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# RAPPORTEUR'S REPORT

## ON

### DAIRY DEVELOPMENT AND BOVINE ECONOMY

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As many as forty-three papers were received on this subject for discussion at the Conference. The synopsis circulated to the paper-writers covered a wide range of important topics related to this subject. Most of the papers submitted for discussion, however, clustered around either the economics of milk production or dairy industry and economic development. Papers were received from all the major regions in India but a majority of them are hastily drafted.

For the purpose of the present review, these papers have been classified into five broad categories, *viz.* : (i) Dairy industry and economic development, (ii) Organizational structure, (iii) Economics of milk production, (iv) Availability of institutional finance for dairy farming, and (v) Impact of dairy development on socio-economic conditions of dairy farmers.

#### DAIRY INDUSTRY AND ECONOMIC DEVELOPMENT

Out of eight papers which considered this aspect, three dealt with the problem at the national level and the rest analysed the data either at the State or district level.

R. P. Singh, M. K. Chaudhry and Himmat Singh have worked out the compound growth rates of various categories of bovine in Haryana during 1961-66 and 1966-72. Using these growth rates, they have projected the bovine population for the year 1977. For this purpose, secondary data from the livestock censuses for 1961, 1966, and 1972 have been used. It is observed that the cattle population recorded a negative growth rate of 0.16 per cent during 1961-66 but it increased to 0.90 per cent during 1966-72. In the case of buffaloes, the growth rates are estimated at 3.10 and 3.80 per cent during 1961-66 and 1966-72, respectively. The higher growth rate in the case of buffaloes is attributed to their popularity for higher milk (also fat) yielding capability (in comparison to indigenous cows) in the case of she-buffaloes and relatively low prices of male-buffaloes compared to the bullocks. The male working buffalo is particularly preferred in the sugar factory areas. The growth rate in respect of bullocks declined to 0.20 in the second period compared to 0.70 estimated for the first period. The decline is attributed

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to mechanization. The growth rate in respect of male working buffaloes is 5.20 per cent during 1961-66 and it just doubled during 1966-72. It does not seem appropriate to use the projected figures for planning purposes because they are based on growth rates calculated for a very short period.

A. C. Gangwar examines the inter-district variation in bovine population, cost structure, and production and disposal of milk in Haryana. The proportion of cattle in milk is reported to be higher in the dry districts and that of buffaloes in the wet districts of the State. Thus the Burns' hypothesis is found to hold good with respect to the proportion of wet cows and buffaloes in various districts of Haryana.

D. K. Sohoni, S. L. Deshpande and C. K. Joshi observe that in Akola district (Maharashtra) the drought in 1970-71 reduced the working buffalo population by 57.64 per cent over 1961 but the population of milch animals remained unaffected. Further, the milch buffaloes increased at a faster rate of 4.57 per cent compared to 0.96 per cent increase in the milch cows during the same period in the district.

K. R. Pichholiya describes the bovine economy of Panchmahals district in Gujarat. He reports that cattle and buffaloes increased by 11.15 and 20.30 per cent during the period of sixteen years ending 1972.

K. N. S. Sharma, R. K. Patel and Surendra Singh work out the economic demand for milk at 36.68 million tonnes in 1978 for India as against the requirement of 50.44 million tonnes based on nutritional standard of 210 gm. per capita, per day. According to them, the milk production should increase at the rate of three million tonnes annually upto 1976, four million tonnes annually between 1976-1979 and upto five million tonnes annually thereafter so as to bridge the increasing gap between the demand and availability. V. K. Gupta and R. K. Pandey also project the demand and supply of milk in India for the years 1979, 1984 and 1986. They estimate the gaps between demand and supply of milk in the country ranging from 4.5 million tonnes in 1979 to 8.6 million tonnes in 1986 on the assumption of 250 gm. per capita milk consumption per day. The accuracy of demand projections would depend upon the validity of the estimates of income elasticity of demand for milk, the formula for projection of milk requirements and population estimates used. In spite of an estimate of 1.6 for income elasticity of demand for milk used in the Fifth Five-Year Plan document, the preference of the authors (Gupta and Pandey) to use just half the value from F.A.O. source does not appear to be justifiable. Moreover, both these studies seem to have under-estimated the supply of milk as the likely shift for the better in the quality and composition of milch animals in the future is completely ignored.

