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4. Extra income is obtained more commonly through working as casual labourers in the neighbouring wet area and casuarina plantations.
5. The chief cash crops giving a very high return are tobacco and chillies, the former as nurseries only.
6. The high water table, 4 to 8 feet, enables the farmer to raise even three crops in the year, including nurseries, though hand watering is the rule.
7. There is ample scope for greatly increasing the yields by more and more intensive manuring.

Conclusion

The economic position of the submarginal farmers of Bapatla is not so bad as may be imagined. There is scope for increasing their income considerably by means of heavier application of manure, particularly artificials. More farmers should be helped with finance to maintain buffaloes so that they can supplement their income by sale of milk. The other directions in which they should be helped are: removal of illiteracy, better houses and better sanitation.

AN ENQUIRY INTO THE ECONOMICS OF MILK PRODUCTION AND DISTRIBUTION IN THE CITY OF MADRAS

by

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Introduction

Although it is agreed on all hands that the most perfect single food for man is milk, very little is known about the economics of its production and distribution beyond the qualitative fact that its inadequate supply has been a serious menace to the health of the people, particularly in large urban centres. When therefore at the last session of the All India Agricultural Economic Conference at Hyderabad it was decided that Economics of Milk Production and Distribution should be a topic for discussion this year, I welcomed the decision as affording an opportunity for a scientific study of the subject. Accordingly an enquiry was started under my supervision into the economics of milk production and distribution in the city of Madras. The salient features of his enquiry are summarised in this paper, the details having been reserved for a more elaborate thesis to be published at a later stage.

Method of Investigation

The enquiry has been confined to cows' and buffaloes' milk only; goats' milk has been left out, as the quantity of milk involved is not considered statistically significant. A preliminary investigation into the records of the Corporation of Madras revealed that there are 2030 licensees in the city, who own among themselves 12,248 cattle and buffaloes. The licensees are distributed throughout the 50 divisions of the city. In the absence of a special staff, it was not possible to undertake a 'census survey'. A random sample survey was, therefore, undertaken. The city was divided into 5 zones and 1/8th of the number of licensees in each zone was selected at random for the enquiry. A comprehensive questionnaire was drawn up for the purpose and the enquiry was entrusted to five investigators, one for each zone. The investigating staff could not complete the enquiry in respect of all the 250 licensees originally selected, as some of the licensees had either changed their residence or had given up the milk trade. A further sampling was made to complete the required number. The list of additional samples was followed up for some time, but in the end, complete replies to the questionnaire could be got in respect of only 228 licensees as some of them could not be traced at all and some were evasive and reluctant to answer the questions put to them. Even in respect of the 228 licensees who responded to the enquiry, few kept regular accounts.

The 228 licensees who responded to the investigation owned among themselves 2160 animals, of which 1594 were adult cows and buffaloes and 566 calves. This works out to an average of 8.23 adult animals per licensee, taking two calves as equivalent to one adult animal. Of the 1594 adult cows and buffaloes, 1388 were in the possession of licensees in the city and 206 were dry animals that had been sent to the salvage farms outside the city. Of the 566 calves, 20 were outside the city either in salvage farms or with private persons who had undertaken to rear them and the remaining 546 were with the licensees in the city.

Of the 1388 adult animals in the possession of the licensees, 534 or 38.47% were cows and 854 or 61.53% were buffaloes. The cattle for the city's milk supply are chiefly drawn from 'Ongole' stock. 263 out of the 534 cows belonged to this stock accounting for 49.2% of the total number of cows. The breeds coming next in importance are the 'English', 'Country', 'Cross', 'Northern' and 'Scindi' accounting for 24.2%, 10.3%, 9.9%, 6.0% and 0.4% respectively of the total. As regards buffaloes, the 'Ongole' breed was, as in the case of cows, the most popular, the number of animals owned viz., 593 accounting for 69.4% of the total; 'country' and 'Northern' breeds of buffaloes totalled 215 (25.2%) and 46 (5.4%) respectively.

