AGRICULTURE DEPARTMENT

GOVERNMENT MILK FACTORY MADRAS

EXPERT COMMITTEE'S REPORT

PRINTED BY THE SUPERINTENDENT
GOVERNMENT PRESS
MADRAS
1954

REPORT OF THE COMMITTEE APPOINTED BY THE GOVERNMENT OF MADRAS TO CONSIDER THE FUTURE OF THE GOVERNMENT MILK FACTORY AND OTHER QUESTIONS PERTAINING THERETO.

I. Preamble.

The Government of Madras in their G.O. Ms. No. 715, Food and Agriculture, dated the 12th May 1953, constituted a Committee to examine the working of the Government Milk Factory in Madras and to report on the following matters :—

(*a*) whether the Government should continue to run the factory ;

(*b*) whether the machinery at the factory can be used for any other useful purpose in case the Government decide not to run the factory ; and

(*c*) whether the milk being manufactured in the factory may be constituted differently so as to be useful to the general public and serve a good purpose and if so whether the Committee has any recommendations to make about the distribution of the milk.

Government also wished that the Committee should examine the system of " toned milk " supply obtaining in Bombay and make its recommendations after such examination. The following persons were appointed to the Committee :—

(1) Dr. A. Lakshmanaswami Mudaliar, M.D., LL.D., D.SC., D.C.L., M.L.C., Vice-Chancellor, University of Madras (*Chairman*).

(2) Mrs. M. N. Clubwala Jadhav, M.L.C.

(3) Sri S. Anantaramakrishnan.

(4) Dr. D. Subba Rao, Assistant Director of Public Health (*Convener*).

At a later stage, the Government co-opted Major T. Murari to the Committee.

In a subsequent letter, dated the 10th July 1953, Government wished the Committee's views and recommendations on the proposal for banning the use of fresh milk by hotels and compelling them to use reconstituted milk instead (skimmed milk powder).

II. Work of the Committee.

Soon after the Committee was constituted, the Chairman had to leave for Europe in his capacity as Deputy Leader of the Indian Delegation to the World Health Organization and consequently requested that the work of the Committee may be taken on hand soon after his return. The Government being agreeable to the proposal, the first meeting of the Committee was held on the 27th May 1953 at the University Buildings, when a preliminary discussion took place as to the programme of work that should be outlined

to consider the whole question. The Chairman had the benefit of visiting the Central Dairy at Aarey Milk Colony, Bombay, through the courtesy of the Government of Bombay, and was shown the various steps that were taken for the collection and distribution of milk and for the better care of cattle. The Committee visited the Government Milk Factory and the factory of the Ayanavaram Co-operative Milk Supply Union. Thirteen meetings were held, and the Committee had the benefit of interviewing a number of persons concerned with or interested in the supply of milk to the City. The Committee had also discussions with the Commissioner and Health Officer of the Corporation of Madras, the Registrar and the Joint Registrar of Co-operative Societies, the Dairy Development Officer, Madras, the President and representatives of the Hotel Association, among others. A sub-committee was constituted which submitted a report on the steps that may be taken towards the formation of milk colonies at the outskirts and around the City of Madras with a view ultimately to evacuate the cattle from the congested areas of the City to the milk colonies with the owners or their agents who should be provided with housing accommodation there. The Committee felt that an accurate report about the nutritive value of the reconstituted milk as produced by the Government Milk Factory by a biological assay including assay of vitamins should be available so as to enable the Committee to come to definite conclusions as to its nutritive value as compared with cow's milk and 'toned milk', etc. With the approval of the University of Madras, the head of the Department of Bio-chemistry in the University very kindly undertook this task and the Committee is deeply grateful to him for the successful analysis he has provided and for the authoritative conclusions drawn therefrom. A copy of his report is enclosed (vide Enclosure II).

III. Scope of the problem as affecting Cattle Wealth, the Economic Condition of the Milkmen Health and Sanitation of the City and the supply of Wholesome Milk to the City.

At an early stage of the discussion, the Committee felt that they could not possibly answer the specific issues raised in the Government order without taking a comprehensive view of the problem of milk supply to the City and the associated problems connected with the cattle wealth, the economic condition of the milkmen, the health and sanitation of the City, etc. It was felt also that any suggested scheme that may be ultimately approved by the Government should be useful as a model for other big cities in the State to be copied.

The need for increasing the cattle wealth of the country is very great and is also urgent. As far as the Committee can gather from the reports and discussions it had, it was obvious that there was a great deal of diminution in the cattle wealth of the country due to various factors, not the least of which were (*a*) the increase in the cost of maintenance of cattle; (*b*) the poor congested and very unwholesome surroundings under which the cattle particularly in big

cities have to be kept leading to greater incidence of preventable disease; (*c*) lack of proper green fodder and proper nutrition to the milch cattle; and (*d*) the comparative neglect of the proper care and feeding of the calves resulting in a large number of premature deaths among calves. Much of this is due to the economic condition of the milkmen which is gradually getting worse. In a report submitted by the Economic Adviser to the Government of Madras, the average monthly earning of a milkman for his family was estimated to be about Rs. 69, and as often happens with averages, probably the bulk of the milkmen get much less so that it is difficult for them to feed the cattle properly and to maintain their family. This has led to the sale of dry cows and buffaloes due to the inability of the milkmen to maintain them during the "Dry period" and the lack of proper opportunities and suitable places where such milch cattle in the dry season may be sent for salvage. It is therefore not surprising that in view of this low level of economy, the tendency on the part of the milkman to adulterate the milk before supplying it to the consumers is fairly widely prevalent and what is more unfortunate is that in this adulteration he does not hesitate to use whatever fluid comes handy for purposes of adulteration.

So far as such big cities like Madras are concerned, the Health Officer of the Corporation stated that there were several unhealthy cattle sheds which were overcrowded in congested localities where sanitation could not be effectively enforced and although in the Public Health Act, relevant provisions of the Madras City Municipal Act, there were provisions which could be applied, the actual implementation of the provisions for this purpose was found impossible of application in view of the many lacunae that exist. The result was that not only the health of the cattle reared under such insanitary environment deteriorated, but the health of the people living in the houses and in surrounding areas was injuriously affected on account of the dirty environment of these cattle sheds and the consequent prevalence of the fly menace and the contamination of water-supply and the inadequate and insanitary disposal of sewage from the cattle-sheds. From the point of view the promotion of the health of the citizens, the Health Officer of the Corporation was emphatic that one of the earliest steps that should be taken is to provide for legislation to compulsorily evacuate such overcrowded and congested cattle-yards, provided suitable accommodation can be found for them in places conveniently near the outskirts of the City.

The supply of wholesome milk is one of the essentials for the nutrition of the people more particularly children. It is well recognized in all civilized countries that children particularly below the age of 5 require for proper development a certain minimum quantity of milk irrespective of other articles of food that they may take; that it is also very desirable that the population in general

should have an opportunity of getting clean and fairly cheap milk supplied to the families with a view to improving and maintaining their health standards. If therefore the general tone of health of the public is to be improved and their resistance to disease raised and susceptibility to disease lessened, it is obvious that clean unadulterated milk of optimum quality in adequate quantity should be available to the whole population. We shall discuss in a later part of the report the present position with regard to the supply of milk in the City of Madras.

IV. Present Milk Supply and Methods of Distribution.

The Government Milk Factory is run on the basis of skim-milk powder being reconstituted into milk by the addition of water, vegetable fat and carotene or vitamin A in certain proportions, and this reconstituted milk is pasteurised, bottled and distributed to various consumers. The bulk of the milk is supplied to the hospitals and some of it is supplied to the public also. The machinery utilized for the milk production was the machinery bought some time ago and perhaps, with certain changes in the existing equipment and improvements in the system of constituting the milk and pasteurising the milk, so that it may be free from bacterial contamination may still be used. The distribution of the milk from the factory is through Messrs. Vernon & Co., who through Government lorries hired out to the firm, distribute the milk to various centres. These motor vans and lorries are of the ordinary variety with no special insulation facilities such as obtain in Bombay, necessary to prevent spoilage of milk in distribution.

The Co-operative Milk Supply Union at Ayanavaram distributes fresh milk. This milk is collected from a number of co-operative societies spread over a wide area, almost 30 to 35 miles from the City to north and south. At each one of these centres, there is a co-operative society which is responsible to see that the animals are milked in the presence of a member of the society and put into the cans supplied by the Milk Supply Union and sent to the Co-operative Union. The milk comes from about 130 co-operative feeder societies located in the rural areas but at no place can it be said that there is any large scale collective method of milking cattle much less any collective dairy farms or milk colonies run by the societies. A few sheds have been put up to enable the cattle to be brought there and milked in the shed, but there is no scheme for any sort of stalling of these cows in regular dairy farms or provision for grazing or exercising of these cattle. The Co-operative Society gives some loans through the milk producer societies to members to purchase cattle and sometimes for getting fodder and concentrates and these loans are given at a particular rate of interest and deductions are made from the supply of milk made by the constituent members. There is also provision for some of the dry cattle to be taken to two centres one near Chingleput and another on the Nellore road for salvage.

The Co-operative Milk Supply Union as such, does not own any pasture land for grazing cattle nor is there any system of milk colonies run by them providing temporary or permanent sheds for the cattle and the milkmen to live. Nor is there any dairy under their control. It was stated that in certain parts of the year, in winter, the Union is able to get more milk than it can sell. The milk sold is in milk cans, the minimum amount of milk in each of these cans, being about 10 measures. The general milk supply is through milk cans, from which milk is drawn through a tap arrangement so that the milk is given to individual customers by opening the tap and measuring the quantity required. In very few cases where the individual customers can make their arrangements for procuring a can or vessel, the vessels can be sent to the co-operative society and milk can be procured by them in their own containers. It is understood that about 100 customers in the City are supplied in this way.

The milk that is brought to the Union is mixed milk, milk of the buffaloes and cows, and it is pasteurised and put into cans sterilized on the premises and distributed.

The Union is also at present responsible for the supply of milk to hospitals. For this purpose cows are gathered from different owners, members of the co-operative society, taken to the hospital and milked in the shed in the hospital in the presence of the hospital staff. The milk left over after supplying the hospital needs, is brought back to the Co-operative Union and mixed with other milk brought in from the feeder societies and supplied to the public. So far as the Government hospitals are concerned, the Government Milk Factory and the Ayanavaram Co-operative Union are between them supplying the needs of the hospitals. The Government Factory supplies 500 Madras measures per day to certain coffee hotels and about 700–800 measures to Government hospitals daily: the co-operative society supplies 1,500 Madras measures to coffee hotels. The total quantity of milk produced by the Government Milk Factory is about 1,500 Madras measures per day. The supply of milk from the co-operative society is 1,500 measures to the hospitals and about 5,500 measures to the general public including the institutions and hotels.

After discussing with these two agencies, the Committee met a number of persons interested in and connected with the milk supply to the City and discussed various proposals with them and particularly with the Registrar of Co-operative Societies. As the Committee saw the problem, it felt that a wider measure of comprehension was required, and what may possibly be suggested for the City of Madras may likewise prove to be of some interest to any other similar big city. From this point of view the Committee feels certain fundamental considerations should be borne in mind :

(1) While it is not possible to state exactly the amount of milk consumed by the population of the City of Madras, if a healthy

state of nutrition is to be observed and a sufficient amount of milk is to be consumed, the average consumption of milk should be a minimum of 8 oz. per head per day. On this basis, by the population of about 15 lakhs for the City, the amount of milk that may be expected to be consumed if it were available and the purchasing power of the community is also sufficient would be on an average 750,000 lbs., in other words 190,000 Madras measures approximately.

(2) It has been estimated that the total number of milch cattle in the City may be put down according to the census enumeration of milch cattle by the staff of the A.R.P. in 1944 under the direction of a special officer at about 15,350 of which 11,944 yielded milk. The actual number of cows and buffaloes was as follows :-

Milk yielding animals—		
Cows	5,509	11,944
Buffaloes	6,435	
Dry animals—		
Cows	2,006	3,406
Buffaloes	1,400	

The percentage of dry animals to the total was 22. In a subsequent census taken by the Agricultural department in 1951, by which time the City limits had been extended, the number of animals in the City was put down at 21,000. The number of animals in the City is about 21,000 of which the milch cattle would be approximately 15,000. The Health Officer of the Corporation is of opinion that it may not be wrong if we estimate 16,000 as the number of milch cattle. This is based on two factors. The number of licensed cow-sheds is 1,500 and the number of unlicensed is about 60. With this is to be taken into account the number of cows kept by individuals either for sale of milk or for personal use, so that on the basis of this calculation, the number of milch cattle about 15 to 16 thousands is stated to be a fair estimate. According to this estimate therefore if the 16,000 milch cattle are taken into consideration the average milk yield (based on an average of 8 lbs. for cows and 4 lbs. for buffaloes) would be on an average of 6 lbs. per day per head of cattle or 96,000 lbs. or 24,000 Madras measures.