A. R. Rajapurohit estimates the bovine feed availability and requirements in Karnataka at district level for the year 1972. The availability-

requirement ratios are less than unity for all districts, for both dry and green fodder suggest an important resource constraint for dairy development. He observes a vicious circle of low feed levels leading to low milk yields necessitating the keeping of more animals leading to low feed levels. The way to reduce the gap between availability and requirements of fodders is either through increasing the fodder supply or by reducing the number of bovines or both ways. It is true that the efficiency of draught animals as well as milk production will increase by the process of elimination but the necessary institutional arrangements may be difficult to provide. For instance, the small and marginal farmers may not afford to keep stronger and more efficient animals, thus, may suffer in the process.

V. T. Raju reviews the dairy development problems of milk production and pricing in India. It is mostly a cut and paste work. He emphasizes the need for cross-breeding, artificial insemination and feeding programmes for solving the problems of milk production. Stress has also been laid on the determination of milk prices according to the compositional quality rather than basing it on demand-supply equilibrium only. He advocates the "Two-axis Pricing Policy" developed by the National Dairy Development Board, Anand, whereby producers of milk are rewarded both for fat and solids-not-fat and adulteration is discouraged.

To sum up, the role of dairy industry in economic development, its past performance and future prospects have just casually been mentioned without resorting to any empirical evidence. Similarly, the trends in bovine population, supply and demand for milk have not undergone the rigours of sophisticated analysis and are based on crude assumptions. Almost all the papers have tried to project bovine population on the basis of the data given in the last three livestock censuses held in 1961, 1966 and 1972. It would have been better to use a longer time-series as it would add precision to the estimates. Similarly, the likely shifts in supply of milk due to the introduction of cross-breds should have been incorporated in the models used to get the supply estimates.

#### ORGANIZATIONAL STRUCTURE

R. Kunwar, Y. S. Chauhan and Ram Iqbal Singh find that the co-operative management in dairy enterprise is superior to the public management in respect of processing costs, fixed and working costs per milch animal, milk production per milch animal per annum, cost of production per litre of milk and also the selling prices for milk. The authors, however, do not provide the details of their methodology which makes it difficult to agree with their conclusion. Further, the authors have not examined the performance of dairy industry in the private sector.

Contrary to the finding of the above study, J. S. Garg and V. Prasad have investigated the problems faced by the Co-operative Milk Board, Kanpur, which resulted in its poor performance. Under-utilization of milk processing plant was noted to result in high overhead costs. The plant processed only 12,500 litres against its installed capacity of 50,000 litres of milk per day. As such the Milk Board is not getting enough profits to meet depreciation and interest charges on buildings, machinery and plant, even after collecting milk with 6.5 per cent fat at Rs. 2.20 per litre and selling standardised milk with 3 per cent fat at Rs. 2.40. Given this, an observation by the authors that only a small percentage of the milk producers are allowed to take advantage of the Milk Board programme seems to be self-contradictory because the milk producers should lose rather than gain by becoming the members of the Co-operative Society.

The section may be concluded by saying that sufficient evidence has not been generated to clearly establish the superiority of one form of organization over the other in respect of economics of milk processing.

#### ECONOMICS OF MILK PRODUCTION

This topic attracted the maximum attention of the researchers and as many as 24 papers covering almost all the regions of the country were received. Most of the studies were based on survey data while a few used secondary and experimental data.

A. C. Gangwar has observed the costs of milk production per litre at Re. 0.79 and 0.82 (excluding labour costs) in the case of cows and buffaloes respectively. His conclusion, however, that the cost of milk production could further be reduced in the case of buffaloes by curtailing the expenses on concentrates, appears to be unfounded.

