

**INTERIM REPORT**  
**OF THE**  
**NATIONAL COMMISSION ON**  
**AGRICULTURE**

**ON**

**MILK PRODUCTION THROUGH SMALL AND**  
**MARGINAL FARMERS AND AGRICULTURAL**  
**LABOURERS**



सत्यमेव जयते

**GOVERNMENT OF INDIA**  
**MINISTRY OF AGRICULTURE**  
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## SUMMARY OF RECOMMENDATIONS

### *Need for Milk Production Enhancement*

1. There is at present a large gap between requirements and availability of milk and milk products in the country. The present pace of dairy development is inadequate for achieving the goal of sufficiency in milk in the foreseeable future. Therefore, milk production in the country should receive urgent attention and an aggressive programme of milk generation should be launched and implemented effectively. (Paragraph 2.4)

### *Scope for Milk Production through Small and Marginal Farmers and Agricultural Labourers*

2. There is very good scope for augmenting milk production rapidly by harnessing and developing the facilities available with the small and marginal farmers and agricultural labourers. An integrated development of cattle and buffalo rearing and milk production through these agencies would assist in a large measure their economic growth. It is, therefore, necessary to formulate and implement an intensive programme of milk production through small and marginal farmers and agricultural labourers. (Paragraph 3.8)

### *Anand Milk Scheme*

3. The experience of Anand Milk Scheme reveals that small farmers derive many benefits by taking to milk production as a subsidiary occupation, for example, additional income, better nutrition and more employment opportunities to the farm family labour. Keeping this in view major milk projects under implementation at present and those proposed for the future should bring under their ambit a large proportion of small and marginal farmers and agricultural labourers. Such an approach would not only help in improving the economy of these sections of our rural people but also help in an organised growth of the dairy industry. In this venture Operation Flood which is the largest dairy project under the Fourth Five Year Plan could play a leading role. (Paragraph 4.7)

### *Operation Flood Project*

4. In all areas of its operation for milk production enhancement Operation Flood Project should invariably identify, induce and enrol all the small and marginal farmers and agricultural labourers for participation in its programme of milk generation, procurement and marketing. It should be ensured that at least one-third of the producers in the project areas are drawn from the groups of small farmers and at least another one third from marginal farmers and/or agricultural labourers. (Paragraph 5.12)

### *Linking up SFDA/MFAL Projects with Operation Flood and State Dairy Schemes*

5. The Operation Flood project should also plan for cattle and buffalo improvement and milk production enhancement in SFDA/MFAL districts which lie in or near the milksheds of the metropolitan cities but which have not so far been included in the operational area proposed to be covered under this project. Operation Flood project should also consider and develop a suitable programme of action for enhancing milk production in a number of additional SFDA/MFAL districts in the different States which have not been included under this project in its first round of operation. (Paragraphs 6.12 and 6.13)

6. The State Governments should identify dairy projects which are located in SFDA/MFAL districts and the dairy projects outside these districts but to which milk production in some of these districts could be linked up and formulate suitable programmes for strengthening the infrastructure, processing capacities and other facilities. They should also work out estimates and earmark suitable financial support under the Plans for providing these additional requirements on a priority basis. The State Governments should identify possible consuming centres in such of these SFDA/MFAL districts as have at present no dairy programmes under implementation. They should also examine the economic implications of promoting milk production in these districts and linking up the marketing of milk from these districts with a nearby milk project. (Paragraph 6.13)

### *Approach to Milk Production from Cows and Buffaloes by Small and Marginal Farmers and Agricultural Labourers*

7. The cattle development and milk production programme envisaged for assisting the small and marginal farmers and agricultural labourers should aim primarily at replacement

of the indigenous cows by crossbred progenies produced by farmers themselves or by supply of crossbred heifers and calves to them from other sources. (Paragraph 7.8)

8. With a view to promoting milk production mainly through high producing cows, particularly crossbred cows, the Central and the State Governments should adopt a 'two-axis' pricing policy for cow and buffalo milk, which will be based on the compositional quality of milk evaluated rationally taking into consideration both the fat and solids-not-fat components. (Paragraph 7.20)

*Production of High Quality Milch Animals and their Supply to Small and Marginal Farmers and Agricultural Labourers*

9. Operation Flood and State dairy projects should organise intensive artificial insemination coverage for crossbreeding in cows and for breeding of buffaloes in their milksheds. Operation Flood project is anticipated to enrol about 11 lakh small and marginal farmers and agricultural labourers under its proposed milk production enhancement programme. The Commission considers that the coverage should be larger and, therefore, recommends that this project should undertake extension of its programme for milk production through an additional 11 lakh small and marginal farmers and agricultural labourers. This would assist about 38,000 such farm families through milk production in each of the districts covered by this project and ensure additional income to them. Government of India should allocate sufficient Plan finance to Operation Flood project for this purpose. (Paragraph 8.3)