Besides this milk is got from different villages within a distance of 10 to 15 miles away, apart from the milk that is brought through the Co-operative Society. Generally this milk is got for hotels in vessels by cycle messengers or through other transport. Some of this milk comes by train also. It is not possible to estimate with any degree of accuracy the quantity of milk from this source.

Taking all these into consideration, it is still obvious that the milk supply available for the people of the Madras City is far from sufficient to meet the needs of the people. In consequence, to meet the demand, the milk is adulterated and supplied in large quantities and milk powder is also bought by several agencies, by hotels or

large institutions, and sometimes by families to make up the shortage of milk supply and supplement the existing supply. It is stated by the Superintendent, Government Milk Factory, that there are about 94 private licensees who import milk powder. In a note the Superintendent of the Government Milk Factory estimated that the average estimated sale of skim milk powder in Madras City per day is 150 cwts. sold through the 94 licensed private importers.

The position therefore in regard to milk supply of the City is one that requires urgent consideration and must be dealt with comprehensively. As already stated, the Committee felt that whatever may be the plan that may ultimately be placed before the Government, it should be a plan which must equally be applicable to all large cities where the need is as great as in Madras. The second consideration which weighed with the Committee was that as matters are at present, the number of milch cattle will rapidly decline unless the requisite conditions for ensuring the health of the cattle are enforced in an increasingly congested city like Madras. Thirdly with the milch cattle kept under such conditions, the owners are not able to look after them satisfactorily and feed them properly with the result that in some cases the cattle are not in a position to give the full yield of milk or milk of the best quality. Another great wastage is, in the number of calves that die within the age of one, referred to already.

V. Recommendations on the terms of reference.

The Committee now presents its views in regard to the particular references contained in G.O. No. 715, dated the 12th May 1953—

(*a*) *Whether the Government should continue to run the factory.*—We are of opinion that the factory should continue to be run, by the Government. We are, however, definitely of opinion that the factory should not be run on the lines on which it is run at present. The method of preparing reconstituted milk with vegetable fat and vitamins added is not a satisfactory one, as shown by biological assay of the nutritive value of the reconstituted milk and should therefore be discontinued. The reconstituted milk is inferior in nutritive value and vitamins revealed by the biological assays, to cow's milk and " toned milk " and hence the present method of manufacturing reconstituted milk and its pasteurization, cooling, bottling and distribution to the consumer public should be changed and improved. We feel that the factory should be utilized for the production of ' toned milk ', and for this purpose we suggest that buffaloe's milk should be made available to the factory by the Ayanavaram Milk Supply Union which is at present collecting buffaloe's milk from its milk producers feeder societies. Buffalo milk from sources other than Ayanavaram Milk Supply Union, may also be obtained by the Government Milk Factory. The buffalo milk will be toned in the factory with an addition of an equal quantity of water and proper proportion of skim milk powder to the

standard and quality of fresh cow's milk in total solids, S.N.F., and Fat. Such "toned milk" from the point of view of its nutritive value, fat content, etc., will be equivalent to fresh cow's milk as can be seen from the report of the University Head of the Biochemistry department already cited. The "toned milk" can be supplied to hospitals, institutions like food catering establishments. In hospitals toned milk can be given to patients above the age of 10 years and to those who are not suffering from any disorders of the alimentary tract, requiring special dietary regulation—such as cases of typhoid, dysentery and other disorders—for whom cow's milk is recommended. In hospitals which consume large quantities of milk, it should not be difficult to give different types of milk"—prescribing toned milk and cow's milk in the Diet sheets as needed for the patients. The preparation and sale of "Toned milk" will in addition to meeting the shortage of the present milk supply to some extent, will make milk available at cheap cost to the low income groups. In regard to maintaining the purity of the toned milk, we feel that certain defects noted in the machinery of the Government Milk Factory should be rectified. Some of the machinery is very old and may require renewal. The bottled milk is much better than the milk supplied in cans, and if large cans are to be utilised, better method of ensuring bacteriological purity by effective sterilization of the cans must be evolved. We feel also that the persons who are responsible for cleaning the cans and for storing the reconstituted milk have not understood the elementary principles underlying the supply of pure pasteurised milk. In this respect considerable attention must be paid by the officers in charge, to removing these defects. We also feel that there should be an adequately equipped laboratory on the premises for the day-to-day check up of the quality of toned milk proposed to be produced at the factory.

(b) *Whether the machinery at the factory can be used for any other useful purpose.*—Our reply to the first question covers this point. The machinery can be used for the preparation of "toned milk", and as a matter of fact it will serve a very useful purpose, also to supply bottled milk in the case of pure cow's milk that may be supplied if the present bottling capacity of the plant is augmented. The other alternative is to provide in the Milk Supply Union Factory at Ayanavaram, special facilities for bottling milk which now do not exist, so that the average middle class and the poorer middle class people can get bottled milk and be sure of its purity. The system of distribution of milk through not properly sealed cans and cans provided with taps has led to abuse and adulteration of milk in distribution both from Ayanavaram Milk Factory and the Government Milk Factory, in the past. In the case of the Government Milk Factory, an instance has come to the notice of the Committee of a small fish having been found in the milk can, reported from one of the hospitals. We have reason to believe that the tampering with the improperly

sealed cans can be done in the process of distribution. It is therefore suggested that no taps should be provided for cans but that the distribution should be in smaller properly sealed containers of different sizes and the rest of it in capped and sealed bottles. There is therefore need for improved methods of bottling and canning to prevent the possibility of tampering with and adulterating the milk by persons in charge of the distribution of milk either from the Ayanavaram centre or from the Government Milk factory.

(c) *Whether the milk being manufactured in the factory can be constituted differently so as to be useful to the general public—if so the Committee's recommendations with regard to manufacture and distribution of milk.*—At present the distribution of milk from the factory is done by Messrs. Vernon and Company. We have no doubt that the company takes as much care as possible in regard to this work, but it is necessary that the transport arrangements for distribution should be improved. The type of motor vans which are now used for such distribution is not in our opinion suitable. Collection and distribution of milk should be done through insulated vans, which would ensure freedom from spoilage during distribution. We feel that this is an aspect of the question which ought to be taken into consideration both by the Government Factory as well as by the Ayanavaram Co-operative Milk Supply Union. The initial cost will be more than covered by the saving in milk otherwise subject to spoilage that will result from the use of such insulated vans which will prevent spoilage of milk.

(d) *The next issue that was referred to the Committee was a proposal for banning the use of fresh milk by hotels, compelling them to use reconstituted milk (or skim milk powder) instead.*—It is understood that in Bombay this practice obtains and the milk commissioner is authorized to see and enforce that only milk powder is used by hotels. In this connection, the Committee interviewed the President of the Hotels Association, Madras, and other representatives of the Hotels Association and discussed with them fully the possibility of utilising different types of milk—reconstituted milk, milk powder, toned milk. It was represented to the Committee that the position in Madras City was very different from that of Bombay; that while for preparation of tea there will be no difficulty in using reconstituted milk or milk powder, so far as coffee is concerned, such milk will not be suitable as it is deficient in fat and cream which are necessary for making good coffee. Moreover a variety of milk products made available through the larger hotels, require milk with optimum milk fat content, and that would not be possible with skim milk powder or reconstituted milk. The consumption of tea in the City is reported to be negligible, over 80 to 85 per cent of milk purchased by the hotels is used for preparation of coffee and a small quantity estimated at about 10 to 15 per cent of the supply, for preparation of milk sweets, and a very small proportion only for Tea. Moreover for

the preparation of milk products, such as Gova Peda, Basanthi, Badam Ksheer, Milk punch, etc., they said it was not possible to use the skim milk powder. Skimmed milk powder can however be utilised for the preparation of curds and buttermilk.

The practice of hotels is to assess the quality of the milk that is supplied to them by the amount of Gova yielded by the milk, the best milk would yield about 12 palams per Madras Measure and the rest 11 and in no case would milk yielding less than 10 palams be accepted by them. As a rough and ready method of assessing the quality of milk, in so far as its total solids including fat content is concerned, this would serve as a rough and ready purpose, though adulteration of milk with skim milk powder will go undetected by this method. Under the circumstances stated, the Committee is not in a position to recommend that skim milk powder alone should be used by hotels and any sort of compulsion on coffee hotels to consume skim milk banning the supply of fresh milk should not be enforced. Reconstituted milk either will not serve the purpose.

VI. Other Recommendations.

The question of the supply of skim milk powder and the agency for it is one that deserves immediate consideration. The ideal would be a state of affairs when such imported milk powder will not be needed in our country. It is for this reason that the Committee strongly emphasises the need to increase the cattle wealth of the country which will mean that the money saved in the country will be used for better purposes. In the meantime, the whole of this milk powder supply sold in the market should be under Government control. It has been stated that the milk powder itself is adulterated and sold, and that it is used for adulterating milk. It may here be mentioned that if milk powder is not kept under conditions of controlled temperature in sealed cans, but in open cans, it tends to deteriorate rapidly and due to bacterial contamination may lead to disease. An example of such contamination in sealed tins was reported from Great Britain where an outbreak of gastro-enteritis occurred in connection with school-midday meal feeding schemes under the control of Government. The Committee wish to invite the attention of the Government to the report and the warning that was issued by the Ministry of Food in Britain in this connection. Milk powder under Government auspices should therefore be kept under proper storage in chambers free from dampness under controlled conditions to ensure its quality and freedom from bacteriological contamination. The skim milk powder can be easily reconstituted into liquid milk by the house-holder and such milk will be about a third of the cost of the reconstituted milk as now sold by Government Milk Factory where additional vegetable fat is added.

The Committee feels that the purchase and distribution of skim milk powder must be under the control of Government and under Government auspices and as it is reported that it is being extensively used for adulterating the milk supply in the City, it should be controlled in such a manner that milk powder is given only for definite purposes or can be used only for the preparation of toned milk. In Bombay the importation and sale of skim milk powder is controlled by Government through the Milk Commissioner, Bombay, and it is estimated that as a result of the skim milk powder being sold to various institutions with a small margin of 2½ annas profit per lb., the Bombay Government has been able to make about Rs. 30 lakhs a year by the sale of 10 tons of milk powder a day to all the establishments in Bombay. If the Madras Government were to take full control over the purchase and distribution of milk powder in the Madras City similarly, it is estimated that on the same rates at which the Bombay Government is selling milk powder to consumers, a net profit can be derived which may be ploughed back into dairy development and quality milk production and supply schemes. The minimum profit which may be derived from such a source for the City of Madras at the present level of consumption of skim milk powder daily in the City is estimated to be not less than Rs. 10 lakhs per annum. In view of this, it is a matter for consideration whether Government cannot take over the control of importation and sale of milk powder as has been done in Bombay. The income so derived may be used for dairy development in the State and for giving necessary grants and loans to milk producers to improve the breed of milch cattle and the cattle wealth of the country.

Having discussed and answered the several questions raised by the Government, the Committee now feel that they may place a scheme that has been discussed, for the consideration of the Government. Three issues have arisen in this connection :—

(1) How best to increase the amount of milk that may be made available to the City;

(2) How best to get the cattle provided with suitable habitations under healthy environment and securing suitable fodder, and care of the calves as well as of the dry cattle;

(3) How best we can help the professional milkman in improving his present low economic status and improve the economics of milk production.

It would appear therefore that the time is come when a large scale plan is necessary if the above objectives are to be achieved. The milk supply to the City is the most vital factor in ensuring freedom from outbreaks of certain types of diseases. No article of food is so easily contaminated, nor does it produce such complications and diseased states as milk whether given to children or to others. If a far greater incidence of disease is not prevalent

under the unsatisfactory conditions under which milk is produced and distributed, it is because of the habit of the people to boil milk before they consume it. It would seem therefore that some attempt should be made to see that the cattle in the city are so grouped together in milk colonies on the outskirts of the City so that they could be fed properly on scientific lines and cared for, and where arrangements are made for the milkmen to live and care for their cattle. This can only be done if the Corporation and the Co-operative Societies work in co-operation and provide the necessary facilities.