By using the data from a survey conducted by the Institute of Agricultural Research Statistics, New Delhi during the year 1963-66 in Hissar district of Haryana, P. Kumar, R. K. Patel and K. C. Raut have fitted Cobb-Douglas type of milk production functions on per milch animal basis for Haryana breed of cows. They suggest a great scope for increasing milk yields by way of manipulation of feeding levels, particularly for cows running in the third and fourth lactations. The data used are rather outdated. No one may, however, disagree with them for giving due weightage to milch stock in different lactations in order to have precise estimates of supply of milk. But studies on continual basis are needed in different regions of the country to make such information available. Moreover, the benefits and costs of opting for less precise supply estimates *versus* gaining precision in information have yet to be estimated.

Parmatma Singh and Dayanatha Jha study the economic optima in milk production for Murrah and non-descript buffaloes separately in Etah district of Uttar Pradesh and suggest a significant scope for raising milk production by readjustment of the feed inputs in the summer and rainy seasons.

P. L. Sankhayan and A. S. Joshi have fitted milk production functions to a randomly selected sample of 40 each of indigenous and cross-bred cows in Ludhiana district of Punjab. They have observed higher marginal value products of concentrates in the case of indigenous breed and that of dry and green fodder in the case of cross-bred cows. This, in turn, indicates that the dairy farmers fed relatively larger quantities of concentrates to the cross-bred cows and dry and green fodders to the *desi* cows. A comparison of marginal value products of concentrates and fodders with their corresponding per unit costs suggests that the returns from milk can be increased by intensifying their use in both the breeds. However, no conclusion could be reached regarding the technical efficiency of milk production through the indigenous and cross-bred cows because of the limitations of data used which do not take into account the full lactation period, dry period and seasonality.

O. P. Chhikara and A. C. Gangwar have worked out the marginal value products of different resources that go into the production of milk for cows (probably indigenous), Murrah buffaloes and cross-bred cows in Jind district of Haryana. It is not clear what sensible purpose would have been served by using data on the basis of agricultural year unless the milch animals behave like agricultural crops. Moreover, important explanatory variables such as preceding dry period, lactation number, weather, etc., have been ignored in estimating the production functions. Most disheartening of all is the conclusion of the authors about the scope for increasing the milk output (they probably mean value of it) by using more of the inputs which in fact should be just the reverse.

The net profits per year were reported to be higher by Rs. 800 per animal in the case of cross-bred cows compared to that for buffaloes in eastern Uttar Pradesh by B. B. Singh. The cost of milk production per litre of milk was found to be Rs. 1.55 in the case of buffaloes as against Re. 0.99 in the case of cross-bred cows. Neither the form of Cobb-Douglas type of milk production function as given by the author nor the claim of trying quadratic type of milk production function is correct. It is infeasible to fit a quadratic equation with five independent variables when the observations are only ten as in the case of cross-bred cows.

The yield of milk per milch animal per day and the annual maintenance costs show an increasing trend with an increase in the size of farms in a study by G. S. Lavania, B. D. Shukla and R. S. Dixit in Varanasi district of Uttar Pradesh. However, the regression analysis shows that the medium sized cultivators are presently incurring excess expenditure on milk production.

The cost of milk production is around Rs. 1.50 per litre on different farms for both the cows and buffaloes.

A study in Erthan and Takarama villages of Olpad taluk of Surat district (Gujarat) by V. K. Madalia and A. S. Charan shows that the cost of maintenance of a buffalo calf and dry stock increases with an increase in the size of land holding while the reverse trend is noted for cow calf. The net income per day per milking animal is reported to be highest in the case of medium sized farms (5.01 to 10 acres) and the farmers in this group followed by landless labourers are more efficient in producing milk. It is, however, not clear as to how the findings of the authors regarding the cost of maintenance vis-a-vis farm size can be usefully utilized either by the policy-makers or by the farmers.

R. I Singh, G. N. Singh and R. K. Singh report that the cost of milk production shows slight decline with an increase in the farm size both for the cows and buffaloes in Dhanipur block, Aligarh district (U.P.). On the contrary, they observe that the cost of maintenance per cow and buffalo is higher on the large farms compared to that on the small. It is rather surprising that the authors should work out milk production functions on per hectare rather than on per animal basis. Also, proper interpretation of the fitted function is lacking.

