4038.
———————, need for legislation to prevent spread of (*Bruen*) 6894.
———————, need for mobile corps to combat (*Farbrother*) 4041-4047, 4133, 4134.
———————, present arrangements for reporting (*Farbrother*) 4109, 4110.
———————, prevalence of (*Farbrother*) (122, 123).
———————, reporting and control of, need for compulsion (*Farbrother*) (122, 123), 4135-4143, 4146-4148, 4165-4169..
Co-operation between Provinces to check infectious disease: lack of (*Bruen*) 6895, 6896.
———————, should be organised by Government of India (*Mann*) (8).
Co-ordination of provincial veterinary work (*Farbrother*) (120).
Financing of veterinary research, by committee appointed by the Government of India (*Farbrother*) (118), 4017, 4018.
Foot and mouth disease (*Bruen*) 7184.
Glanders and Farcy Act, its effect (*Farbrother*) 4039, 4040.
Government of India, might control financing of veterinary research (*Farbrother*) (118)
———————, should have a veterinary department of its own to co-ordina control of epidemics (*Farbrother*) (119, 120).
Indian States and the control of contagious disease (*Farbrother*) 4033-4037.
———————, provision of veterinary assistance to (*Farbrother*) 4073-4076.
Inoculation, compulsory (*Farbrother*) (124), 4108.
———————, fee for, limits use (*Farbrother*) (122), 4107.
———————, should be more generally used (*Bruen*) (406).
———————, superstition of cultivators a bar to employment of (*Farbrother*) (122)
———————, but may be overcome by demonstration of success of (*Farbrother*) (122)
———————, *see also under* Rinderpest *and* Serum.
Isolation of infected villages, legislation for, essential (*Bruen*) (406).
Itinerating veterinary dispensaries (*Farbrother*) (121).
Legislation to control disease, *see under* Central legislation, Contagious diseases *and* Isolation.
Local Boards, should control veterinary dispensaries in their areas (*Farbrother*) (119, 121), 4098-4102.
———————, should appoint their own veterinary staff distinct from that of Civil Veterinary Department (*Farbrother*) 4063-4066.
———————, would require provincial advice and support in veterinary matters (*Farbrother*) 4099, 4100.
Mobile corps for combating epidemics, need for (*Farbrother*) 4041-4047.
Muktesar, Director of, should be Veterinary Adviser to the Government of India (*Farbrother*) 4013.
———————, fulfils its purpose satisfactorily (*Farbrother*) 4011, 4012.
———————, necessity for whole-time Director at (*Farbrother*) (118).
———————, too isolated to undertake local problems (*Farbrother*) (118).
Parasitic diseases, prevalence of (*Farbrother*) (122).
Private veterinary practitioners, little opening for at present (*Farbrother*) 4015, 4158 4163.