10. As in the case of Operation Flood project, State dairy projects to which milk production in SFDA/MFAL districts would be linked should also work out and implement programmes to assist at least 38,000 small and marginal farmers and agricultural labourers in each district. It is anticipated that about 4 million families of small and marginal farmers and agricultural labourers could be assisted by this way to improve their economic status through milk production over a period of about five or six years (Paragraph 8.4)

11. The small and marginal farmers who have produced crossbred heifers should be extended financial assistance in the form of half subsidy and half loan and agricultural labourers at the rate of two-thirds subsidy and one-third loan for the purchase

of concentrates for rearing heifer calves upto calving stage. This would mean that each farmer would get Rs. 480 as subsidy and Rs. 480 as loan and each agricultural labourer would get Rs. 640 as subsidy and Rs. 320 as loan. (Paragraph 8.5)

12. The amount of subsidy should be given for the entire programme of milk production through small and marginal farmers and agricultural labourers in about 107 districts as a centrally sponsored programme. The total subsidy is expected to amount to roughly Rs. 225 crores spread over a period of 8 to 9 years or approximately Rs. 25 crores per annum. Keeping in view the fact that the programme is likely to create employment opportunities for roughly 4 million families of small and marginal farmers and agricultural labourers, we consider that a subsidy of this magnitude is absolutely essential and justified. (Paragraph 8.6)

13. The schemes for cattle and buffalo rearing and milk production through small and marginal farmers and agricultural labourers should envisage organisation of an intensive artificial insemination service so as to replace the existing low producing milch stock of these farmers by improved progenies in as short a time as possible. This artificial insemination programme may be started mainly with the use of liquid semen which can be progressively replaced by frozen semen. (Paragraph 8.8)

14. The Government of India should make available necessary foreign exchange to Operation Flood and State dairy projects for the import of sufficient number of superior bulls and cows of exotic dairy breeds for supporting an intensive crossbreeding programme through artificial insemination. (Paragraph 8.8)

15. Large scale programmes for production, rearing and supply of crossbred heifer calves and crossbred heifers in advanced pregnancy to the small and marginal farmers and agricultural labourers should be formulated to bring them as early as possible under the milk production ventures. The proposals of the Government of Rajasthan for the colonisation of a large number of nomadic cattle breeders around tubewells in Jaisalmer District, development of pastures and fodder production, intensive crossbreeding of cattle through artificial insemination, purchase of crossbred heifers from these areas and other parts of the State, rearing them at a farm upto calving stage for distributing them to small and marginal farmers and agricultural labourers in the State and outside should be scrutinised from technical and financial angles by the Ministry of Agriculture for early sanction

and implementation. If Rajasthan Government agrees to hand over all the heifers reared for distribution in areas covered by the Operation Flood project then the funding of this project should also be considered by the Indian Dairy Corporation. (Paragraph 8.10)

16. The possibility of taking up large programmes for encouraging the production and rearing of crossbred heifers upto weaning stage in areas such as Malnad in the South, grassland areas in Madhya Pradesh, Rajasthan and Gujarat and the hilly areas of Assam, etc. should be considered for implementation during the Fourth Plan period as Centrally sponsored projects. They should be continued on an expanded basis under the Fifth Five Year Plan. (Paragraph 8.12)

17. Indian Dairy Corporation, in consultation with the Maharashtra and West Bengal Governments, should carry out an intensive survey of the present situation of disposal of buffaloes when they go dry and buffalo calves in the cities of Bombay and Calcutta. They should work out a suitable programme for artificially breeding she -buffaloes in time, purchasing these buffaloes when they go dry and introducing them mainly to small farmers in the milksheds of Operation Flood and other dairy projects. The possibility of salvaging a large number of buffalo calves at an early age and rearing them at a suitable place should also be examined keeping in view the economics of such efforts from the angle of small and marginal farmers and agricultural labourers. (Paragraph 8.14)

### *Credit and Insurance*

18. In respect of milk production, collection and marketing at the village level the functional cooperative system is considered to be best suited. The primary cooperative may consist of all producers and suppliers of milk in the village. These primary cooperatives may be linked up directly with functional cooperative organisation or a corporation at the district level. (Paragraph 9.3)