I. V. Parthasarathy feels that the procurement price offered by the Integrated Milk Project (Rs. 1.75 per litre) is not commensurate with the cost of production (Rs. 1.48 per litre) nor does it leave adequate margin for the development of dairy industry around Vijayawada in Krishna district (Andhra Pradesh). This causes predominance of private agencies in the milk trade.

By comparing the cost of raising a cross-bred and a Sahiwal cow upto their dates of conception and age of first calving, J. S. Garg, and M. P. Azad have reported that the cross-bred cow is relatively economical.

By taking the data from 30 farmers of five villages selected purposively from Kalyanpur block in Kanpur district (U.P.), H. L. Srivastava and G. N. Singh have worked out the cost of maintenance of a cow and a buffalo. They also worked out the cost of production of milk and input-output ratios in the production of milk. They find that the net maintenance cost per "inter-calving" is Rs. 1,079.46 and Rs. 1,351.44 and the cost of production per litre of milk is Rs. 1.64 and 1.37 for the cow and buffalo, respectively. The authors have confused even the elementary term "cattle" to include both the cows and buffaloes. They have concluded without any support from data that the milch animal maintained by the sample farmers are of poor breed and are also not fed properly and this resulted in lower yields per milch animal.



Kuber Ram and Kulwant Singh demonstrate that the cross-bred cows are economically superior to the best pure bred Zebu cows. The cost of milk production, calf rearing, lactation length, dry period and inter-calving period are lower in the cross-bred cows while the average milk yield is almost the double. The overall profit per cow per day is reported to be Rs. 5.29 in the cross-bred cows compared to Re. 0.19 in the pure-bred cows.

P. N. Kuwar has reported the findings of some earlier studies conducted in India by various institutions and individuals, *e.g.*, 'Cross-bred cows gave better performance in second lactation,' 'Cost of milk production is lowest in respect of cross-bred cows as compared to pure breeds of Indian cows and buffaloes,' 'Dairying was more paying than general cropping,' etc.

R. E. Waghmare and P. D. Diskalkar study the economics of maintenance and milk production in respect of cows and buffaloes in Mahad tehsil of Kolaba district (Maharashtra) on very small, small and medium farms. It is found that the cost of maintenance of a buffalo is lowest on the small farms on the 'A', 'B' and 'C' cost concepts. The same is precisely true about the cost of milk production per litre, profits per milch animal and profits for milk produced per farm. No explanation for the relatively better performance of the small farms (0.82 to 1.62 hectares) is, however, provided.

D. G. Parkale, D. V. Kasar and D. R. Pise have studied the newly established dairy project at Mahatma Phule Krishi Vidyapeeth, Rahuri (Maharashtra) for its costs, returns and profitability structure. One fails to understand the usefulness and validity of finding working costs, fixed cost of milk production and annual gross income from milk and its by-product on the dairy farm when the number of milch cows itself was undergoing change over the period. It would have been better to have analysed the data on per cow basis. Again, even the little attempt to compare the annual gross income per cow appears meaningless in view of the sharp changes in milk prices experienced during the period which have not been accounted for. One finds it hard, therefore, to agree with the authors that the increased gross incomes per milch cow are the result of efficient management. The net incomes per cow over three years would be acceptable for comparison only if the prices of inputs were to increase at the same rate as milk prices during the period.

A study of the comparative economics of Haryana and Rathi breeds of cows and Murrah breed of buffaloes maintained at the S. K. N. College of Agriculture, Jobner (Rajasthan) for the years 1969-71 by D. L. Sardiwal and J.C. Kalla shows that losses were being incurred in the case of all the three breeds. Since the dairy enterprise on this farm is mainly for research purposes, such results need not surprise any one. Therefore, the observations made by the authors would not be of relevance to the dairy farmers who have interest in the commercial aspects of the enterprise. The conclusion that

the sixth lactation of Haryana and Murrah breed and fifth lactation of Rathi breed are economical for milk production on the farm is neither based on convincing methodology nor does it have any relevance to the practical situations.

R. B. Singh and P. V. Krishna study the comparative economics of three private dairies in Meerut (U.P.). The maintenance cost of milch animals formed 87-90 per cent of the total expenditure. The net returns per litre of milk produced ranged between Re. 0.90 and Rs. 1.08. Their conclusion that more and more dairies can be opened in the co-operative or private sectors to benefit the producers, does not follow from the findings of the study.