It is understood that some sewage farms are proposed by the Corporation where provision for growing green fodder and grass is contemplated. It was therefore suggested by the Commissioner and Health Officer of the Corporation that advantage may be taken of the Corporation sewage farm schemes and milch cattle colonies with provision for accommodation for cattle, for their exercise and for the milkmen to live and care for their cattle under hygienic conditions may be organised near the sewage farms, not only to ensure cheap supplies of green fodder, etc., to the milch cattle colonies, but to provide subsidiary occupation to milkmen on the land proposed to be brought under sewage farming. This scheme involves also the co-operation of such co-operative societies as are at present functioning and those which may be constituted in the future, the whole thing being controlled by the Government through a Milk Commissioner, and the passing of necessary legislation for the compulsory removal of the cattle from the extremely congested and unhealthy surroundings to such colonies as may be formed. This subject was discussed at length with the Commissioner of the Corporation and the Health Officer and a sub-committee also visited the localities where it would be possible for such colonies to be formed near the proposed sewage farms. The Committee is of opinion that large colonies of the type that have been established for the City of Bombay are not possible for the City of Madras, where conditions differ very much from the conditions in Bombay. It would be very much better to have these colonies spread out around the City and its outskirts in four to six smaller colonies which may be better worked and controlled with the assistance of the staff in the Government Veterinary Department, Animal Husbandry and Co-operative Departments as well as of the Corporation of Madras. The Committee envisages the possibility of gradual development of these colonies, but it would emphasise that the first one or two colonies be established to cover the requirements for the evacuation of the milch cattle from the most congested localities of the City. In the view of the Committee and on the advice of the Health Officer of the Corporation, it is felt that in the first instance it is very urgent to see to it that cattle in areas in Georgetown, Washermanpet and Choolai and round about, which are extremely congested are removed. Likewise, the areas

in Triplicane, Royapettah and surroundings are extremely congested. Roughly speaking therefore the colonies that are to be established at the outskirts of the City would be one in the North of Madras for the areas mentioned and one towards the South for the areas mentioned in the South. Later perhaps it may be necessary to have two more colonies in the outskirts of the City, for parts of the City round about Egmore, Komaleswaranpet, Mylapore, T. Nagar, etc.

The Sub-Committee consisting of the Commissioner of the Corporation, the Health Officer of the Corporation and Joint Registrar of Co-operative Societies, etc., visited the place which the Corporation had selected in Kodungayur for a sewage farm and in this connection examined the suitability for the establishment of a milk colony nearby. This particular sewage farm is expected to be at Kodungayur which is about two miles from Municipal limits on the Northern side and the location of a milk colony is proposed at Erukancheri, within a mile of the sewage farm. A second place selected is Arambakkam for the sewage farm and Koyambedu for the milk colony. The Committee suggests that immediate advantage may be taken of the proposed sewage farm in Kodungayur village by the Madras Corporation, to start the milk colony in Erukancheri. It is suggested that the Corporation may be in a position to acquire the necessary land required both for the sewage farm and for the location of the milk colony in the villages mentioned.

In this connexion the scheme drawn up for the establishment of the milk colony at Erukancheri is enclosed for the information of the Government. The scheme envisages among others (1) the opening of a sewage farm near Kodungayur village where the right type of grass and green fodder for cattle can be grown abundantly for use as fodder for the cattle. This will be undertaken by the Corporation as Part of the sewage disposal of the City. (2) A milk colony near Erukancheri village closeby which will consist of a rural housing scheme to house the cattle owners and their agents permanently with hygienic accommodation for the cattle owned by them. (3) General cattle sheds either for stalling such cattle as may be necessary, as well as for the milking of the cattle. (4) A smaller shed for the calves to be properly cared for. (5) Necessary accommodation for the office dairy, and for handling of the milk and its distribution. (6) A fairly extensive area with the necessary exercising facilities for the milch cattle.

It is expected that this type of model colony will be copied in the different directions to serve different regions of the City, in course of time, to evacuate cattle from the other congested areas of the City to which reference has already been made.

Attention has already been invited to the fact that the primary necessity is to appoint a Milk Commissioner to take charge of all

these arrangements. Such a Milk Commissioner should be directly under the Government and should be in a position to organise, direct, guide and control the milk supply of the whole City with the active help and co-operation of the authorities of the Corporation, Veterinary Department, the Co-operative Department, the Food and Agricultural Department, the departments in charge of rural housing and such other departments as are interested in the scheme or may have a part to play in the scheme.

It may be stated in this connection that one of the main problems of the cowherds is the care of the cows during the period they go dry. The responsibility for looking after these cattle with the limited facilities available both in regard to fodder and in regard to financial commitments has made many a cowherd sell his cow in the ' dry ' period or so underfeed the animal that the period of dryness is increased and when the animal is in a position to yield milk once more the yield of milk is very poor. It is understood that there are two dry cattle salvage centres whereto these animals may be sent, and it is recommended that these may be properly organised and steps taken for the effective care of the milch cattle sent from the proposed milk colony at Erukancheri.

As far as the financial commitments are concerned, the Corporation of Madras and the Government of Madras will have to share in the financial responsibility upon mutually agreed arrangements. In course of time, it will be found that the scheme will work in such a way that it will produce returns and the investments made by the Government or the Corporation will yield profitable results not merely in cash dividends but what is far more important, in kind. The expenditure that the Corporation is now incurring in regard to diseased conditions prevalent in the City both among human beings and in cattle will certainly be diminished firstly because of the consequent improvement of sanitation and cleanliness of those areas which are extremely congested and secondly because of the larger quantity of purer milk that will be available to the children and the citizens of the City.

From the long range point of view therefore, one of the main causes of intestinal disorders and other diseases brought about through adulterated and contaminated milk supply, such contaminated supply should be prevented, and both the Corporation of Madras and the Government will promote better health of the citizens; and therefore less of expenditure on drugs and hospital accommodation will be needed. From the point of view of the Government, the great advantage will be in the improvement of the cattle wealth of the country. In a predominantly agricultural area, cattle wealth forms a most beneficial method of increasing the wealth of the rural population. One of the chief obstacles in agricultural operation is the lack of proper and well-built and sturdy bullocks for agricultural operations. If even in a few large cities the cattle wealth can be improved and increased and the rural

population made to realize how best they could look after the cattle through the advice and assistance of the Veterinary and Animal Husbandry and Agricultural departments and through such milk colonies as have been suggested, a more positive step would have been taken for the promotion of the welfare of the cattle, one of the rich heritages of India.

Another incidental advantage to agriculture which would accrue through the establishment of such milk colonies is the large quantity of manure that may be made available for agricultural operations. At present, the cowdung in the City is either used as fuel as cowdung cakes, or is washed away through the sewers. When a colony with proper facilities for storage of manure and for farm-yard manure compost manufacture is established all the valuable manure which now goes to waste can be put to proper use.

In this connexion, attention of the Government is invited to the scheme for the *Gosadans* in the Planning Commission's report, and it is suggested that help may be available from the Planning Commission for such colonies being established for the purpose of gosamrakshana and gosamvardhana. A good deal of the sentiment that is expressed for the care of cattle could thus be translated into positive action. The Committee hopes that the recommendations that have now been submitted will receive the earnest consideration of the Government and of the Corporation of Madras. The present method of collecting milk through Co-operative Societies in rural parts may be continued and such milk may be brought separately as buffalo's milk and cow's milk, buffalo's milk being sent to the Government Factory for conversion into toned milk, the cow's milk being kept in Ayanavaram factory for pasteurising and distribution. When the supply of milk is increased, we suggest that milk distribution centres in separate structures may be established in the different divisions of the Corporation so that the milk may be effectively and with the least delay distributed to the consumers concerned.

The Committee desires to place on record its very high appreciation of the invaluable services rendered by Dr. Subba Rao, the Convenor of the Committee. His ripe knowledge and vast experience in the field of public health were fully utilised for the consideration of the many difficult problems connected with this question, and the Committee is most grateful to him for the help he rendered. The Committee also desires to express its thanks to the Andhra Government for having spared the services of Dr. Subba Rao to continue as Convenor of the Committee after the separation of the State.

A. L. MUDALIAR,
Chairman.

1st December 1953.

Summary of recommendations.

The Committee recommends—

(1) That the Government Milk Factory should work on the modified lines suggested as follows :—

(*a*) It must produce *toned milk*.

(*b*) Its machinery must be improved and some of the machinery which is now not in proper working order should be replaced by new and improved equipment.

(*c*) That better laboratory facilities on the premises should be available for the daily check of the quality of toned milk.

(*d*) That the employees should be properly instructed in regard to the sterilization and care of the sterilized vessels and in the process of bottling milk.

(*e*) That the cans should be of such a nature that they can be automatically sealed by the machinery.

(*f*) That for distribution insulated motor vans should be made available.

(*g*) That the Government Milk Factory should also be the storehouse for the skim milk powder which is proposed to be brought under the control of Government and all indents of consumer for milk powder should be supplied through the Government Milk Factory.

(2) (*a*) That a Milk Commissioner should be immediately appointed who will be responsible for the inspection of all centres where milk is brought from different centres, stored and distributed and enforce quality standards; for the inspection along with the Health Officer of the Corporation of all cattle-sheds in the City and as per special legislation to be passed, for enforcing removal of such cattle from congested areas in co-operation with the Corporation, to the milk farms suggested elsewhere.

(*b*) That the Milk Commissioner should work in close co-operation with the Corporation and with the Co-operative departments, the Animal Husbandry and Veterinary Departments and the co-operative societies established for milk supply and distribution.

(3) That the Ayanavaram Milk Supply Union should continue to function on the following lines :—

(*a*) It must collect milk as at present, but should arrange for transport through insulated motor vans.

(*b*) As far as possible the mufassal centres where milk is collected should have proper facilities afforded for the cattle and for milking of the cattle in the presence of responsible persons.

(*c*) The milk brought to the Ayanavaram Union from the different sources should be labelled and should be tested before such milk is pasteurised.

(*d*) That as in the Government Milk Factory the milk cans must be properly cleaned and sterilized and sealed automatically before they are sent out for distribution.

(*e*) The present method of utilizing the cans with taps for retail distribution should be discontinued.

(*f*) The staff should be properly trained in the processes connected with the storage, pasteurising and bottling or canning of milk.

(*g*) That as far as possible, provision should be made in Ayanavaram for proper cattle-sheds and for pasture land where the cattle could graze.

(4) (*a*) That the Corporation schemes of opening sewage farms should be taken advantage of and milk colonies in close association with such sewage farms should be encouraged and subsidy should be given besides loans on easy terms to enable the Corporation to perform this task.

(*b*) That under the rural housing scheme, provision must be made for the construction of small houses for the cattle-owners or their agents in these colonies.

(*c*) That in these places proper cattle-sheds should be made available, and quarters for the supervisors, and other Veterinary, Co-operative and Health staff.

(*d*) That distribution from these colonies should be as in recommendations (1) and (3) above.

(*e*) That in the City, centres should be opened at different places to serve as milk distribution centres.

(*f*) That the scheme proposed by the Commissioner, the Health Officer and the Registrar of Co-operative Societies should be carefully examined and implemented as soon as possible; the cost being borne partly by the Government and partly by the Corporation, and partly from grants from the Planning Commission for Gosadans.

(*g*) That the Corporation milk colonies like other centres, should be under the supervision of the Milk Commissioner who will be expected to work in close co-operation with the Health authorities of the Corporation of Madras.

(*h*) That as an initial step two centres, one at Kodungayur for sewage farm and Erukancheri for milk colony, and Arambakkam for the sewage farm and Koyambedu for the milk colony, should be established.

(*i*) There will be 4 to 6 such colonies within easy distance of the City of Madras, ultimately when the scheme is expanded.

(5) (*a*) The Committee is not in favour of restricting coffee hotels and other establishments to use skim milk powder only for the reasons stated in the report.

(*b*) That the proprietors of coffee hotels, however, may be compelled to purchase milk only through one of these organized societies under conditions which would ensure proper care being taken in the supply of wholesome and clean milk.

ENCLOSURE I.

Letter from Dr. P. S. SARMA, M.SC., PH.D., F.R.I.C., F.A.SC., Reader in Biochemistry, University of Madras, A.C. College Buildings, Guindy, Madras-25, to the Vice-Chancellor, University of Madras, Chairman, Milk Enquiry Committee, University Buildings, Chepauk, Madras-5, dated 22nd September 1953.

I have the honour to submit the following detailed report on the investigations conducted in the University Biochemical Laboratory, in regard to

(i) Biological evaluation using albino rats, and

(ii) Estimation of different vitamins by chemical, spectrophotometric, and microbiologigal methods in (*a*) reconstituted milk, (*b*) reconstituted milk with added vitamin A or carotene, (*c*) cow's milk and (*d*) Toned milk.

Reconstituted milk and reconstituted milk with carotene or vitamin A added, were obtained every day by random sampling of the milk in bottles at the Government Milk Factory, Teynampet. It was mentioned to me at the time I visited the factory that the public were supplied reconstituted milk without added carotene or vitamin A and only hospitals were supplied with reconstituted milk to which carotene or vitamin A was added. The cow's milk was obtained fresh everyday, while the toned milk was prepared by diluting the fresh buffaloe's milk with an equal volume of water and adding 10 gms. of skimmed milk powder for every 100 cc. of diluted milk and mixing the same for five minutes in the Waring Blendor in the laboratory.