19. As recommended in the Commission's Interim Report on Credit Services for Small and Marginal Farmers and Agricultural Labourers, the Farmers' Service Societies at the tehsil/block level may undertake the responsibility for extending short and medium term credit for purchase of milch animals for all the members of the primary village dairy cooperative societies. It is recommended that there should be a close



organisational and functional link up among these three agencies particularly in regard to advancing and realisation of loans (Paragraph 9.6)

20. In order to encourage the provision of insurance cover to a large number of high producing animals of the small and marginal farmers and agricultural labourers, the State Governments, the project authorities, credit institutions and insurance agencies should consider ways and means of integrating the insurance premia with the interest structure on loans so as to reduce the burden of these farmers in regard to payment of interest, repayment of loans and payment of insurance premia. (Paragraph 9.7)

#### *Other Inputs and Services*

21. For ensuring the success of milk production programmes, it is necessary to strengthen the dairy husbandry extension organisation with sufficient funding with the specific objective of augmenting fodder production, its conservation and judicious use. The fodder development programme has to be an aggressive one and the involvement of the State Departments of Agriculture in this programme on a priority basis is essential. Grasses and hay available from forest areas should primarily be reserved for feeding of milch animals maintained by landless agricultural labourers in the districts located near the forest areas. The supply of balanced concentrate feed mixtures at a reasonable price should also be ensured. (Paragraph 10.2)

22. The production of adequate quantities of foot and mouth disease vaccine in the country should receive very high priority and steps should be taken by the Government with utmost urgency to increase considerably vaccine production. The Indian Dairy Corporation may also be encouraged to implement their contemplated programme of foot and mouth disease vaccine production to meet the requirements of this vaccine in areas covered by the Operation Flood. (Paragraphs 10.4 and 10.5)

23. With the introduction of high yielding milch animals it would be necessary to undertake periodical testing to assess the prevalence of tuberculosis and brucellosis. Wherever the incidence is found to be high, suitable control measures should be undertaken. Measures for the production of vaccines against brucellosis should be taken up. (Paragraph 10.6)

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**INTERIM REPORT**  
**ON**  
**Milk Production Through Small and Marginal Farmers and**  
**Agricultural Labourers**

**SECTION I**

**Introduction**

1.1 One of the terms of reference of the National Commission on Agriculture relates to the study of the problems of "small farmers and agricultural labour viewed in the context of social justice and equality of opportunity and as a factor in securing effective participation of the bulk of the Indian peasantry stepping up agricultural production". This item is also one of those on which the Commission is required to make interim recommendations to the Government. The Commission is examining this item in depth covering all aspects and will be submitting Reports on it separately. However, while considering the overall problems of small and marginal farmers and agricultural labour an item suggested itself to the Commission needing priority attention both from the angle of social justice and improving the quality of the diet of our people. This relates to the need for undertaking programmes of milk production through small and marginal farmers and agricultural labourers on an urgent basis.

1.2 Another important term of reference of the Commission envisages 'development of animal husbandry both for providing nutritious diet to the population, draught power for agricultural operations and income and employment opportunities to the rural population'. The need for increasing rapidly the milk production in the country with a view to improving the quality of the diet of our population is being felt more and more. A number of cattle and dairy development schemes have been formulated and implemented under the Five Year Plans. The Operation Flood project is the largest in this field. The Commission feels that Operation Flood and other dairy projects could assist in a large measure small and marginal farmers and agricultural labourers through milk production enhancement programmes. In the

view of the Commission, apart from increasing milk production, dairy cattle rearing has great potentiality and scope for improving the economic lot of a large number of small and marginal farmers and agricultural labourers, provided the programmes are properly organised and supported with improved breeding, better feeding, introduction of quality animals, adequate animal health cover and above all, providing a suitable marketing system to enable the producers to get a reasonable return for the milk produced. Therefore, the Commission decided to deal with this subject of milk production through small and marginal farmers and agricultural labourers separately and on a priority basis in this Report. There is an urgent need to extend the benefits of dairy development programmes to as large a proportion of small and marginal farmers and agricultural labourers as possible in the rural areas.

1.3 The Commission during its discussions with the various State Governments and other institutions kept this particular aspect of animal husbandry in view. We had opportunities of discussions with the State Governments of Assam, Bihar, Gujarat, Haryana, Jammu & Kashmir, Maharashtra, Mysore, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. We also held several detailed discussions with the Chairman of the Indian Dairy Corporation and the National Dairy Development Board and some of the Directors of the Corporation and Members of the Dairy Board. Discussions were also held with the representatives of the United Planters' Association of South India. The Commission visited Anand and studied the working of the Kaira District Cooperative Milk Producers' Union. The Commission has collected available information regarding milk production programmes in the small and marginal farmers' districts, the progress achieved by the Kaira District Cooperative Milk Producers' Union Limited, the programmes proposed by the Operation Flood and other relevant details. Based on the discussions with the various State Governments and institutions and information collected from various sources, the Commission has analysed the potential and scope for increasing milk production through small and marginal farmers and agricultural labourers in the country and has made several recommendations in this Report for early achievement of this goal.