Age and calving of animals

The average age of animals of all breeds in the possession of licensees was 7.18 years. In almost all the cases enquired into, the animals had calved thrice. Normally an animal begins to calve when it is between 3 and 4 years old and the average interval between the first and second calving is usually 15 to 18 months. After the third calving the animals are disposed of, as their yield will be low. The period of lactation varies from breed to breed and animal to animal. The animals, both cows and buffaloes, are in lactation for a period ranging from 5 to 9 months. When the animals in lactation are crossed, they continue to yield milk though in diminishing quantities for a further period of 2 to 3 and even 4 months in some cases.

Yield of milk

Out of 1388 animals in the possession of the licensees during the period of enquiry, 1143 animals or 82.35% were in lactation. Of the 1143 animals in lactation, 430 or 37.62% were cows and 713 or 62.38% buffaloes. The average milk yield per day of an animal according to enquiries made of licensees was 1.8 measures. The average yield of a cow was 2.0 measures and that of a buffalo was 1.6 measures.

The following statement shows the milk yield of cows and buffaloes of different breeds:—

Breed	Cow or Buffalo	Yield of milk per day in Madras measures (1 Madras measure = 4 lbs,)
Ongole	Cow Buffalo	1.9 to 2.5 1.6 to 2.3
Northern	Cow Buffalo	1.9 to 2.5 2.7 to 3.6
English	Cow	2.4 to 3.5
Cross	Cow	2.3 to 3.3
Country	Cow Buffalo	1.3 to 1.8 1.4 to 1.9
Scindi	Cow	4.0 to 4.5

The yield of milk is dependent largely on the quantity and quality of cattle feed consumed by the cattle. The productivity of the available pasture should be improved by growing crops rich in protein to feed cattle. Increasing use should also be made of concentrates. By adopting such methods the United Kingdom has been able to increase

its milk supply in spite of the fact that part of the land previously used as pasture was diverted to food crops.

Practices obtaining in the sale and distribution of Milk

Two practices are in vogue in the sale and distribution of milk, namely (1) the animals are taken to the consumers' residence and milked there (2) they are milked in the licencees' sheds and the milk is disposed of there or is sold outside for cash or credit. Both practices are also combined by some licensees. About 35% of the licensees who own cows and about 25% of the licensees who own buffaloes resort to the first practice and about 25% of the licensees who own cows and 49% of the licensees who own buffaloes resort to second practice. The remaining licensees follow both methods according to circumstances. The retail market price of milk was found to vary from Rs. 1-4-0 to Rs. 1-8-0 per Madras measure, buffaloes' milk being more costly than cows' milk. Prices in the case of milk drawn in the cattle sheds of milkmen and delivered at consumers' houses ranged from Rs. 1-2-0 to Rs. 1-4-0 per Madras measure depending on the extent of adulteration. The total quantity of milk yielded per day by the 1143 animals in lactation covered by the enquiry was 2035 measures. Of this 1936 measures (or 96%) were sold to customers and the remaining 89 measures (or 4%) were retained for personal consumption or preparation of curds.

The sale and distribution of milk would be considerably facilitated by the formation of a Milk Marketing Board which will be an organisation of producers. The formation of such a Board will help in avoiding waste and ensuring a pure, regular, co-ordinated and reasonably cheap supply of milk to consumers and provide opportunities to individual milkmen, who in this country are unorganised, to market their produce efficiently. The Milk Marketing Board should draw up priority of consumers and afford high priority to children, expectant mothers and the poor. Arrangements should also be made to supply milk to the latter class of consumers at specially cheap prices. The Milk Board should also have a well-organised means of transport for distribution and own a good number of lorries to facilitate collection and distribution of milk. The Board should function under the direction of the Government which should fix fair prices for milk after taking into account the producers' costs. In the United Kingdom, for example, there is an organisation of this kind. Most of Britain's farmers (about 70%) keep only 15 cows or less. The Milk Marketing Board consisting of 15 representatives elected by farmers and 2 co-opted members welds the producers into a national organisation and gives the smallest dairy farmer the same protection and advantages in selling his milk as that enjoyed by the richest and most

powerful producer. If functions due to the goodwill of producers, but is subject to control by the State. Every dairy farmer in England must be its member and sell his milk through it. The Board draws up priority of consumers and advises the Government in fixing the prices which the producer should receive for his milk.