I. *Biological evaluation using albino rats.*—Young albino rats, 28 days to 30 days old and weighing 35 to 40 gms. have been used in these investigations in groups of three each, either males or females being used in each set of experiments. The first set of four groups was designed after nutrition experiments of Collins, Schreiber and Elvehjem who compared cow's milk with goat's milk in their effect on growth of young albino rats (*Journal of Nutrition*, Vol. 49, page 485, year 1953).

The following minerals—iron, copper and manganese—were added to the milk in the proportion of 3 mg. of iron, 0·15 mg. of copper, and 0·15 mg. of manganese per 100 cc. of milk using ferric ammonium

citrate, hydrated copper and manganous sulphates respectively in equivalent amounts and fed *ad lib*. Weights were taken twice a week and the experiments were carried out for eight to ten weeks growth period. The following data in Table I gives the average weekly increase of rats for the ten weeks and is also graphically represented in Figure I.

TABLE I.

Serial number.	Milk used.	Initial weight of the group (average).	Final weight of the group (average).	Average weekly increase.
(1)	(2)	(3)	(4)	(5)
		GMS.	GMS.	GMS.
1	Reconstituted milk	35·3	102·6	6·7
2	Reconstituted milk with vitamin A added	34·3	119·0	8.5
3	Cow's mil	34·8	148·6	11·4
4	Toned milk	35·3	147·6	11·2

II. The second set of experiments was planned to test the four different milks stated above, on a " poor Madrasi diet ", the composition of which is as follows:—

TABLE II.

Serial number.	Ingredients.	Gms. per 100 gms.	Percentage composition.	
(1)	(2)	(3)	(4)	
1	Raw milled rice	89·0	Protein	8·30
2	Toor dhal	3·0	Fat	1·00
3	Brinjals	3·0	Carbohydrates	77·80
4	Plantain, green	3·0	Calcium	0·02
5	Oil	0·5	Phosphorous	0·16
6	Mutton	0·5	Riboflavin	0·47
7	Salt (sodium chloride)	1·0	Vitamin A	Nil.

This diet has been used in several investigations previously (Krishna Murthy and Subramanium, *Indian Journal of Medical Research*, Volume 39, page 61, year 1949, Mason and Arulanandam, *Indian Journal of Medical Research*, Volume 34, page 45, year 1946, and Krishnan and Aykroyd, *Indian Journal of Medical Research*, Volume 24, page 1098, year 1937) and is taken as a representative " poor Madrasi diet ". This diet was cooked and supplied *ad lib*. Young rats were kept on these diets for eight weeks and the average weekly gain is given in Table III and is also graphically represented in Figure II.

TABLE III.

Serial number	Milk used.	Initial weight of the group (average).	Final weight of the group (average).	Average weekly increase.
(1)	(2)	(3)	(4	(5)
		GMS.	GMS.	GMS.
1	" Poor Madrasi diet " with reconstituted milk	38·8	92·3	6·7
2	" Poor Madrasi diet " with reconstituted milk with vitamin A added	38·8	96·2	7·2
3	" Poor Madrasi diet " with cow's milk (fresh).	39·0	110·3	8·9
4	" Poor Madrasi diet " with toned milk .	38·5	126·5	11·0

III. A third series of biological experiments with albino rats was also carried out with the object of comparing dried whole milk powder (Molly brand) as obtained in sealed tins from the local market, with reconstituted milk powder, obtained by adding hydrogenated fat and carotene to skim milk powder in the proportion used by the Government Milk Factory to make reconstituted milk with carotene (i.e., 10 lbs. of spray-processed milk powder, 4 lbs. of vanaspati, and a small quantity of carotene solution of which 0·64 oz. containing 50 m.gms. of carotene is used for preparing 100 lbs. of reconstituted milk by carotene). For this purpose, an adequate diet as given by Hawk, Oser and Summerson (Practical Physiological Chemistry, page 985, year 1947) of the following composition was prepared:—

A	PER CENT.	B	PER CENT.
Whole milk powder	17	Reconstituted milk powder ..	17
Whole wheat powder ..	82	Whole wheat powder ..	82
Sodium chloride	1	Sodium chloride	1

For comparison with local conditions which is predominantly a rice-eating area, whole wheat was replaced by rice and dhal in the fourth set of experiments in the following proportions and the two diets prepared were—

A	PER CENT.	B	PER CENT.
Whole milk powder	17	Reconstituted milk powder ..	17
Raw rice powder	77	Raw rice powder ..	77
Toor dhal	5	Toor dhal	5
Sodium chloride	1	Sodium chloride	1

Young weanling rats were placed in individual metabolism cages as before, and the above four diets were fed *ad lib*. Weights were taken twice a week and the average weights were plotted as shown in Figures III and IV. Average gain in weight in the four different diets is given in Table IV.

TABLE IV.

Serial number. (1)	Milk used. (2)		Initial weight of the group (average). (3) GMS.	Final weight of the group (average). (4) GMS.	Average weekly increase. (5) GMS.
1	Whole milk powder ..	17 PER CENT	38·5	130·6	11·5
	Wheat powder ..	82			
	Sodium chloride ..	1			
2	Reconstituted milk powder	17	38·3	109·5	8·9
	Wheat powder ..	82			
	Sodium chloride ..	1			
1	Whole milk powder ..	17	38·8	168·8	16·3
	Raw rice powder ..	77			
	Toor dhal ..	5			
	Sodium chloride ..	1			
2	Reconstituted milk powder	17	38·8	133·8	11·8
	Raw rice powder ..	77			
	Toor dhal ..	5			
	Sodium chloride ..	1			

Estimation of different vitamins—Carotene.—This was estimated colorimetrically by the cold saponification method (Boyer, Spitzer,

Jenson and Phillips, Industrial Engineering Chemistry, Analytical Edition, Volume 16, page 101, year 1944) using 20 per cent alcholic potash, extracting with ether, washing first with water, and then dilute alcoholic solution containing hydrochloric acid, evaporating the ether, and finally dissolving the residue in petrolium ether. Instead of pure carotene, potassium dichromate standard according to the method of Nelson (Analyst, Volume 72, page 200, year 1947) was used for comparison. The values were checked by the spectrophotometric method (Biological Symposia, Volume 12, page 38, year 1947).

Vitamin " A ".—This was estimated by the cold saponification method as adopted in the case of carotene, but the residue was taken up in spectroscopically pure cyclohexane. The absorption was measured at 328 mu. using model DU spectrophotometer with pure vitamin A as standard. (*Reference*: Boyer, Spitzer, Jenson and Phillips, Industrial Engineering Chemistry, Analytical Edition, Volume 16, page 101, year 1944.)

Vitamin " C ".—This was estimated by the method of Bessey and King (Journal of Biological Chemistry, Volume 103, page 687, year 1933). The vitamin was extracted with 4 per cent metaphosphoric acid and titrated against 2:6 dichloro phenol indophenol. The titre value was compared with that of standard solutions of vitamin C.

Vitamin " B-1 " (thiamine).—This was estimated by the thiochrome method using Lumetron 402 EF model fluorimeter, according to the standard method, described in the Handbook of Association of Vitamin Chemists, page 111, year 1951. Thiamine was liberated by acid hydrolysis using hydrochloric acid (O. 1 N) and then incubating with " takadiastase " enzyme. This was then exidized by potassium ferricyanide to thiochrome, extracted with isobutanol and the fluorescence measured.

Vitamin " B-2 " (riboflavin).—This was estimated using Lumetron flourimeter, as described in the Hand book of Vitamin Chemists. The vitamin was extracted by hydrolysing with O. 1 N HC 1, the interfering impurities removed by filtration at PH 6·8. The filtrate was oxidized by potassium permanganate at PH 4·0 and then treated with hydrogen peroxide. The fluorescence measured and compared with that of standard solution of riboflavin. (Ref: Methods of vitamin essay, Association of Vitamin Chemists, page 166, year 1951.)

Nicotinic acid.—This was estimated by microbiological assay using *Lactobacillus arabinosus* as the organism, according to the method of Snell and Wright (Journal of Biological Chemistry, Volume 139, page 675, year 1941). It was also estimated by the chemical method, using the modified procedure of Shanmugasundaram, Ranganathan & Sarma (Current Science, Volume 20, page 122, year 1951). The vitamin was liberated by hydrolysis with 4-N sulphuric acid, deprotenised using lead acetate and zinc sulphate. The colour produced with cyanogen bromide and aniline was compared with that of a standard nicotinic acid as described by Hawk, Oser and Summerson (Practical Physiological Chemistry, page 1093, year 1947).

Vitamin "B-6" (pyridoxine).—This was estimated by the microbiological assay using Neurospora sitophila, as described by Stokes, Larson, Woodward and Foster (Journal of Biological Chemistry, Volume 150, page 13, year 1953).

Pantothenic acid.—This was liberated enzymatically using pigeon liver enzyme and alkaline phosphatase and estimated microbiologically using *Lactobacillus arabinosus* (Methods of Vitamin Assay, Association of Vitamin Chemists, 2nd Edition, page 209, year 1951).

Biotin.—This was estimated micro-biologically using wild strain of *Neurospora crassa*, as described by Tatum, Ritchie, Cowdrey and Wicks, (Journal of Biological Chemistry, Volume 163, page 675, year 1946).

Choline.—This was liberated by hydrolysis with sulphuric acid and estimated micro-biologically using mutant of *Neurospora crassa* according to the method of Horowitz and Beadle (Journal of Biological Chemistry, Volume 150, page 325, year 1943).

Folic acid.—This was determined by the micro-biological assay using *Streptococcus faecalis*, according to the standard method originated by Teply and Elvehjem (Journal of Biological Chemistry, Volume 157, page 303, year 1945).

Vitamin "B-12".—This was estimated by the micro-biological assay using L. Lactis dorner, and measuring the lactic acid produced according to the standard method of Green, Brook and Mc'Cormick (Journal of Biological Chemistry, Volume 178, page 999, year 1949); Cooperman, Drucker and Tabenkin (Journal of Biological Chemistry, Volume 191, page 135, year 1951). The values are given in Table V.

Results and conclusion.—From the results presented above, it would appear that Reconstituted milk and Reconstituted milk with added vitamin A, do not support the growth of young albino rats, to the same extent as fresh cow's milk or Toned milk. In biological value, therefore, they appear to be inferior to cow's milk and Toned milk. This observation is further confirmed in the second set of experiments where "poor Madrasi diet" was used as supplement. The Toned milk in this case, however, appears to have an advantage over cow's milk. From the data obtained in the third set of experiments, it is evident that the skim milk powder reconstituted in the manner adopted by the Government Milk Factory does not support the growth of rats to the same extent as whole milk powder (Molly brand), as obtained from the local market, when fed under identical conditions. One may conclude, therefrom, that the milk prepared from this Reconstituted milk powder will be inferior to that prepared from whole milk powder.

The data on vitamin contents of the four different milks show that Reconstituted milk either with or without vitamin A has lower vitamin value in regard to most of the vitamins investigated than either cow's milk or Toned milk.

TABLE V.

The vitamin content different milks.

Milk sample.	Carotene microgram/litre.	Vitamin A I.U./litre.	Vitamin C milligram/litre.	B1 Thiamine milligram/litre.	B2 Riboflavin milligram/litre.	Nicotinic acid milligram litre.
(1) (2)	(3)	(4)	(5)	(6)	(7)	(8)
1 Reconstituted milk (from Government Milk Factory) ..	85	1,905	1·08	0·17	2·28	1·52
2 Reconstituted milk, Added Vitamin A (from Government Milk Factory) ..	68	3,737	1·08	0·16	2·20	1·52
3 Cow's milk (fresh) ..	290	3,138	2·20	0·18	2·52	2·01
4 Toned milk ..	36	1,730	3·90	0 27	2·44	2·60

Milk sample.	Pyridoxine milligram/litre.	Pantothenic acid milligram/litre.	Biotin microgram/litre.	Choline milligram/ litre.	Folic acid microgram/litre.	Vitamin B12 microgram/litre.
	(9)	(10)	(11)	(12)	(13)	(14)
1 Reconstituted milk (from Government Milk Factory) ..	1·17	5·65	17·3	64·0	0·53	4·2
2 Reconstituted milk, Added Vitamin A (from Government Milk Factory) ..	1·18	5·15	17·7	69·0	0·53	4·4
3 Cow's milk, fresh ..	1·32	7·79	20·0	77·0	1·03	6·4
4 Toned milk ..	1·50	10·20	23·1	74·0	0·81	5·5

ENCLOSURE II.