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## SECTION II

### Need for Milk Production Enhancement

2.1 The 'green revolution' is likely to usher in an era of self-sufficiency in foodgrains in the very near future, but that will not entirely solve the food problem of the country. Production of cereals alone may provide sufficient food in terms of quantity but will not meet the quality requirements for adequate nutrition. The problem that remains to be solved is of ensuring a balanced diet to all sections of our people both in rural and urban areas. The problem of adverse effects of undernutrition and malnutrition on physical development and on mental growth and development is engaging the attention of planners and scientists all over the world, particularly in developing countries. Protein deficiency is known to be widespread and this problem has been singled out for special attention in recent years.

2.2 In so far as India is concerned, it has been estimated that there is a shortage of about 10 per cent in supply of calorie requirements. It is estimated that the dietary protein available in India amounts to a little over 50 gm. per head per day against a requirement of 45-55 gm, based on the latest recommendations of the Indian Council of Medical Research (1971)\* and those of the Joint Expert Committee of FAO and WHO (1965)\*\*; but the distribution of available food is very uneven, with the result that the poorer sections of the people get inadequate quantities of both energy and protein in their diet. Apart from the inadequacy of total protein, there is also deficiency of some of the essential proteins necessary for making a balanced diet. Thus the adverse effects of protein deficiency are aggravated by deficiency of proteins of high biological value such as proteins of animal origin like milk, meat, eggs, fish etc. These are particularly required for infants, growing children and expectant mothers.

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\* Indian Council of Medical Research (1971)—Dietary Allowances for Indians. Special Report Series No. 60.

\*\*FAO (1965). Protein Requirements, FAO Nutrition Meetings Report Series No. 37.

In India, the overall intake of animal protein is only 12 per cent against the recommended quantity of 30 per cent of total proteins\*. The intake is naturally still less in the case of the poorer sections of the people both in urban and rural areas.

### *Present Availability and Targets of Milk Production*

2.3 Milk is an article of diet which is accepted by all people in the country and its value as nature's near perfect food is fully realised. In spite of this realisation and the presence of an enormous cattle and buffalo population in the country, the total milk production is far short of requirements. According to the Fourth Five Year Plan, the production of milk increased from 20 million tonnes in 1966-67 to 21.2 million tonnes in 1968-69. The milk production target fixed for 1973-74 is 25.86 million tonnes. The present availability of milk is estimated only around 108 gm. per head per day. The Nutrition Expert Group of the Indian Council of Medical Research has recommended 300 gm of milk for pre-school children, 250 gm. for school children in the age group of 7-12 years and for boys and girls from 13—18 years of age, and 200 gm. for adult man and woman and an additional 150 gm for expectant mothers. These are for vegetarian population. For non-vegetarian people the recommended requirements range from 200 gm. for children to 100 gm. for adults. Thus it will be seen that there is a wide gap between the actual per capita availability and recommended requirements. According to one estimate\*\* it is anticipated that with the magnitude and pace of development programmes currently under implementation and those envisaged under the Fourth Five Year Plan, milk production may reach a level of 31 million tonnes in 1981 thus implying a per capital availability of only 120 gm. The minimum nutritional target per head per day recommended by Sukhatme† comes to about 201 gm. On the basis of 201 gm. of milk per head the requirements in 1981 would be of the order of 51.26 million tonnes. It is anticipated that with the breakthrough in crop production, the calorie and vegetable protein requirements will be largely met, but there will

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\* Singh C. M. (1970). Increasing output of livestock products—paper presented at National Food Congress, New Delhi.

\*\* Sarma J. S. (1970). Feeding of India's population in 1980—A quantitative assessment—paper presented at National Food Congress, New Delhi.

† Sukhatme P. V. (1970). Nature of Protein problem and its implications for policy measures—paper presented at National Food Congress, New Delhi.

be a deficiency in the supply of animal protein. The demand projections mentioned above are only tentative. More precise projections of demand for milk and milk products in different time perspectives will be made available by the Commission's Working Group on "Projections on Demand and Supply for Selected Agricultural Commodities".