A study on the economics of milk production under specialised dairy farming with Murrah buffaloes at the Haryana Agricultural University, Hissar, by R. N. Pal, A. S. Faroda, N. S. R. Sastry and R. S. Yadav shows that about ten buffaloes and their followers can be maintained on two hectares of land having 260 per cent cropping intensity and assured irrigation. The average net income per hectare works out to Rs. 2,347.09 from dairy husbandry as against Rs. 1,989.89 from mixed farming and Rs. 1,948.46 from arable farming.

From the foregoing review of the studies, it can be observed that the cost of milk production and cost of rearing cattle and buffaloes vary with the breed, region, management level, etc. As such, they are not exactly comparable. Further, none of the studies examines the appropriateness of the different concepts of costs of production as a guide to fixation of procurement prices by the milk plants. However, there seems to be a general consensus that the cross-bred cows are economical to keep as compared with the indigenous breed of cows and buffaloes and the cost of milk production is the lowest with the cross-bred cows.

#### AVAILABILITY OF INSTITUTIONAL FINANCE FOR DAIRY FARMING

P. S. George and U. K. Srivastava analyse the viability of a scheme initiated by the State Bank of India in Baroda district (Gujarat) in 1972 for financing the purchase of buffaloes. They observe that the dairy development scheme is viable and feasible from the point of view of both the direct beneficiaries and indirect beneficiaries and it provides a continuous source of income. The investment in the cattle development scheme is found to be justified on economic considerations. It is also shown that given adequate finances, dairying could be used as an effective means for increasing the income position of the rural poor. They have, however, not been able to demonstrate clearly the effect of the additional milch cattle bought with the help of bank loan on the supply of milk.

In a study of the role played by different financial institutions in the development of dairy industry in Akola district (Maharashtra), V. D.

Galgalikar, B.S. Bhole and N.A. Gadre report a 14 times increase in the quantity of milk procured between 1962-63 and 1974-75. One may find hard to agree with the authors since this increase in procurement may not necessarily be due to the impact of financial assistance rendered by various institutions.

T. S. Chahal and J. S. Chawla have worked out the economics and short-term capital and credit needs of various categories of dairy farms in Amritsar city (Punjab). They conclude that the dairy farms obtain less yield of milk per animal due to the sub-optimal use of operating and fixed capital. Provision of loans for the purchase of milk animals and for the purchase of feeds on the small, medium and large farms is recommended. In the case of big dairy owners only long-term loan for the construction of buildings is suggested. It is shown that the present price of Rs. 2 per litre of milk will ensure profits ranging from 18 paise to 30 paise per litre on different sizes of dairy farms which may be considered normal from the investment point of view. It is surprising that a conclusion about the sub-optimal use of feeds resulting in low milk yields is drawn by the authors without any economic analysis.

No researcher studied the problem of cattle insurance which is to play a great role in the development of the dairy industry in general and adoption of cross-bred cows in particular because of heavy investment and greater risk and uncertainty involved in rearing the cross-breds.

#### IMPACT OF DAIRY DEVELOPMENT ON SOCIAL AND ECONOMIC CONDITIONS OF THE DAIRY FARMERS

D. S. Thakur analyses the progress made by the milk societies and milk unions and the impact of the milk co-operatives on the economic conditions of rural people including the weaker sections in the Gujarat State. The study brings out that the milk co-operatives have made remarkable progress since their inception (1969-70) in terms of number of milk societies, total membership, share capital, reserve fund, net profits, milk collection and the value of milk and milk products handled. He also examines the impact of technical inputs provided by the milk co-operatives on the production and marketed surplus of milk, adoption of improved agricultural inputs and the annual income of the milk producers. He reports that the milk production per animal and marketed surplus are a little higher in the experimental areas than that in the control villages. Also in the experimental villages, the use of improved agricultural inputs and total incomes are found to be higher. That the marketed surplus of milk is higher in the case of the weaker sections compared to the medium and large farmers in general seems to be too obvious a conclusion. Moreover, the technique to measure the impact of dairy development on the adoption of improved agricultural inputs and total incomes may be questionable.