A scheme for the evacuation of milch animals from the City of Madras.—The Committee constituted by Government to make recommendations on the improvements to milk production and distribution in the Madras City desired that a concrete scheme might be drawn up for the evacuation of milch cattle from the City and appointed a Sub-Committee for the purpose. The Sub-Committee met on 16th October 1953. The members of the Committee also inspected the same day the sites selected by the Corporation for the evacuation of the milch cattle, one at Erukancheri village and the others adjoining Arumbakkam and Koyambedu in the Poonamalle Road. It was agreed that the scheme might be drawn up for one centre in the first

instance and that it could be extended with suitable modifications to other centres. It was also agreed that, to start with, the centre might provide for settling about 100 families of cow-owners and 1,000 milch cattle. The number of houses to be provided for the cow-owners will have to be increased if necessary to about 150 to 200. On the basis of the above decisions of the Sub-Committee, the following scheme is suggested for the consideration of the Committee.

2. *Scheme.*—It has been recognized that the scheme for the evacuation of cattle will involve large liabilities and responsibilities by way of providing housing and other facilities outside the City for the evacuated cow-owners, construction of suitable cattle-sheds and dairy buildings, transport of milk and its efficient distribution in the areas from which the milch cattle have been evacuated. To make the scheme a success it would require the joint effort of the various interests concerned. The process of evacuation of the milch cattle should go hand in hand with the arrangements for receiving and settling the cow-owners and cattle in the place selected. At the same time it should be completed within a specified time.

(*a*) *Location.*—The Corporation has proposed to acquire a site in Erukkancheri village to locate the colony for the evacuated milkmen and their cattle. The village is about a mile from the Kodungayur village where the Corporation will be taking up a scheme for the disposal of part of the City sewage. The advantages of the site selected are that when the sewage farm is developed, plentiful supply of good green grass will be available at a cheap rate and the sewage farm will afford scope for subsidiary employment to the colonists. Land will be required for (1) housing the colonists, (2) construction of cattle yards and other dairy buildings, (3) for cultivation of fodder and (4) for the construction of staff quarters. An area of 10 acres will be required for housing 100 families of milkmen. Another 10 acres will be required for further expansion and putting of additional houses for cow-owners. For the construction of cattle yards and other dairy buildings including quarters for the staff, about 40 acres will be required. About 400 acres will be required for the cultivation of fodder for the milch animals in the colony. The total land that will have to be acquired by the Corporation for the colony will come to 460 acres—60 acres in Erukancheri and 400 acres in Kodungayur village. The cost of each acre is estimated at Rs. 1,200. The value of land required for the construction of houses for the cow-owners will be recovered from them. The cost of the lands required for the construction of cattle yards and other dairy buildings including quarters for the staff and for cultivation of fodder will be borne by the Corporation. The lands acquired for the cultivation of cattle fodder will be leased out to the milk supply societies that will be formed in the area for a period of ten years in the first instance to be sub-leased to the colonists.

(*b*) *Buildings.*—Buildings required in the colony come under three categories. (1) Residential quarters for colonists; (2) Cattle yards and other dairy buildings for the common use of the colonists; (3) Residential quarters for the staff. As regards residential quarters for the colonists, Government loans will be provided under the Rural Housing Scheme to the co-operative society that will be formed for

the milkmen in the colony. The society will undertake the construction of houses and let them out to the members on hire-purchase system. The cost of each house will be about Rs. 3,000. The houses will remain the property of the society for a period of 10 years with the option for the colonists to purchase them at the end of the period. Otherwise the loan will run for a period of 30 years. As the period of the loans will be for 30 years the houses should be of pucca construction. Each colonist will have to pay a sum of Rs. 100 as initial share capital. In this way a sum of Rs. 10,000 will be collected as share capital from the colonists. The society will be permitted as a special case to borrow up to 30 times its paid-up share capital. Normally the borrowing power is 8 times. But as the cow-owners are generally poor and as the scheme is designed to remove the milch cattle from the City as part of general improvement of the City, the relaxation up to 30 times will be permitted. When the houses are constructed, each colonist will have to pay a sum of Rs. 16-12-0 per mensem towards the repayment of the loan over a period of 30 years. A sum of Rs. 3 lakhs will be required as loans for the colonist and this will be met from the allotment under the Rural Housing Scheme. If it is considered that the cow-owners will not be able to pay a monthly rent of Rs. 16-12-0 towards the repayment of the loan for the dwelling houses, the alternative will be to obtain a subsidy from Government to the extent of 50 per cent of the cost of the building, viz., Rs. 1,500 per colonist. This subsidy would be passed on to the Rural Housing Society if it will undertake the construction of houses. In the alternative the Corporation will obtain the funds required for housing both by way of loan and by way of grant from the Government and construct houses and let them out to the colonist either for rent or on hire-purchase system. The rent for the houses will be arranged to be collected by the Corporation.

As regards dairy buildings 40 cattle-sheds will be required to house the milch animals at the rate of 25 in each shed. The cost of the cattle-sheds is estimated at Rs. 3 lakhs. Besides milch animals, the colonists may be expected to maintain dry animals also belonging to them which will be about 20 per cent of the animals in milk, namely 200. Eight cattle-sheds estimated to cost Rs. 60,000, will have to be provided for housing these animals. The other dairy buildings that will have to be provided for the colonists are as follows and their estimated cost is noted against each:

		Amount.
		Rs.
1	Cattle feed depot	3 050
2	Milk collecting centre	17,400
3	Stack yard	8,100
4	Wash up room	1,500
5	Office room	7,500
6	Veterinary first-aid and milk testing room	1 500
7	Calving pen	1,500
8	An isolation shed and foot path	3,000
9	Bull pen	2,250
10	Milking sheds	8,000
11	Milking platform	7,000
	Total ..	70,800

The total cost of these buildings is estimated at Rs. 70,800. Quarters will have to be provided for some of the members of the staff who will be the permanent residents in the colony. Quarters will have to be provided for the Secretary, Veterinary Officer, Sanitary Inspector, Accountant and the menial staff. The cost of these buildings will come roughly to Rs. 50,000.

Four wells will be necessary to provide water for drinking and washing purposes. The cost of the four wells is estimated at rupees 8,000. The cost of construction of overhead tanks and distribution connexion is estimated to cost Rs. 30,000. Two water-troughs for drinking water for the animals will be required at an estimated cost of Rs. 1,500 each.

(*c*) *Veterinary aid.*—The colony will require the services of a Veterinary Officer and of a stockman-*cum*-compounder and a Sanitary Inspector to look after the sanitation of the colony. The Veterinary staff will be in charge of the first-aid post of the colony and will attend to the first-aid of the animals.

(*d*) *Stud-bulls.*—The colony will have two stud-bulls estimated to cost Rs. 2,400 and the bulls will be provided by Government free of cost. The maintenance of the stud-bulls will be brought under the premium scheme. The bulls will be entrusted to two of the colonists for maintenance and they will be paid the premium and the service fees. In the alternative, the Veterinary department will be requested to locate one of their units under the Village Livestock Improvement Schemes in the colony.

(*e*) *Other amenities.*—Other amenities will have to be provided such as forming roads, surface drains, manure pits, etc. This may cost Rs. 1 lakh.

(*f*) *Working of the colony.*—The colony will be run on the following lines:—

(i) *Organization of a co-operative society for the colonists.*—The cow-owners evacuated from the City and settling in the colony will form themselves into a co-operative society. This society will admit all the colonists and also other cow-owners residing in the village or nearby villages. Cow-owners coming from the City alone will be eligible for the facilities under housing and lease of land for fodder cultivation. The society will be affiliated to the Madras Co-operative Milk Supply Union, Limited.

(ii) *Functions of the society.*—The main functions of the society will be to arrange for the efficient production of milk in the colony and its collection and marketing. The society will advance loans to members for the purchase of milch animals out of the funds that will be made available by Government. It will distribute cattle feed to the members and also undertake cultivation of fodder. It will arrange for the purchase and distribution of the domestic requirements of its members. The society will also undertake the following functions:—

(1) It will obtain on lease the land required for the cultivation of fodder from the Corporation of Madras and sub-lease it to

the colonists. It will collect the lease amount and remit it to the Corporation. It can also undertake the cultivation of fodder on its own account and sell the fodder to the colonists.

(2) It will undertake the construction of houses and give them to the members under the hire-purchase system, if housing is provided under the Rural Housing Scheme. The society will undertake the collection of rent or the loan instalment as the case may be for payment towards Government loan. Otherwise the Corporation will undertake this work.

To arrange for the collection of milk and its transport to the City this society will have to be provided with a lorry and the milk will be delivered by the society for supply to the locality which has been evacuated. So far as distribution of milk in the locality is concerned, it will be left to the Madras Milk Supply Union to undertake the work after pasteurizing the milk. Milk will be sold by the Milk Supply Union either through its own depots or through depots that will be constructed by the Corporation. At least three depots will be required for the distribution of milk. Each depot will cost about Rs. 5,000. Milk will be sold in other places by taking over private buildings on rent or in the Corporation buildings. The Corporation will also be required to purchase the milk that is produced in the colony.

(iii) *Funds.*—The society that will be formed for the colonists will obtain the funds required for several purposes in the manner detailed below:—

(1) Each colonist will pay a share capital of Rs. 100.

(2) For purchase of milch animals loans will be given to the society by Government out of the funds placed at the disposal of the Registrar of Co-operative Societies.

(3) For purchase of cattle-feed loans will be raised by the society from the Madras Co-operative Milk Supply Union or the financing bank as the case may be and no Government loan will be required for this purpose.

(4) Loans required by the colonists for other purposes will be obtained as in item 3.

(5) Loans for construction of dwelling houses will be provided under the rural housing schemes as detailed above. Only one type of house will be encouraged to be built. Members may however make additions if they require at their own cost. If loans are not provided under the Rural Housing Scheme, the Corporation will obtain the necessary funds from Government.

(6) Funds required for the construction of common buildings, such as dairy buildings, cattle yard, milk depots in the evacuated places will have to be provided by the Corporation. The society cannot meet any portion of the cost.

(7) The funds for the construction of residential buildings for the staff will have to be provided by the Corporation. The rent will be recovered from the staff who will occupy the buildings on the usual scale.

(8) The cost of the staff will have to be met by Government for a period of three years. Funds required for other working expenses will be raised by the society from the union or from the financing bank.

(9) As regards lands required for the colony, the entire cost of lands will have to be borne by the Corporation except in the case of land made available for construction of dwelling houses for cow-owners in which case the value of the land will be recovered from the colonists. The land required for cultivation either for fodder or for agricultural crops will be leased to the members through the society.

(iv) *Management.*—While the Corporation will be in charge of the provision of general amenities such as roads, lighting, sewage, sanitation, etc., the actual working of the colony will be entrusted to the society. The management of the society will vest with a Board of Directors that will be nominated by the Registrar for the first three years. The Board of Directors will consist of influential persons and officers of Government departments. The society will have to employ the staff indicated in Annexure I.

3. *Preliminary investigation for the organization and formation of the colony and the co-operative society.*—A lot of preliminary work will be necessary to go through before the colony is actually started on its work. To attend to the preliminary work connected with the formation of the society and the settlement of the colonists, it is necessary that a Special Officer should be appointed. He should be in the grade of a Deputy Registrar of Co-operative Societies as he will have to be in constant touch with the Corporation on the one hand and prospective members on the other in order to bring about the settlement of cow-owners in the colony and to organize the milk supply society to be formed. The Special Officer should be on duty for a period of six months to start with.

4. It is presumed that necessary legislation will be introduced in order to bring about the evacuation of the milch cattle in the City by instalments. Legislation will also be necessary to ensure that milk in the evacuated area is sold by persons licensed for the purpose. Apart from legislation, some propaganda will be necessary to induce the cow-owners to remove themselves to the colony.

5. A statement showing the estimated cost of the scheme is appended—vide Annexure II.

6. The figures and the estimates are tentative.

ANNEXURE I.

Statement showing the details of the staff to be employed under the scheme.