2.4 From what has been stated above, it would be obvious that there is at present a large gap between requirements and availability of milk and milk products in the country. The Commission, therefore, recommends that milk production in the country should receive urgent attention and an aggressive programme of milk generation should be launched and implemented effectively. The present pace of dairy cattle development is inadequate for achieving the goal of sufficiency in milk in the foreseeable future. Milk production programmes will not only be essential for ensuring better and balanced nutrition for the people, but they also offer opportunities for diversification of agriculture which has become essential in the present context of agricultural development in the country. According to the Indicative World Plan of FAO (1969), it has been estimated that there would be surplus production of foodgrains in India between 1975 and 1985. When the present situation of scarcity of foodgrains gets replaced by bothersome surpluses (either localised or widespread) one of the ways to tackle it, is to make the maximum use of coarse grain surpluses for feeding cattle and poultry. Fodder crops could also be cultivated in rotation with cereals or on lands released from cereals. This would in turn help in increasing the availability of milk, milk products and other live-stock products so essential for an improved and balanced diet for our people.

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## SECTION III

### Scope for Milk Production Through Small and Marginal Farmers and Agricultural Labourers

3.1 In the attempt to rapidly develop milk production there is good scope for harnessing the facilities available with the farmers, even with very small holdings and landless agricultural labourers in our villages. Apart from increasing milk production, such a programme supported by adequate investment would help to improve the economy and the nutritional status of the farmers with smaller holdings and poorer means. The strategy for agricultural development in India initiated in 1965, consisting of introduction of high yielding varieties and adoption of latest technological methods such as judicious use of fertilisers, water use and management, plant protection, storage, processing, marketing etc., has given a new direction to agricultural development. As it was necessary to achieve a breakthrough within the minimum possible time and to make optimum use of limited available inputs, a selective approach had to be adopted. Naturally, therefore, the benefits of such intensive agricultural programmes flowed towards progressive farmers who also happened to be those with larger holdings having irrigation facilities. Farmers with smaller holdings and poorer means have, by and large, had to be left out. This resulted in one kind of major imbalance in the rural areas. As a large proportion of rural population could not share the economic benefits resulting from this new strategy of agricultural development, a strong feeling of dissatisfaction developed among the less affluent farmers giving rise to social tension in the rural areas. Social justice demands avoidance of such imbalances. It is not desirable to have growth without social justice and this points to the need for an integrated development of all sections of people in the rural areas by reducing the present widespread poverty, unemployment and under-employment. In our efforts to achieve this objective in the rural areas, intensification of cattle rearing and milk production programmes can play a vital role. However, it would be necessary that these are organised on proper scientific lines. Further, it has to be ensured from the initial planning stage itself that the benefits would be spread over all sections of farmers and in particular reach the small and marginal farmers and agricultural labourers. This

is quite feasible because dairy farming has the highest potentiality to benefit the rural population including the small and marginal farmers and agricultural labourers for economic growth and development.

### *Proportion of Smaller Farmers and Labourers Owning Cattle*

3.2 An examination of the distribution of households possessing cattle according to size of holdings in different areas of the country shows that about 70 to 75 per cent of the households fall under the category of small farmers, marginal farmers and agricultural labourers\*. In the Anand area in Gujarat, according to a survey made in 1969-70, about 11.5 per cent of the households owning cattle are landless\*\*. The households possessing land less than one hectare and owning cattle form about 40 per cent of the total number of households. About 30 per cent of the households owning cattle have been holding areas of 1 to 2 hectares. A similar position is observed in the Krishna delta of Andhra Pradesh (Appendix I). From the survey conducted on the availability and cost of production of milk by the Institute of Agricultural Research Statistics in 1967, it is observed that about 23 per cent of the households owning cattle are non-cultivators, 31 per cent possess 0.8 hectare of land or less and about 21 per cent are in the group possessing 0.8 hectare to 2 hectares in the Krishna area. In Guntur area the percentage of the households possessing 0.8 hectare or less of land and owning cattle is 57 per cent, and about 23 per cent have between 0.8 and 2 hectares. From a survey conducted in the Mehsana District of Gujarat State by the Sardar Patel University (Appendix II), it has been found that the percentage of landless breeders was 6.1 in 1966-67 and 6.2 in 1967-68; during the former year 24.2 per cent of the breeders fell in the category of farmers having 2 hectares of land or less, and in the following year 18.5 per cent of the farmers belonged to this category. From a survey carried out by the Institute of

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\* Generally the average size of holding for potentially viable small farmers is expected to range from 2.5 to 5 acres in the case of irrigated or irrigable lands and upto 7.5 acres in the case of dry areas. Marginal farmers are those having holdings of not more than 2.5 acres. Agricultural labourers are those having a homestead and earning 50 per cent or more of their income from agricultural wages (Pamphlets on SFDA and MFAL—Farm Information Unit—Directorate of Extension, New Delhi—March 1971).