VETERINARY—*contd.*

Provincial veterinary research, clinical material for (*Farbrother*) 4069-4072.
———————, could be undertaken at Veterinary College (*Farbrother*) (118).
———————, must be divorced from teaching work (*Farbrother*) (118).
———————, necessity for (*Farbrother*) (118).
Rinderpest, periodicity of outbreaks and causes of same (*Farbrother*) 4105, 4106.
————, serum-alone inoculation for, necessity for continuous protection (*Farbrother*) 4062.
———————, only resorted to when outbreaks occur (*Farbrother*) 4061.
———————, short period of immunity an objection to (*Farbrother*) (122).
———————, success of reinoculation (*Farbrother*) (122).
———————, use of (*Farbrother*) 4059, 4060.
————, simultaneous inoculation for, dangerous at present (*Bruen*) 3002-3005.
———————, disadvantageous for small owners owing to animals having to lie up (*Farbrother*) 4054, 4055.
———————, use of (*Farbrother*) 4056-4058.
————, *see* also Inoculation *and* Serum.
Serum, can be obtained from Muktesar in sufficient quantities (*Farbrother*) (121), 4103
———, influence of cost of, on amount used (*Farbrother*) (122), 4107.
———, provincial manufacture of (*Farbrother*) 4149, 4151.
————, storage of (*Farbrother*) (121), 4103, 4104.
———, supply of, sometimes subject to delay (*Farbrother*) (121).
Surra, treatment of (*Farbrother*) 4172.
Veterinary Adviser to Government of India, need for appointment of (*Farbrother*) (120).
———————, should act as Director of Muktesar Institute (*Farbrother*) 4013.
Veterinary and Agricultural Departments, should be under one Minister (*Mann*) 2881, 2889-2891, (*Bruen*) 6886-6888.
Veterinary college, Bombay, should be in closer touch with agricultural college (*Mann*) 2889.
———————, students joining, have poor knowledge of English (*Farbrother*) 4123, 4124.
———————, percentage of passes at, high (*Farbrother*) 4170, 4171.
———————, room for improvement in course of (*Farbrother*) 4125-4128.
Veterinary Department, Bombay, dual control of staff of, unsatisfactory (*Farbrother*) (119, 120).
———————, duties of (*Farbrother*) (119, 120).
———————, is not under same Minister as Agricultural Department (*Mann*) 2881.
———————, deals only with diseases of animals and horse-breeding (*Mann*) 2882.
———————, does little research (*Mann*) 2885.
———————, need not control cattle-breeding (*Farbrother*) 4050-4053.
———————, should be in closer touch with Augricultral Department (*Mann*) 2883, 2884.
———————, staff of, allowed to take private practice (*Farbrother*) 4162, 4163, 4186-4192.
———————, insufficient (*Farbrother*) (120).
———————, present numbers of (*Farbrother*) 4084-4087.
———————, qualifications of (*Farbrother*) 4015, 4016.
———————, rate of recruitment of (*Farbrother*) 4015.
Veterinary Departments, detection, investigation and control of disease their most important work (*Farbrother*) (119), 4019, 4020.
———————, need not control cattle-breeding (*Farbrother*) 4050,4053.
———————, need not be under Director of Agriculture (*Mann*) 2081. 2889-2891.
———————, should be under Director of Agriculture (*Bruen*) 6887, 6889. (*Desai*) (577).
———————, should not be under Director of Agriculture (*Farbrother*) (121) 4048, 4049, 4091, 4092.
———————, staff of, should be separated from staff in charge of dispensaries (*Farbrother*) 4093-4097, 4129-4134.

VETERINARY—*concld.*

Veterinary Dispensaries, are located at taluka headquarters (*Farbrother*) 4174, 4181.
———————, itinerating (*Farbrother*) (121).
———————, need for further (*Farbrother*) 4067, 4173.
———————, should be controlled by Local Boards, or alternatively taken over by Government (*Farbrother*) (119, 120, 121), 4068, 4069.
Veterinary research, should be conducted in Provinces as well as at Muktesar (*Mann*) 3614, 3615, (*Farbrother*) (118).
———————, financing of (*Farbrother*) (118).
———————, *see also* Provincial Veterinary research.
Veterinary work, organisation of, in Bombay (*Farbrother*) (120), 4079, 4080.
———————, should be under one head (*Farbrother*) 4079-4082.
———————, in Great Britain (*Farbrother*) 4157.