Serial number.	Category of the staff.	Number.	Average pay.	Cost of living allowance.	Other compensatory allowances.	Travelling allowances.	Total expenditure on staff per mensem.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Rs. A. P.	Rs.	Rs.		Rs. A. P.
1	Deputy Registrar (to attend to the preliminary works relating to the organization of the colony and the co-operative society) ..	1	449 5 4	70	50	..	569 5 4
2	District Veterinary Officer.	1	465 5 4	70	50	..	585 5 4
3	Secretary of the Society, Co-operative Sub-Registrar ..	1	180 8 11	40	25	..	245 8 11
4	Accountant (Senior Inspector)	1	109 5 4	27	12	..	148 5 4
5	Sanitary (Health) Inspector.	1	90 0 0	27	12	..	129 0 0
6	Milk recording clerk ..	1	67 10 0	24	9	..	100 10 0
7	Stores clerk	1	67 10 0	24	9	..	100 10 0
8	Routine clerk	1	67 10 0	24	9	..	100 10 0
9	Typist	1	67 10 0	24	9	..	100 10 0
10	Milk tester	1	60 0 0	24	9	..	93 0 0
11	Lorry driver	1	60 0 0	24	9	..	93 0 0
12	Cleaner	1	30 0 0	22	7	..	59 0 0
13	Agricultural maistri ..	1	30 0 0	22	7	..	59 0 0
14	Stockman-compounder ..	1	30 0 0	22	7	..	59 0 0
15	Peons	4	22 0 0	22	7	..	(51 × 4) 204 0 0
16	Masalchi	1	15 0 0	18	2	..	35 0 0
17	Sweepers	5	15 0 0	18	2	..	(35 × 5) 175 0 0
	Total (from serial numbers 2 to 17) ..						2,287 11 7

	Rs. A. P.	Rs. A. P.
Cost of Deputy Registrar for six months only, Rs. 569-5-4 × 6	3,416 0 0	
Cost of other staff for one year, Rs. 2,287-11-7 × 12	27,452 11 0	30,900 0 0
	30,868 11 0	
Expenditure for the first year	30,900 0 0	
Expenditure for the second year	27,500 0 0	
Expenditure for the third year	27,500 0 0	
Total expenditure for three years ..	85,900 0 0	

ANNEXURE II.

Statement showing the estimated cost of the scheme.

		Non-recurring.	*Recurring.*
	RS.	RS.	RS.
I. Land—			
(*a*) For construction of residential quarters, 10 acres at Rs. 1,200 per acre	12,000	..	..
(*b*) Spare area for further construction, 10 acres at Rs. 1,200 per acre	12,000	..	..
(*c*) For construction of cattle-yards and other buildings, 40 acres at Rs. 1,200 per acre ..	48,000	..	..
(*d*) For cultivation of fodder, 400 acres at Rs. 1,200 per acre	4,80,000	..	..
		5,52,000	..
II. Buildings—			
(*a*) Residential quarters for milkmen	3,00 000	..	..
(*b*) Residential quarters for staff	50,000	..	..
(*c*) Cattle-yards 40	3,00,000	..	..
(*d*) Cattle yards for dry animals	60, 00	..	..
(*e*) Other dairy buildings	70 800	..	..
		7,80,800	..
III. Water-supply—			
(*a*) Wells 4 at Rs. 2.000 each	8,000	..	..
(*b*) Overhead tanks and pipe connexion ..	30,000	..	..
(*c*) Two water-troughs at Rs. 1,500 each ..	3,000	..	..
		41,000	..
IV. Veterinary aid (equipment)	..	1,000	500 (cost of medicine).
V. Stud bulls	..	2,400	..
VI. Milk-testing equipment	..	2,000	500 (cost of chemicals).
VII Other amenities—			
(*a*) Milk pails at Rs. 12 (per 100 pails) ..	1,200	..	..
(*b*) Other amenities (including roads, drainages, etc.)	1,00,000	..	..
(*c*) Construction of three milk depots at Rs. 5,000 per depot	15,000	..	..
(*d*) One lorry (3 tonner)	30,000	..	..
		1,46,200	
VIII. Government staff for supervision and management	..	..	85,900 (for three years).
IX. Miscellaneous—Furniture, fittings, stationery, etc.	..	2,000	500 (cost of stationery).
		15,27,400	87,400

Abstract.

	RS.
Non-recurring	15,27,400
Recurring	87,400
Total ..	16,14,800

Demi-official from the Registrar of Co-operative Societies, Madras, to the Director of Public Health (Andhra) and Convener of the Expert Committee, Madras, dated 30th October 1953, No. 155090/53.T.

[SUBJECT.—Scheme for evacuation of milch animals from the City of Madras. *Reference.*—My D.O. letter No. 155090/53 T., dated 23rd October 1953.]

In continuation of my letter cited, I would like to clarify the following points in the scheme which was sent along with that letter:—

1. *Dwelling houses for cow-owners.*—Under sub-paragraph (*b*) of paragraph 2 of the scheme, I indicated that the houses would remain the property of the society for a period of 10 years with the option for the colonists to purchase the houses at the end of the period. I may clarify this point further as indicated below.

If the society undertakes the construction of houses for cow-owners under the Rural Housing Scheme, the arrangements will be on the following lines. The society will obtain loans from Government under the Rural Housing Scheme and undertake construction of houses on behalf of the members, besides any subsidy that may be obtained from Government for the purpose as a special case. The cost of each building is estimated at Rs. 3,000 and this will be treated as a loan to each colonist. Normally the colonist will have to pay about Rs. 16-12-0 every month to enable him to clear the loan within a period of 30 years. At the end of 30 years the house will belong to him. He will also have the option to repay the entire sum earlier and to own the house himself but he cannot do so until at least 10 years are over. Until then the houses will be the property of the society.

If, in the alternative, the Corporation of Madras arranges to obtain funds by way of loans and subsidy from Government and constructs dwelling houses, the houses will remain the property of the Corporation and will be placed at the disposal of the society to be let out to the colonists either for rent or on hire-purchase system. In both the cases the society will be the managing agent. If the houses are let out on rent, the colonists will not acquire ownership; they will be mere tenants. And the society will arrange for the collection of rent from the colonist and payment to the Corporation. If however the houses are let out on hire-purchase system, the society will arrange for the collection of the hire-purchase instalments. The necessary agreements between the Corporation and the society in this behalf will have to be got executed.

As regards the land required for construction of dwelling houses, the land will be assigned to the society for value, if the society should undertake the construction of houses under the Rural Housing Scheme. The society will allot sites to the colonists and the value of the site will be recovered from them. If the Corporation should undertake the construction of houses, the cost of the land required

2. *Land and buildings for other purposes.*—Land will be required for cultivation of fodder. The Corporation will purchase the land and lease it to the society for a period of 10 years and the society will in turn sub-lease it to the colonists. The terms of the lease will have to be settled.

The value of the land required for the construction of buildings like residential quarters, dairy buildings, cattle-sheds, milking yard, wells, etc., will be borne by the Corporation. The cost of construction of these buildings will also be met by the Corporation. The buildings will remain the property of the Corporation but they will be placed at the disposal of the society with whom will vest the entire management of the colony. The buildings and other appurtenances will be placed at the disposal of the society by the Corporation by a suitable agreement for at least a period of 10 years. Suitable agreement will be entered into between the Corporation and the society with regard to the management of the buildings.

3. *Staff.*—The staff proposed for working the colony will be placed under the control of the society which will be managed by a Board of Directors. The staff will be paid by the society.

In conclusion it may be stated that the society will act as an agent of the Corporation with full powers regarding the administration of the colony. A suitable agreement will be entered into between the Corporation and the society in this behalf.

ENCLOSURE III.

List of Expert Witnesses examined.

The Dean of the Madras Medical College, Madras.

The Dean of the Stanley Medical College, Madras.

The Director, King Institute, Guindy, Madras.

The Registrar of Co-operative Societies, Madras.

The Commissioner, Corporation of Madras.

The Health Officer, Corporation of Madras.

The President, The Madras Hotels' Association, and two representative members of the Madras Hotels' Association.

The Dairy Development Officer, Madras.

The Manager, Government Milk Factory, Teynampet.

The President, Avanavaram Co-operative Milk Supply Union, Madras.

ENCLOSURE IV

Copies of Questionnaire issued to Institutions and Individual Customers consuming reconstituted milk from Government Milk Factory, Teynampet, Madras.

Letter from Dr. D. SUBBA RAO, M.P.H. (Harvard), Assistant Director and Convener of the Expert Committee, 141, Poonamallee High Road, Kilpauk Post, Madras-10, to the Dean, General Hospital, Madras.

[SUBJECT.—Milk supplied by Government Milk Factory, Teynampet, to Hospitals and Institutions—Information requested.]

The Government in G.O. Ms. No. 715, dated 12th May 1953, appointed an Expert Committee with Dr. A. Lakshmanaswamy Mudaliar, M.D., LL.D., D.SC., D.C.L., M.L.C., Vice-Chancellor, Madras University, as Chairman to examine and report on the working of the Government Milk Factory, Teynampet and the quality of milk supplied to consumers, etc. In connexion with this enquiry under instructions from the Chairman, I request you to please furnish information on the points noted below at your earliest convenience:—

1. What is the total daily average consumption of milk in your institution?

2. How much of milk is supplied to Adults' and Children's wards, respectively?

3. What is the average daily number of adult and child consumers?

4. From what sources and to what extent is the total quantity of milk noted under (1) obtained? (i.e., from Government Milk Factory, milk from milch cattle milked on the premises, from milk supply unions, etc.).

5. Do you mix the milk obtained from these different sources separately to in-patients or inmates?

6. When was the old system of getting cows to hospital for milking in the immediate supervision of the hospital staff abandoned?

7. How is this milk received from different sources under (4) treated, before distribution to patients?

8. What is the price of milk, per Madras measure (or a pound) as purchased from these different sources?

9. If the milk from the various sources is not pooled, mixed before distribution to patients, how do the patients like the flavour, and taste of milk from the different sources?

10. Is the milk supply from the various sources an interrupted supply or are any difficulties and deficiencies noticed in this supply of milk from the various sources in different seasons of this year.

Questionnaire issued to consumers.

Letter from Dr. SUBBA RAO, M.P.H. (Harvard), Assistant Director and Convener of the Expert Committee, 141, Poonamallee High Road, Kilpauk Post, Madras-10, dated 23rd June 1953, R. No. 49 D.P.H.-53.

[SUBJECT.—Milk supplied by Government Milk Factory, Teynampet—Questionnaire issued to consumers.]

The Government in G.O. Ms. No. 715, dated 12th May 1953, appointed an Expert Committee with Dr. A. Lakshmanaswamy Mudaliar, M.D., LL.D., D.SC., D.C.L., M.L.C., Vice-Chancellor, Madras University, as Chairman to examine and report on the working of the Government Milk Factory, Teynampet and the quality of milk supplied to the consumers from this factory under instructions from the Chairman of the Committee, a questionnaire to the present consumer of the milk from Government Milk Factory has been drawn up and is herewith appended.

I request you on behalf of the Committee to please send your answers to the questionnaire before 7th July 1953 and help the Committee in its enquiry.

Questionnaire in connection with milk supplies made by Government Milk Factory, Teynampet, Madras.

1. How long (in months and years) have you been taking the milk supply from Government Milk Factory, Teynampet?

2. What is the average quantity of milk taken daily?

3. For what purposes is the milk purchased used?

   (*a*) For preparation of coffee, tea, etc.?

   (*b*) For preparation of curds?

   (*c*) For preparation of sweets or other preparations?

   (*d*) Is this milk used for children, if so for what ages?

4. Do you like its taste and flavour?

5. Do you boil the milk—prior to consumption?

6. What reasons have prompted you to purchase this milk in preference to milk sold by other milkmen in the City?

   Is it because of its cheapness? Unavailiability of milk from other sources? Better palatability? Keeping qualities? Cleanliness? Uninterrupted availability?

7. How does it compare with regard to taste, flavour, usefulness and cleanliness with milk supplied from other sources—e.g., milkmen' co-operative societies, etc.

8. Do you suggest any improvements in the manufacture of the distribution of milk from Government Milk Factory—as carried out at present?

ENCLOSURE V

Letter from Dr. Y. S. NARAYANA RAO, M.B.B.S., D.T.M. (Cal.), D.E. (Lond.), Director, King Institute, Guindy, Saidapet P.O., Madras-15, to the Director of Public Health, Kilpauk, Madras-10, dated 25th July 1953, C. No. C6/53.

[SUBJECT.—Chemical and Bacteriological analysis of Government Milk Samples. *Reference.*—Your telephonic message, dated 24th July 1953.]

The following are the results of Chemical analysis of reconstituted milk samples sent by the Government Milk Factory, Teynampet, in June 1953:—

Nature of sample.	Number.	Fat.	Solids not fat.	Specific gravity.	Acidity.	Remarks.
		PER CENT.	PER CENT.		PER CENT.	
The samples received here on 5th June 1953—						
Reconstituted milk ..	1	3·9	8·8	27·0	0·11	Satisfactory.
Reconstituted milk ..	2	3·8	8·9	26·6	0·109	Do.
Reconstituted milk ..	3	3·8	8·8	27·0	0·126	Do.
The samples received here on 13th June 1953—						
Reconstituted milk ..	1	4·0	8·9	27·2	0·11	Do.
Reconstituted milk ..	2	3·9	8·9	27·1	0·123	Do.
Reconstituted milk ..	3	4·0	9·0	27·4	0·136	Do.
The samples received here on 19th June 1953—						
Reconstituted milk ..	1	4·0	9·1	27·9	0·11	Do.
Reconstituted milk ..	2	4·0	8·9	28·1	0·122	Do.
Reconstituted milk ..	3	4·0	9·1	28·0	0·136	Do.
The samples received here on 26th June 1953—						
Reconstituted milk ..	1	4·0	9·0	27·5	0·11	Do.
Reconstituted milk ..	2	3·9	8·9	27·0	0·112	Do.
Reconstituted milk ..	3	4·0	8·8	26·7	0·126	Do.