\*\* Srivastava R. K. (1970)—Impact of cattle development programme on rural economy in the Kaira district (Paper presented at Symposium on Livestock Statistics at IARS, New Delhi).



Agricultural Research Statistics in the Dhulia region of Maharashtra State during 1969-70 on the basis of data collected from 10,368 households, it has been found that 10.5 per cent were handless and 26.7 per cent possessed 2 hectares or less of land (Appendix III). In the course of another study by the Indian Council of Agricultural Research on economics of raising cattle and buffaloes in Hissar District during 1963-66, (Appendix IV) a similar trend was noticed in the distribution of households owning cattle in different size groups of holdings. About 17 per cent of the households owning cattle are landless while the percentage of those having 2 hectares or less of land is about 17.6 per cent. These data thus show that, unlike in the case of crop production, the small and marginal farmers and agricultural labourers have already some capital in the form of a few milch animals and are in a position to derive benefits from any well planned programme of milk generation through application of modern scientific techniques and provision of necessary inputs. It is generally known that in spite of low production from milch animals with the farmers, the major proportion of milk produced in the country comes from small producers. The number of milch animals per small farmer household is generally one or two on the basis of the results of the surveys referred to above.

3.3 In response to a suggestion made by the Commission during its discussion with the Indian Dairy Corporation and the National Dairy Development Board, the National Dairy Development Board had requested the concerned States for information on small farmers and landless people owning milch animals that are likely to be covered in the area of operation proposed for milk production under the Operation Flood (Appendix V). In response to this, some information has been received from the States of Haryana, Punjab, Andhra Pradesh and Gujarat. It has been estimated that in Karnal District of Haryana 35.6 per cent of cattle owners are landless agricultural labourers. About 26 per cent of cattle owning farmers have 2 hectares of land. In the Punjab 43.8 per cent cattle owners have no land. About 21 per cent of cattle owners have less than 2 hectares of land. In Mehsana and Saberkantha areas in Gujarat the proportion of landless people having animals among all cattle owning holdings is 19.10 percent and 15.16 per cent respectively.

#### *Contribution from Dairy Farming to Total Farm Income*

3.4 Certain investigations carried out in different parts of the country have shown that dairy farming can contribute a

considerable portion of the total farm income. An investigation carried out by the Indian Council of Agricultural Research over a period of six years (1962-63 to 1967-68)\* at Nasirpur, Patiala has shown that dairy farming, if properly practised, could be more profitable in relation to the mixed or arable farming. The average net return from five acres of holding was about Rs. 2997 per annum in the dairy unit, Rs. 2730 in the mixed farming unit and Rs. 2243 in the arable farming unit. This means that the average net return per hectare in the dairy, mixed and arable farming units was about Rs. 1480, Rs. 1348 and Rs. 1107 per annum respectively. This net return was realised after allowing for labour charges paid for farm and stall operations. The average net return per Rs. 100 invested was Rs. 16.6 in the dairy farming unit, Rs. 16.4 in the mixed farming unit and Rs. 13.3 in the arable farming unit. This indicates that the percentage of net return was of the same order in dairy farming and mixed farming systems.

3.5 A cross sectional study of two areas of Gujarat conducted by the Agro Economic Research Centre at Vallabh Vidyanagar in 1969\*\* has also shown that dairying can contribute a considerable portion of the total farm business income. The proportion of income from dairying to total income in different sizes of farms in the two Talukas studied—Nadiad (Kaira) and Dehgam (Ahmedabad) is given in Appendix VI. This study indicated that the proportion of income from dairying to the total farm income was higher in the case of farmers with small holdings.

3.6 A similar observation was made from the socio-economic study of a Charotar village, Valasan, in Kaira District in 1958-59†. It was observed that the income of the village from milk alone was of the order of Rs. 3,29,000 out of the total income of Rs. 6,64,000 derived from agriculture and allied pursuits. Thus dairying contributed about 49 per cent of

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\* Raut K. C. and Chugh K. K.—Productivity of different systems of farming—a comparative study. *Indian Farming*, Vol. 20, No. 10, January, 1971.

\*\* Vyas V. S., Tyagi D. S. and Misra V. N. (1969)—Significance of the New Strategy of Agricultural Development for Small Farmers.

† Amin R. K.—Valasan (Socio-Economic Study of a Charotar Village), Sardar Vallabhbhai Vidyapeeth.

the total income from agriculture and allied pursuits. Cash income from sale of milk was about Rs. 2,03,000 in 1958-59 while the sale of all other agricultural products including food-grains gave Rs. 2,02,000. This study indicates the enormous scope for development of animal husbandry, particularly milk production with smaller farmers in the country.