Financial aspects of the milk trade

The following statement shows the receipts and expenditure of the 228 licensees covered by the enquiry.

Receipts per month	Rs.	a.	p.	*Expenditure per month*	Rs.	a.	p.
Value of milk sold to consumers	81,183	0	0	Cattle feed* .. .	61,312	0	0
Value of milk utilised for personal consumption	3,087	0	0	Cost of maintaining dry animals outside city	1,778	0	0
Value of milk products	461	0	0	Rental charges	1,358	0	0
Income from cow dung sold as fuel	733	0	0	Wages for servants	4,954	0	0
Sale value of calves	1,655	0	0	Interest. on capital investment at 4%	1,780	0	0
Total ..	87,119	0	0	Licence fees	266	0	0
Average per licensee	382	0	0	Total ..	71,448	0	0
Average net income of a licensee..	69	0	0	Average per licensee ..	313	0	0

The above amount was spent on 1388 adult animals and 546 calves taken as equivalent to 273 adult animals.

The average number of animals per licensee, the gross income, expenditure and the net income or profit per animal per month are shown below:—

Average number of equivalent adult animals owned by the licensee = 8.23

	Rs.	a.	p.
Gross income per animal per month	46	6	7
Average expenditure per animal per month	38	1	1
Net income or profit per animal per month	8	5	6

**Details of amounts spent on several items of cattle feed.*

Item.				Expenditure per animal.			Percentage Expenditure on each item to total expenditure.
	Rs.	a.	p.	Rs.	a.	p	
Straw	21,707	0	0	13	1	1	35.4
Oilcakes	17,054	0	0	10	4	4	27.8
Husk (of all types)	15,295	0	0	9	3	4	24.9
Bran (of rice & wheat)	4,664	0	0	2	12	11	7.6
Cotton seed (not largely used due to high cost)	277	0	0	0	2	8	0.5
Other items (Broken pulses, flour, greens, etc.)	2,315	0	0	1	6	3	3.8
Total ..	61,312	0	0	36	14	7	100 0

It will be seen from the above that the margin of profit accruing to each licensee from his trade is very slender and is hardly adequate to maintain himself and his family, unless he takes to subsidiary occupations or, as he often does, resorts to the easier proposition of adulterating milk.

Adulteration of milk

Adulteration is a practice widely prevalent in the milk trade; the penalties imposed by the Food Adulteration Act cannot fly in the face of economic facts of the situation. The Public Analyist employed by the Corporation of Madras examines annually not less than 2000 samples of food, a majority of which are those relating to milk. Statistics of samples tested by him in August 1949 show that out of 230 cases examined 164 cases or 70% nearly, were adulterated. The proportion of water added to milk in the case of 164 samples examined varied from 4 to 70% and the average percentage was about 22.

The milkmen who are convicted of adulteration are fined in a court of law and though the total amount of fines realised is considerable (about Rs. 40,000 anually), the penalty to the individual ranged only from Rs. 10 to 50. Obviously, it is more economic to pay the fine than to give up the malpractice.

It cannot, however, be said that the entire quantity of milk produced is adulterated. Adulteration generally takes place only in respect of milk drawn at the milkmen's sheds and sold to customers outside. The value of both pure and adulterated milk sold by the 228 licensees is estimated at Rs. 84,869 per month as against Rs. 81,183 if the entire quantity of milk produced is sold unadulterated. The average net income of a licensee would consequently increase from Rs. 69 to Rs. 83 per month.