The results of the bacteriological examination of samples of milk, rinse waters from sterilized utensils and water drawn from the Government Milk Factory, Teynampet, in the month of June 1953 are furnished in the statements attached.

Letter from the Director, King Institute, Guindy, to the Manager, Government Milk Factory, Teynampet, dated 13th July 1953, R.C. No. 4677/C6/53.

The results of the bacteriological examination of samples of milk, rinse waters from sterilized utensils and water collected from the Government Milk Factory, Teynampet, in the month of June 1953 are furnished in the statements attached.

On both the occasions, the bacteriological quality of the heat treated milk before its passage through the cooler is of fair quality. Deterioration in quality occurs as usual, after passage of the milk through the cooling system, as evidenced by the increase in the coliform count. However, the results obtained on the second set of samples are slightly better, when compared with the results obtained

on the first occasion. The samples of milk collected from the cans and bottles are more or less alike as regards their bacteriological quality and resemble the milk collected from the tap after passage through the cooler.

The results of the bacteriological examination of the rinse waters from the sterilized utensils give indication that the methods of cleaning and sterilization have been satisfactory on the day samples were collected.

The water sample collected from a tap inside the factory on 16th June 1953 shows a high colony count and coliform organisms are present in 10 c.c. volumes. The supply was not chlorinated on this occasion. Chlorination of the supply was resumed a few days prior to the collection of the second set of samples. The sample of chlorinated water collected on 30th June 1953 is satisfactory from the bacteriological point of view.

RESULTS OF THE BACTERIOLOGICAL EXAMINATION OF SAMPLES OF RECONSTITUTED MILK COLLECTED FROM THE GOVERNMENT MILK FACTORY, TEYNAMPET, IN THE MONTH OF JUNE 1953.

Number and date.	Description of samples.	Total colony count on milk agar at 37° C	Coliform organisms in ? ccs.	Remarks.
		RS.		
1 16th June 1953.	Sample of milk from the tap after mixing vat.	3,300	None in 60 ccs.	
2 Do.	Sample of milk from the tap after homogeniser.	2,000	Do.	
3 Do.	Sample of milk from the tap after cooler.	4,500	0·1 cc. and upwards.	
4 Do.	Sample of milk from a can for an issue.	23,000	Do.	
5 Do.	Sample of milk from a bottle.	6,000	Do.	
1 30th June 1953.	Sample of milk from the tap after homogeniser.	4,700	None in 60 ccs.	
2 Do.	Sample of milk from the tap after cooler.	3,600	1 cc. and upwards.	
3 Do.	Sample of milk from can ..	2,000	Do.	
4 Do.	Sample of milk from a bottle.	2,000	0·1 cc. and upwards.	

RESULTS OF THE BACTERIOLOGICAL EXAMINATION OF RINSE WATERS COLLECTED FROM THE STERILIZED UTENSIL COLLECTED FROM THE GOVERNMENT MILK FACTORY IN THE MONTH OF JUNE 1953.

Number and date.	Description.	Colony count per utensil.	Coliform count per utensil.
1 16th June 1953.	Rinse water from a sterilized bottle.	70	Absent.
2 30th June 1953.	Rinse water from a sterilized can.	14,410	Do.
3 Do.	Rinse water from a sterilized bottle.	10	Do.

RESULTS OF THE BACTERIOLOGICAL EXAMINATION OF THE WATER-SUPPLY TO THE MILK FACTORY.

Number and date.	Source.	Total count per cc. on nutrient agar at 37°C.	Coliform present in $\frac{1}{2}$ ccs.
(1)	(2)	(3)	(4)
1 16th June 1953.	Tap inside the factory ..	386	10 cc. and upwards.
1 30th June 1953.	Tap inside the factory ..	54	None in 60 ccs.

RESULTS OF ANALYSIS OF MILK SAMPLES TAKEN FROM CO-OPERATIVE MILK SUPPLY UNION, AYYANAVARAM AND RECEIVED THROUGH CHIEF WATER ANALYST'S SECTION ON 25TH JUNE 1953.

Number and source.	Fat. PER CENT.	Solids not fat. PER CENT.	Freezing point.	Acidity.	Remarks.
1 From tank	4·9	9·3	—0·530	0·144	Genuine.
2 After pasteurization from tap in overhead tank.	4·9	9·3	—0·530	0·147	Do.
3 From can	4·7	9·3	—0·535	0·147	Do.

AYYANANHARAM MILK FACTORY—SAMPLES OF MILK COLLECTED ON 6TH JUNE 1953.

Samples of raw milk and milk subjected to heat treatment were collected from the Ayyanavaram Milk Factory for bacteriological examination on 6th June 1953. A sample of the rinse water from a sterilized can and the well-water used in the factory for cleaning and washing purposes were also drawn for examination.

It was observed during this visit that the milk received at the factory was filtered through paper pulp pads before being drawn into the " tipping tanks ". These tanks have been provided with stainless steel covers, subsequent to our last visit. As was the case on the last occasion, the bacteriological quality of the samples of the raw milk before pasteurization is definitely unsatisfactory, the colony and the coliform counts being very high. Methylene blue was reduced in as short a time as 12 minutes on this occasion. The method of collection and transport of the milk before processing therefore calls for improvement.

Pasteurization has reduced the bacterial content of the milk considerably but still, the colony and the coliform counts remain fairly high. Methylene blue is reduced only after 5 hours. The efficiency of pasteurization is known to depend largely on the initial bacterial density of the raw milk.

The sample of milk drawn from one of the cans is similar to the pasteurized milk issuing out of the overhead tank as regards its general bacterial quality.

The bacteriological examination of the sterilized can shows a high colony count on agar at 37°C; the coliform density is however low. Heat treatment of the cans with steam has been fairly effective on this occasion as judged by the coliform density. By subjecting the cans to heat treatment for a longer time, it would be possible to reduce the bacterial counts further.

A sample of water from the factory supply was also drawn for examination on this occasion. The source of water is an open draw-well provided with steps and a pump and located inside the factory premises. The water shows heavy bacterial pollution. Organisms belonging to the coliform group are present in as small a volume as 0·1 c.c. and the total colony count on agar at 37°C is high. The well may be covered with advantage and provision also made for systematic bactericidal treatment in a reservoir, so that a "safe" supply from the bacteriological point of view will be available at all times.

RESULTS OF THE BACTERIOLOGICAL EXAMINATION OF SAMPLES OF PASTEURIZED MILK COLLECTED FROM THE AYYANAVARAM MILK SUPPLY UNION.

Number and date of collection.	Description of the sample.	Total colony count on milk agar at 37°C per c.c.	Coliform organisms in 1 c.c.	M. B. reduction time in hours.	Anaerobic spores present in 1 c.c.
1 6th June 1953.	Sample of raw milk collected from a can.	13,300,000	0·00001	7 minutes	1 c.c. and upwards.
	Sample of raw milk after filtration from the tipping tank.	10,900,000	0·0001	12 minutes	Do.
	Sample of pasteurized milk collected from the overhead tank.	13,200	0·1	5 hours.	Do.
	Sample of milk from a can.	12,800	0·1	5 hours.	Do.

RESULTS OF THE BACTERIOLOGICAL EXEMINATION OF THE RINSE WATER COLLECTED FROM A STERILIZED CAN FROM THE AYYANAVARAM MILK SUPPLY UNION FACTORY.

Number and date of collection.	Colony count per utensil.	Coliform count per utensil
1 6th June 1953	420,000	4

RESULTS OF THE BACTERIOLOGICAL EXAMINATION OF WATER SAMPLE COLLECTED FROM THE AYYANAVARAM MILK SUPPLY UNION.

Number and date.	Source.	Total colony count on agar at 37°C per c.c.	Coliform organisms present in c.c.
(1)	(2)	(3)	(4)
16th June 1953.	Tap inside the factory ..	3,580	0·1 c.c. and upwards.

FIGURE IV

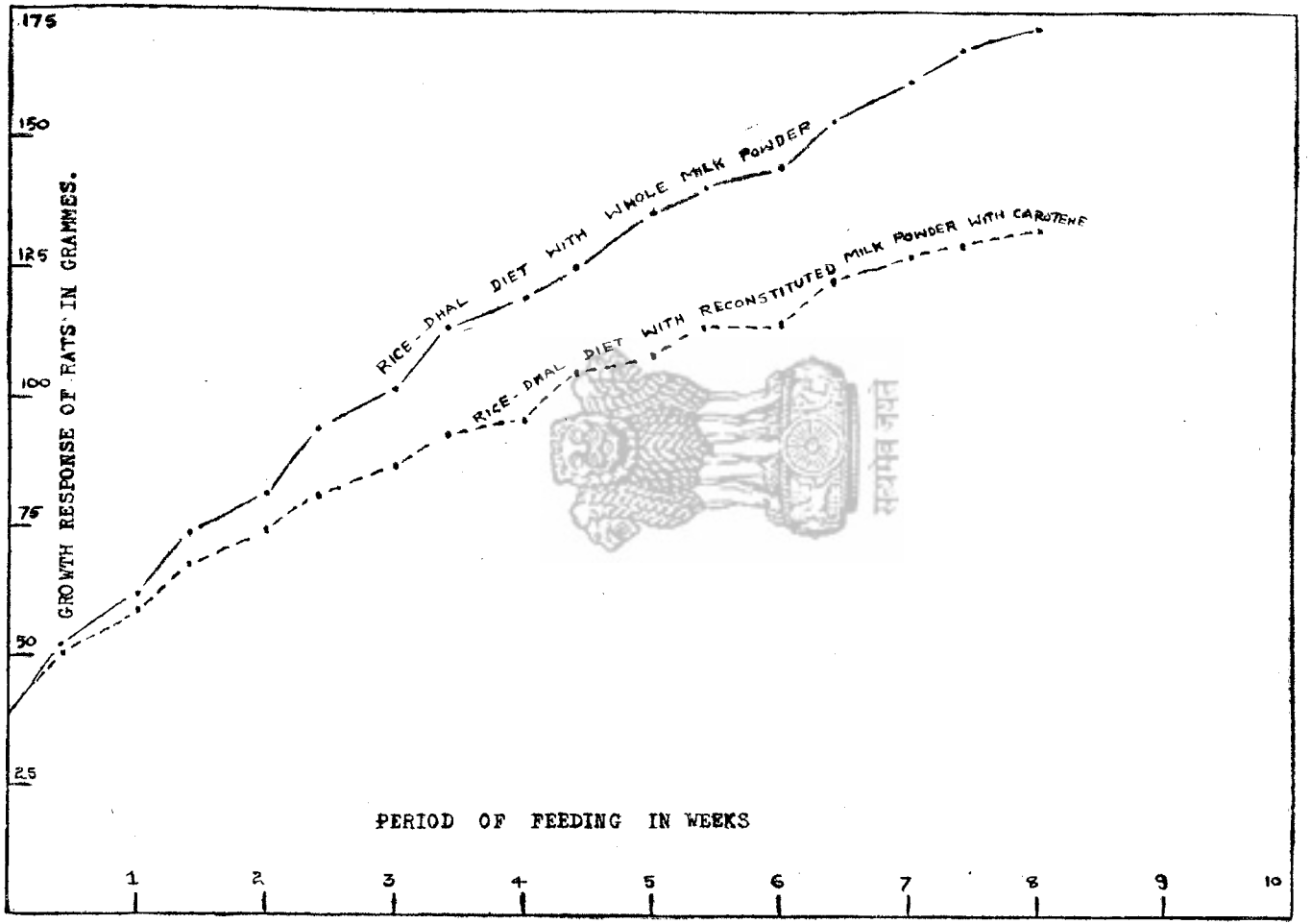

175
150
125
100
75
50
25
GROWTH RESPONSE OF RATS IN GRAMMES.
RICE-DHAL DIET WITH WHOLE MILK POWDER
RICE-DHAL DIET WITH RECONSTITUTED MILK POWDER WITH CAROTENE
PERIOD OF FEEDING IN WEEKS
1
2
3
4
5
6
7
8
9
10