3.7 An enquiry\* into the economics of dairy enterprises in a selected agricultural tract of Delhi region made during the years 1960-62 by the Indian Agricultural Research Institute has shown that the average net return per milch animal per annum was of the order of Rs. 227.6 in holdings of size less than 2 hectares. The net return in holdings of 2 to 4 hectares was of the order of Rs. 306.

3.8 From what has been stated above, it is clear that small and marginal farmers and agricultural labourers are already keeping milch animals to supplement their income. But it is well known that the animals with them in most cases are not good producers. Their productive efficiency is low with the result that the owners are not induced to adopt proper husbandry practices such as improved breeding, provision of good forages and balanced feeds, animal health cover etc. The existence of such a vicious circle has led to the continued deterioration in the productivity of cattle in the rural areas. Therefore, it is imperative that any programme designed to assist small farmers to take to dairy cattle raising, should ensure a profitable system which would guarantee an economic gain from this venture. The success of the venture would depend upon the supply of cattle with a fairly high level of production and optimum reproductive efficiency. Only such milch animals would ensure sustained milk production to the farmers from year to year and enable them to pay back the credit, if any, obtained for the purchase and proper maintenance of the animals, and also leave a reasonable margin to add to their income. Apart from the supply of high producing animals, the programme should also envisage improved and controlled breeding so that the progenies of the existing cattle population are comparatively much better producers and can supplant the original low producing stock in the course of a few years. Higher and more economic milk production can only be sustained by inducing the farmers to produce, conserve and feed as much of quality forages as possible supplemented by balanced concentrate feeds

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\*Singh C.B. (1965) An analysis of feed-milk relationship and cost of production of milk on farms in Delhi area, Indian Journal of Agricultural Economics, Vol. 20 No. 1.

purchased at a reasonable cost. The programme should also *inter alia* provide adequate veterinary cover both for prevention of infectious diseases and treatment of ailments. This is a prerequisite as these animals will require a better animal health regime because of stress caused by high production. Above all, the programme should also ensure a ready and remunerative market for surplus milk produced. For this it might be necessary to strengthen milk collection and processing facilities. That such an integrated approach to dairy cattle raising helps the small farmers in their economic growth has been well demonstrated by the Anand scheme.

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## SECTION IV

### Anand Milk Scheme

4.1 Twentyfive years ago, the pattern of farming and life of the farmers of Kaira District in Gujarat were similar to those found in many parts of the country. Even though mixed farming was the pattern of rural life in the area then, their income from milch buffaloes was meagre and undependable. In the absence of any suitable marketing facilities they had to depend on contractors and middlemen who fully exploited the situation to their own benefit. Because of the perishable nature of milk and milk products, the farmers had to sell these at a distress price. This exploitation went to such an extent that the farmers were forced to consider some ways and means to remedy the situation. Under the advice and guidance of late Sardar Vallabhbhai Patel, the farmers of the area formed a Co-operative of their own which marked the beginning of the now world famous Kaira District Co-operative Milk Producers' Union Ltd. Anand, which is popularly known as 'AMUL'. The progressive growth, development and expansion of this Co-operative in Kaira District over the last two and a half decades have revolutionised the rural structure of the district, the benefits accruing from this venture having in a large measure gone to the smaller farmers.

#### *Origin of Anand Milk Scheme*

4.2 The Kaira District Co-operative Milk Producers' Union Ltd. started with a handful of members in June, 1948 in two villages producing just 250 litres of milk a day. In 1970-71 the Union had 706 societies with 1,80,000 farmer-members having a total breedable buffalo population of 2.25 lakhs. About 70 per cent of members were owning only one milch buffalo at a time. The quantity of milk collected during the year 1969-70 was 124 thousand tonnes and the farmers were paid Rs. 19.39 crores. The average daily collection of milk was about 3.40 lakh litres and during flush season, the daily collection exceeded a little over four lakh litres. During the last fifteen years, the share capital of the Union has gone up ten times and the value of milk and milk products sold has gone up by about forty times. During the year 1970-71, the total turnover went up to nearly

Rs. 28.0 crores. The development of the marketing structure of Amul mainly contributed to the growth of the Union and provided the necessary motivation to the farmers to take to better animal husbandry practices and increase milk production and their income. The Kaira Union has also been trying to help the farmers in improving milk production by better breeding, feeding, management and disease control measures. Their attempt in this direction received a big impetus in 1965 when they integrated their milk production enhancement work with the Intensive Cattle Development Programme sponsored by the Union Ministry of Agriculture. A proper integration of planned cattle development and increased milk production supported by an efficient marketing system ensuring an assured and remunerative price for all surplus milk have combined to produce a substantial impact on the economy of the member farmers.