By analysing the impact of 'Operation Flood Project' on the dairy sector in Bombay, Calcutta, Madras and New Delhi, Dilip R. Shah finds that the project has made a favourable impact on the industry in certain areas.

R. N. Pandey, T. S. Bhogal and M. L. Verma evaluate the economic impact of Dairy Development Project, Aligarh, on milk production, number and composition of milk animals, area under fodder crops, incidence of diseases and the attitude and awareness of the farmers towards various dairy development programmes. The buffalo population and milk production in the project villages are reported to have increased by 28 and 33 per cent respectively in 1974-75 over that in 1970-71. Further, the mortality rate, number of non-pregnant animals and incidence of disease have either declined or stabilised at a very low level. The average gross income per farm family has increased by about 10 per cent during the last five years, and the contribution of milk production enterprise to the total farm income increased from 13 per cent in 1970-71 to 18 per cent in 1974-75. Income from crops is reported to be practically unchanged.

A. S. Kahlon, K. C. Dhawan and G. S. Gill show through a linear programming exercise that there is a significant potential for raising incomes on the farms of Ludhiana district in Punjab through optimization of resources coupled with adoption of complete package of recommended practices and dairy husbandry. It is a surprising conclusion that crops become less profitable compared to the dairy because the farmers do not use plant protection measures in the *kharif* season. The authors have not quantified the separate contribution of dairy enterprise which would have been more relevant in the present context.

S. A. Radhakrishnan and M. Sivanandham use the input-output for 90 farms situated in Sarkarsamakulam block of Coimbatore taluk (Tamil Nadu) in order to explore the possibilities of maintaining the milch animals within the availability of fodder, labour and other resources. Linear programming model is used to arrive at optimum cropping and livestock combination on the average situation farm. They have shown that the readjustment of cropping pattern to suit the farming situation would earn 44.21 per cent additional income and the maximum number of milch animals that a farmer can maintain would be five. The set of constraints does not include such an important resource as capital and housing arrangements for the cattle. Also, an assumption that bullock pairs are not maintained on the farm since it can be hired, would also invalidate the results of this exercise.

Amrik Singh Saini observes that optimizations of existing resources and crop activities along with dairy enterprise would increase the returns to the fixed farm resources by 61.14, 55.76 and 68.22 per cent on the small, medium and large farms, respectively, in Malerkotla development block of Sangrur district (Punjab). He, however, could not succeed in assessing the contribution of dairy enterprise only in the enhanced income due to optimization.

None of the studies included in this section could demonstrate clearly the impact of dairy development alone on the social and economic conditions of the dairy farmers.

#### ISSUES FOR DISCUSSION

In the light of the foregoing review, the Group may find it fruitful to concentrate the discussion around the following issues :

1. Possibility of reduction in the number of milch stock without affecting the milk production.
2. Some optimum range or number of milch animals and the land area required to support this number.
3. Most suitable methodology to estimate the demand for milk in India, keeping in view the limitations of the data available.
4. The most appropriate approach or approaches to project : (a) the number and composition of milch stock and (b) the potentials of milk production with the changing composition of milch stock over time.
5. Types of organizational structures of dairy plants and milk collecting and distribution agencies most suitable for different conditions in the country, both from the point of view of the producers and consumers.
6. Economics of readjustment of various inputs going into the milk production with special emphasis on the possibility of reducing the cost of production.
7. Reasons for variations in the cost of milk production and some consensus on a profit margin needed to stimulate milk production.
8. Comparative economics of cows and buffaloes and of indigenous and cross-bred cows.
9. Social and economic implications of diversification of farm business *versus* specialisation in dairy enterprise with special emphasis on the constraint on the aggregate availability of milch animals.
10. Financial and managerial implications of rearing cross-bred cows particularly for the small and marginal farmers and the landless agricultural labourers.
11. Methodology for finding out the contribution of dairy enterprise alone in the enhanced incomes of farmers and the impact of dairy development on incomes and employment of various categories of farmers in different regions of the country.