Maintenance of cattle sheds

The rules regarding the maintenance of cattle sheds are stringent and are calculated to ward off infectious diseases both for man and beast. According to these rules, the owner or occupier of any such premises should cause the flooring of every building in such premises to be paved or otherwise made impervious. He should cause such flooring to be grooved and sloped towards an impervious masonry drain which in unsewered areas in the city should be shallow and discharge into a grit chamber and should be connected with a public drain. In sewered areas such drains should be provided with suitable traps and connected with the sewers. When there is no public drain or sewer, the drain from the

premises should discharge into a masonry cistern which should be completely emptied and cleansed at least once every 24 hours. If these rules are observed much improvement can be expected in the health of man and animals.

Cattle diseases

The enquiry showed that 102 animals belonging to 79 licensees were affected by cattle diseases during the period of 12 months preceding the enquiry. The licensees were rather reluctant to give out the number of animals affected by diseases, as they feared that their licences might be cancelled. They generally pleaded for better medical facilities. The following statment shows the number of animals affected by various diseases and the percentage of mortality among the animals attacked.

Disease	Total number of attacks.	Percentage to the Total	Total number of deaths	Percentage of mortality amongst cattle.
Foot and mouth	80	5.02	35	2.20
Diarrehoea	14	0.88	8	0.50
Anthrax	8	0.50	8	0.50
Total ..	102	6.40	51	3.20

Diseases among cattle can be effectively controlled through the provision of adequate veterinary assistance. All milch animals should be subjected to official veterinary inspection and suitable provision should also be made for treatment of diseased animals at low cost to the owner. Periodical tests should be conducted and the animals found to suffer from tuberculosis should immediately be removed. Animals showing any sign of disease which may contaminate milk must be segregated and removed, if necessary.

In the United Kingdom there is a scheme for the control of disease of dairy cattle which enables a farmer, on payment of a flat rate fee, to obtain advice and treatment from the veterinary surgeon for certain diseases. The state also provides a free laboratory service for diagnosis and free or inexpensive material for treatment. All herds which have passed tuberculin tests are subjected to a periodical test for tuberculosis and animals reacting to the test are removed. These herds also have to undergo a routine veterinary inspection twice a year.

The Bombay Plan

The experience gained by other province may be a guide in formulating a milk plan for this Province. A milk plan drawn up by the Dairy

Development Adviser to the Government of India (Mr. Z. R. Kothawala) for Bombay and which has been working successfully from 1946 is reported to have virtually doubled the city's milk supply. Under the Bombay Plan it was proposed to start several modern well-equipped 'milk colonies'—groups of farms with a central dairy. Two milk colonies have been established. The Milk Commissioner who is in charge of the scheme is vested with considerable powers. The plan is to remove all the milk stalls out of Bombay and to efficiently co-ordinate production and supply. There are about 50,000 milk buffaloes in the city. Under the plan the Milk Commissioner has already taken over 25% of the milk supply of that city. His organisation purchases milk on quality basis from producers and the milk production in the city is supplemented by imports from the mofussils. Milk is suitably treated and distributed by the Commissioner at various centres. The Milk Commissioner has two Advisory Committees, one consisting of producers and the other of consumers.

The present supply position of milk in Madras city and steps taken to improve it

The total quantity of milk consumed in the city of Madras is about 30,000 measures per day consisting of 16,500 measures produced in the city, 11,500 measures imported into the city from rural parts and 2,000 measures produced at the Government milk factories. The present population of the city is nearly 15 lakhs and the per capita consumption of milk on this basis works out to 1.28 oz. per diem. This is very low when compared with the per capita consumption for other cities and countries outside. The per capita consumption of milk ranged from 2.5 oz. in Cuttack to 22.7 oz. in Delhi and from 10.1 oz. in Italy to 56.8 oz. in Canada.