WELFARE.*

Agricultural problem, largely phychological (*Mann*) 3165.
Amenities in villages, need for increasing to keep peasantry on the land (*Burns*) (104), 3878.
Birth control (*Rothfield*) (165), 4582, 4586, (*Knight*) (291, 292).
Castes in West Khandesh (*Knight*) 6026, 6027.
Chavdis in villages, improvement of (*Naik*) (141), 4895-4802.
Collectors, should take personal interest in rural reconstruction (*Naik*) 4752, 4753.
Co-operative movement, and rural reconstruction (*Mann*) 3557, 3591.
———————, social value of (*Collins*) 5011, 5012, 5032.
Deputy Directors of Agriculture, must take an interest in rural economics and village welfare (*Salimath*) 6704-6710.
District Boards, can help in rural reconstruction (*Mann*) 3388.
———————, apathy of villagers with regard to (*Knight*) 5845-5848, 5911, 5912.
Drift of rural population to towns (*Rothfield*) 4589, 4593, 4594.
Drinking water in villages, importance of pure (*Mann*) 2946, (*Rothfield*) (165), (*Knight*) (296), (*Salimath*) (380, 392), 6805-6828, (*Lowsley*) (358, 359), 6537-6540.
Economic surveys of villages, as far as possible should be carried out without expense to Government (*Collins*) 5111.
———————, desirable (*Rothfield*) (165), (*Collins*) 5109, 5110, 5113, (*Patil*) (514).
———————, difficult but important (*Mann*) 2931.
———————, generalising from, dangerous (*Mann*) 2932, 2933.
———————, should be conducted by Government (*Salimath*) (380), 6711-6713.
———————, should be conducted by non-Government agency (*Mann*) 3592-3594, (*Rothfield*) (165).
———————, year required for one village (*Mann*) 2931.
———————, *see also under* Investigation.
Factions in villages, a hinderance to co-operative movement (*Jenkins*) (464, 465).
———————, the bane of village life (*Naik*) (141).
Games in villages (*Desai*) (578), 8601.
Housing conditions in rural areas (*Mann*) 3694-3700, (*Naik*) (141), (*Rothfield*) (165).
Investigation of ten typical cotton-growing villages in Khandesh (*Jenkins*) (448, 449).
Local development associations (*Mann*) (15, 16), 3378.
Luxuries, should be discouraged (*Patil*) (511), 7880-7884, 7935-7937.
Malaria, and depopulation (*Salimath*) (374).
———, vitally affects welfare of agriculturists (*Knight*) (296).
Non-official agencies and rural reconstruction (*Rothfield*) 4643-4648.
Non-official social service organisations in West Khandesh (*Knight*) 5925-5929.
Panchayets, *see* Village panchayets.
Parliament, should pass statute for development of agriculture in India (*Naik*) (142), 4219-4221, 4825-4827.
Political 'country party', need for in India (*Rothfield*) (164), 4546.
Rural hygiene, better than is sometimes imagined (*Mann*) 2945.
———————, promotion of, by Taluka Development Association (*Mann*) 2946.
———————, should be taught in all schools (*Patel*) (539).
Rural improvements by forced labour, undesirable (*Knight*) 6042-6046.
Rural leaders, Importance of (*Mann*) 3378.
———————, training of (*Mann*) 3381-3383.

* For Medical and hygiene questions, *see also* **MELHUISH, Lt.-Col. H. M. H.**

WELFARE—*contd.*

Rural thrift movement (*Collins*) 5081-5083.
Servants of Rural India Society, suggestion for (*Mann*) (15, 16), 3384, 3385, 3549, 3556-3559.
Social service organisations for rural work, need for encouraging (*Patel*) (539), 8343-8350, 8416-8420.
———————————————, State help for (*Patel*) 8344.
Standard of living of cultivators (*Mann*) 2938, 2940, 3171, 3172, 3176, 3604-3606, (*Rothfield*) 4515-4521, 4627-4631, (*Salimuth*) 6695-6703, (*Jenkins*) (464), (*Patil*) (511), 7880-7884, (*Desai*) 8999-9012.
Taluka Development Associations, *see under* CO-OPERATION.
Village panchayets (*Knight*) 5966-5978, (*Salimuth*) 6869-6873, (*Desai*) (578), 8602-8607, 8817-8839, 8870-8878, 8917-8925.
Village problems, must be dealt with as a whole (*Mann*) (15), 2947, 3591.
Village sanitary committees (*Salimath*) 6849-6855, 6871-6873.
Village sanitation (*Salimath*) (391).
Village schools, should be centres of enlightenment (*Salimath*) (380).
Villages, should be organised on co-operative lines (*Mann*) 3431.
Water supply, *see* Drinking water.
Welfare work in villages, Government aid for (*Mann*) (16), 2930.
———————————————, need for missionary effort (*Mann*) (15, 16), 3217-3222.
———————————————, suggested directions for (*Mann*) (15, 16).