FIGURE III

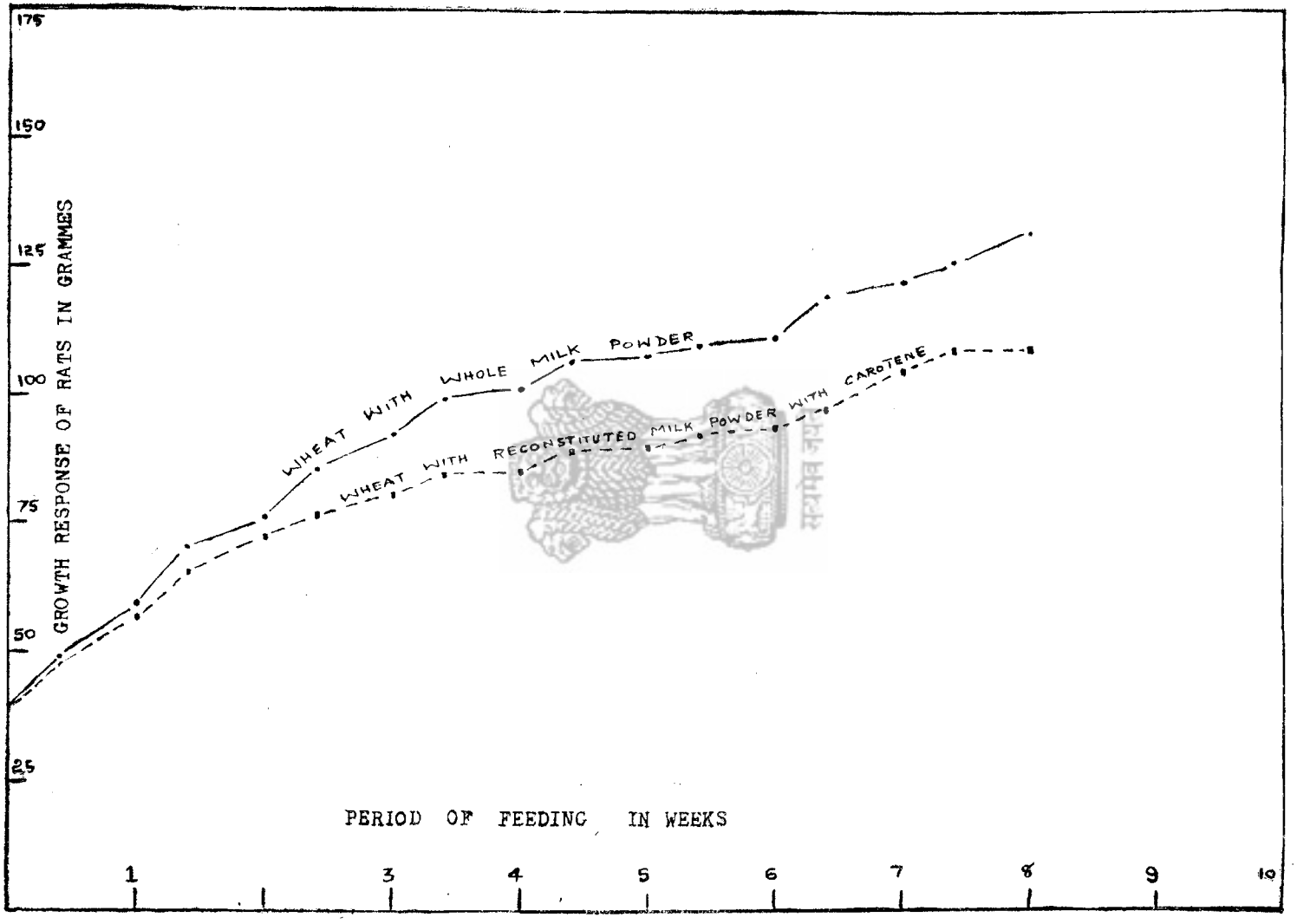

175
150
125
100
75
50
25
GROWTH RESPONSE OF RATS IN GRAMMES
WHEAT WITH WHOLE MILK POWDER
WHEAT WITH RECONSTITUTED MILK POWDER WITH CAROTENE
PERIOD OF FEEDING IN WEEKS
1
3
4
5
6
7
8
9
10

FIGURE II

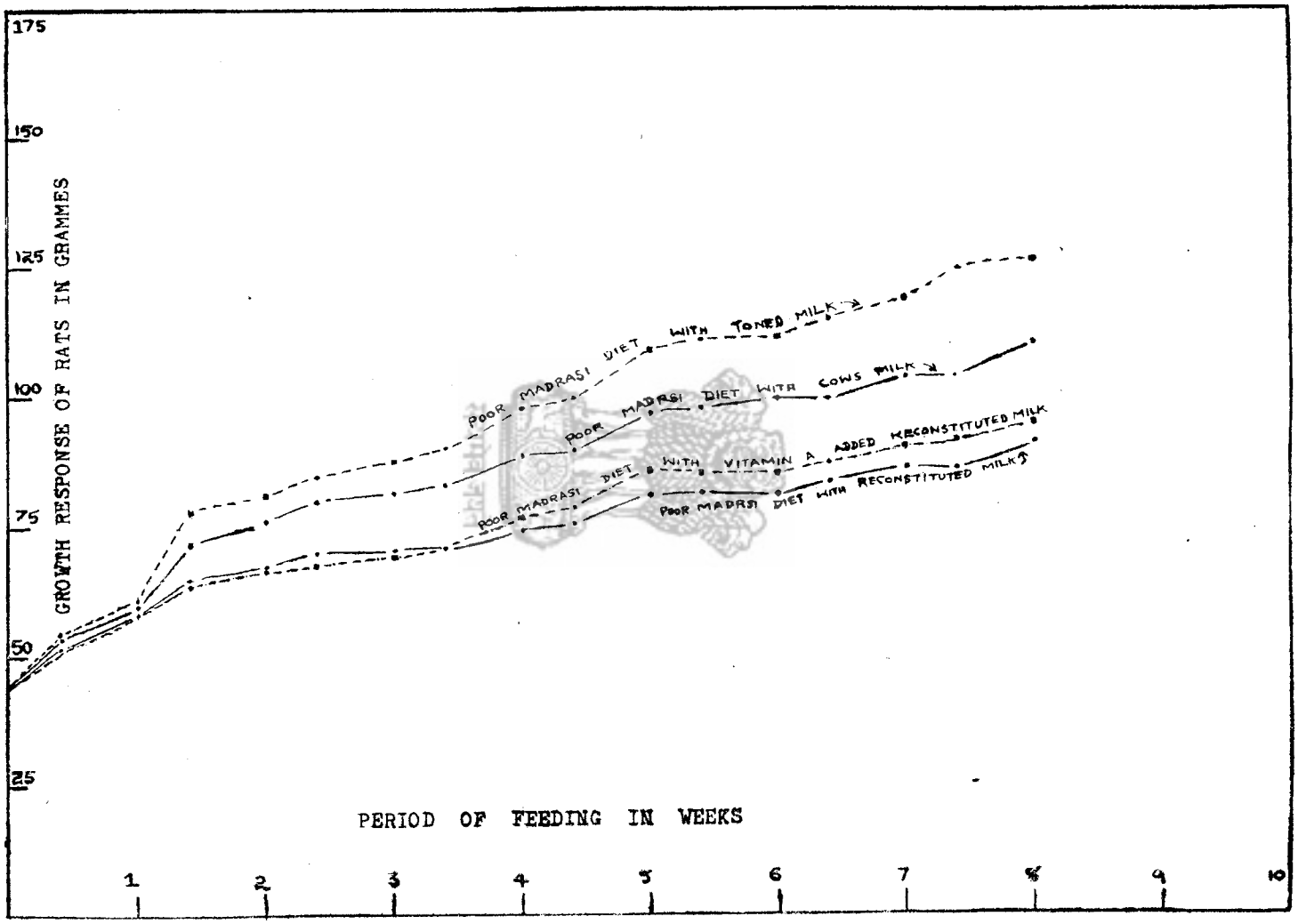
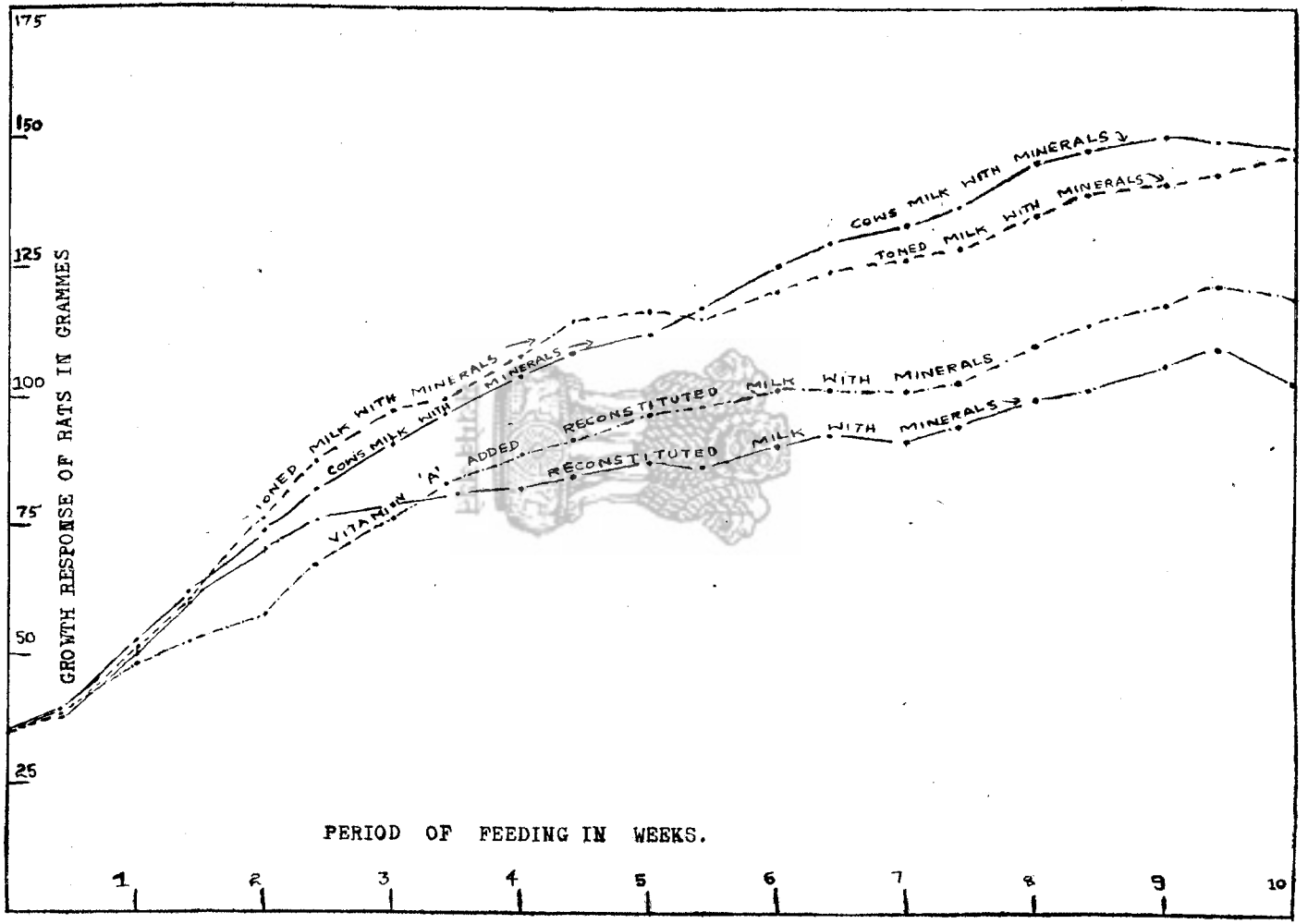

175
150
125
100
75
50
25
GROWTH RESPONSE OF RATS IN GRAMMES
POOR MADRASI DIET WITH TONED MILK
POOR MADRASI DIET WITH COWS MILK
POOR MADRASI DIET WITH VITAMIN A ADDED RECONSTITUTED MILK
POOR MADRASI DIET WITH RECONSTITUTED MILK
PERIOD OF FEEDING IN WEEKS
1
2
3
4
5
6
7
8
9
10

FIGURE I


175
150
125
100
75
50
25
GROWTH RESPONSE OF RATS IN GRAMMES
COWS MILK WITH MINERALS
TONED MILK WITH MINERALS
TONED MILK WITH MINERALS
COWS MILK WITH MINERALS
RECONSTITUTED MILK WITH MINERALS
ADDED VITAMIN 'A'
RECONSTITUTED MILK WITH MINERALS
PERIOD OF FEEDING IN WEEKS.
1
2
3
4
5
6
7
8
9
10