With a view to increasing the per capita consumption to 16 oz. per day, the Director of Animal Husbandry has drawn up a tentative scheme, the main features of which are:

1. The appointment of a milk Commissioner.
2. The stepping up of production of milk by importing better cattle and judicious breeding.
3. Starting of a large-scale Dairy farm at Vandalur with dry and young stock at Guduvancheri reserve forest area.
4. Encouraging the formation of Private Dairy farms outside the city.
5. Formation of milk co-operative societies outside the city limits.
6. Arranging for adequate cattle feed at reasonable prices.

Mr. Z. R. Kothawala, the Dairy Development Adviser has offered certain tentative remarks on the scheme and the Government propose to invite him for a detailed discussion.

To increase the per capita consumption to at least 8 oz. immediately, it will be necessary to distribute and supply 7.5 lakhs of lbs. of milk per day and for this purpose the present supply should be increased by nearly six-fold.

In 1945 the Government of Madras sanctioned a sum of Rs. 4.20 lakhs for the grant of loans to members of Milk-Co-operative Societies. In 1948 a Dairy Development Officer was appointed with a view to improving the milk supply in the Province. He is charged with

(a) organisation of milk supply societies in the Province.

(b) Strengthening of existing milk supply societies and unions.

(c) Supervision over the working of milk supply Societies and

(d) Provision of technical advice and veterinary assistance.

The Government of Madras have also empowered the Registrar of Co-operative Societies to sanction interest-bearing loans to the Madras Co-operative Milk Suppy Union for purchase of motor vehicles for transporting milk from the rural areas to the city. They have, besides, approved several other measures suggested by the Registrar of Co-operative Societies for the salvage of dry cows, starting of breeding societies, co-operative creameries etc. A scheme for cattle insurance is also under the consideration of the Government. A 3-year plan for livestock development and for increasing production and distribution of milk is now in progress.

Indian Plan

Reference may also be made in connection with the 5-year milk plan of the Central Government. This plan aims at an overall increase in the output of milk in the country by about 10% in 5 years' time against 25% required to provide the optimum nutritional requirement (8 ozs. fluid milk and 8 ozs. of milk products) per head of population per diem. This will involve the establishment of 4206 organisations of different types. 6397 factories of all types and equipment and appliances costing huge sums of money will also be required. It also aims at providing breeding bulls for improving the villagers' cow. The Military Dairy farms are proposed to be used to the fullest extent for the purpose. The plan gives prominence to co-operative methods and is drawn with the object of providing education and research facilities for the personnel. The central government have advised the provincial governments to

take steps to ban the slaughter of useful cattle. A bill on this subject is under the consideration of the Government of Madras.

Summary

The cardinal features of the problem of milk supply in Madras city are:

(i) uneconomic production and distribution

(ii) inadequate production and

(iii) appallingly low consumption

All these are interrelated.

As long as the milk man and his family have to be content themselves with an average net imcome of Rs.69 per month, adulteration will continue to be practiced to increase the income to Rs. 83 and more. Anti-adulteration laws are no solution to a problem which is intrinsically economic. If punishments are made more deterrent, the result may only be less production of milk, higher prices, less consumption and a consequent deterioration in the health of the population.

The aim, therefore, should be not only to increase the supply of milk but also to make the milk trade an economic proposition. The plan suggested earlier, if implemented, would go a long way in not only stepping up production but also ensuring purer supplies. In the meantime, however, prices of cattle feed in the city may have to be subsidized as in the case of foodgrains; ampler veterinary facilities should be afforded to milkmen and better cattle and selective breeding need encouragement. The milk trade in the city is an unorganised one and the authorities have a great responsibility in the matter. The milkmen must be organised and to enable them to safeguard their interests a Milk Marketing Board consisting of their elected representatives should be constituted on the lines of the British Milk Marketing Board. The Board should undertake the collection of all the milk produced as also its distribution according to priorities drawn up and at prices fixed by the Government. The strength and vitality of the future generations depend on the quality and quantity of milk our children now consume.