GLOSSARY

ɾ Adatya or Aratya . A broker.

ɕi .. .. A small millet (*Pennisetum typhoideum*).
ıdhara .. .. Dam.
ʌvto (Ragi) .. An inferior kind of millet.
Berseem .. .. Egyptian clover (*Tripolium alexandrinum*).
ınd .. .. Dam.

ɯmars .. .. Workers in leather. One of the depressed classes.
ɒrasi .. .. Peon (a messenger in the employ of Government).
ɔdis .. .. Places where village officers hold their office.
ola .. An oven.
ɔha (*see* Kutcha).

ɜal .. .. A broker.
ɯdopat .. .. An ancient Hindu provision by which the total interest on a loan may not exceed the amount of the principal.
aralas .. .. A backward class of cultivators in Gujarat.
oti .. .. Loin cloth worn by men.
kara .. .. A unit of weight for cotton, usually about 12 maunds or 336 lbs.

uthan .. .. Village site.
wrakshak .. A refuge home for cows (lit : a cowkeeper).
wshala .. .. A refuge home for cows (lit : a cowshed).
ɯl .. .. Unrefined Indian sugar.
ɯntha .. .. 1/40th of one acre.

ʌmals .. .. Porters.

ɜmdars .. .. Holders of beneficiary grants of land.

amabandi .. An annual account of lands held in a village and the amount of land revenue due on them.
uar .. .. The large millet (*Sorghum vulgare*).

Kacheri .. .. The office of a Government official.
Kadbi .. .. Dried straw of jowar (millet).
Kamgar .. .. Petty Officer.
Kapas .. .. Cotton with cotton seed still adhering.
Kharif .. .. Summer-sown (crops).
Kilbanavi .. .. A way of preserving fodder by plastering the stack with mud.
Koli .. .. An aboriginal tribe found in Gujarat and in the Deccan.
Kumri .. .. Temporary cultivation in jungle clearings.
Kunbi .. .. A cultivator.
Kutcha .. .. Literally "not solid." Used of country roads, roughly constructed buildings, etc. (Opposite term is "pucca.")
Kutchra .. .. Refuse.

Mahars .. .. A depressed class.
Mamlatdar .. The Revenue head of a taluka.
Mote (Mhote, Moth) .. Water-bag.

Nilgai .. .. Blue buck (*Boselaphus tragocamelus*).
Nullah (Nallah) .. A water course

Palla	.. A measure of varying capacity.
Pancha	.. A loin cloth.
Panchayet	.. Literally a Committee of five. Used to describe an asso of any number of persons instituted for objects of an ad trative or judicial nature.
Patel (Patil)	.. Headman of a village.
Patidar	.. Holder of an ancestral share in village lands.
Patwari	.. Village accountant or registrar.
Pinjrapole	.. A refuge home for cows.
Rabari	.. A caste of cattle breeders.
Rabi	.. Winter-sown (crops).
Ragi	.. An inferior kind of millet (*Eleusine corocana*).
Salutri (Salutari)	.. A veterinary assistant.
Sari	.. A long piece of cloth worn by women as a shawl.
Sastras	.. The Hindu scriptures.
Senji	.. A forage trefoil (*Medicago parviflora*).
Seva Sadan	.. Literally " home of service. " A charitable organization.
Sirkar	.. Owner (used as a synonym for the Government).
Sowcar	.. A moneylender.
Taccavi	.. Advances made by Government to cultivators for agricult purposes.
Tal (Tahl)	.. Dam.
Taluka	.. A local revenue division of a district.
Tur	.. A variety of pulse (*Cajanus indicus*).
Vafa	.. Division of a field into squares for irrigation.
Zilladar	.. Term used in the Punjab for the Revenue Officer in cha of a group of villages. The term corresponds to a Ci Inspector, Bombay.

सत्यमेव जयते

BOMBAY : PRINTED AT THE GOVERNMENT CENTRAL PRESS