4.3 For rapid breed improvement the Union has a well-equipped Artificial Insemination Station with about 80 superior Surti buffalo bulls. About, 1,80,000 inseminations are being done per annum. The Station has also recently taken up a programme of progeny testing of young Surti bulls born out of high yielding dams and by good sires maintained at the Artificial Insemination Station. This is commendable as the use of progeny tested sires would ensure genetic gain from generation to generation. The project has also a well-knit veterinary service organisation to attend to all animal health problems in the area without any delay. To make balanced feed available for the milch animals at a reasonable price the project has a large feed mixing plant to manufacture balanced feed, mainly with the by-products from oilseeds, pulses and cereals and damaged cereal grains etc. Fodder production campaigns have been arranged from time to time with a view to inducing the farmers to grow forage crops and thereby minimise the cost of milk production. In a district where such a practice was non-existent before, over 40,000 farms are now growing lucerne for fodder in about 18,000 acres.

#### *Impact of Intensive Cattle Development Programme*

4.4 A study\* has recently been made to evaluate the direct and indirect impact of the above mentioned integrated cattle development programme by making a comparison between the

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\* Srivastava R. K. (1970). Impact of Cattle Development Programme on Rural Economy in Kaira District. (Paper presented at Symposium on Livestock Statistics at I. A. R. S., New Delhi).

cattle development area *vis-a-vis* a contemporary control area. It is observed that the increase in the average monthly income of the farmer from one animal in milk and per milch animal (buffaloes in milk and dry) in the cattle development area as compared to the control area was higher by 50.72 per cent and 61.96 per cent respectively. The annual income from sale of milk and milk products per animal in milk and the income per milch animal (buffaloes in milk and dry) in the cattle development area have been estimated at Rs. 292.05 and Rs. 242.16 respectively. Apart from the above income each farmer also gets on an average Rs. 40 as the annual bonus from the village milk co-operative (Appendix VII). The productivity of a buffalo in milk in the cattle development area was 48.1 per cent more over a contemporary buffalo in the control area. The average milk yield per buffalo was estimated at 3.09 kg in 1960-61 in the milkshed areas of Anand Project. The production per buffalo had gone up to 4.17 kg during the years 1966-69 showing an increase of 34.9 per cent. The percentage of animals in milk in 1960-61 was 58.5 and this increased to 65.3 in 1966-69 showing an increase of 11.16 per cent. The overall milk yield per 100 buffaloes was estimated at 181.03 kg in 1960-61 and it rose to 272.09 kg in 1966-69, thus showing an overall increase of about 50 per cent in milk production in Anand area. The age at first calving and the intercalving period in buffaloes in the cattle development areas were 46 months and 16.5 months respectively as compared to 48 months and 19.62 months respectively in the control areas. The survey also revealed that the buffaloes fed with lucerne were giving 16 to 22 per cent more milk on an average. The farmers were also convinced that feeding of lucerne not only increased milk yield and ensured better utilisation of dry roughage available with them but also that its cultivation resulted in a higher yield of the subsequent crop grown on the same land. The farmers in the cattle development areas were also found to spare more milk for home consumption, contrary to common belief that dairy schemes deprive the milk producers of milk consumption at home. The consumption of milk per head was on an average 145 gm during the years 1967-70 in the cattle development areas. The corresponding figure was 105 gm in the control areas. Similarly milk consumption was also higher among commercial non-producers and non-producers of milk in cattle development areas compared to similar groups of people in the control areas. One very interesting finding was that small holdings which are non-viable in the control areas have been found to be viable units in the cattle development areas due to greater reliance on dairying by small farmers rather than on crop production. This survey revealed that 80 per cent of the buffalo owners have a holding of 2 hect-

ares or less and 11.5 per cent farmers maintain buffaloes without possessing any land. In the control areas 52 per cent of the buffalo owners have a holding of the size of more than 2 hectares and those having no holding and yet keeping buffaloes are only 0.5 per cent. Another general observation made was that the milch animals were looked after by farmer's family and thus at least partial employment to family labour was ensured which would have otherwise remained idle for want of any other suitable employment opportunity.

#### *Multiple Benefits to Farmers from Milk Production*

4.5 The experience in Anand area clearly reveals the multiple benefits that are derived by the small farmers as a result of taking to milk production as a subsidiary occupation. Firstly, they are benefited by additional income to the family almost throughout the year as a result of daily, weekly, fortnightly or monthly payments made for the milk sold. Secondly, the farmer's families are also ensured of better nutrition through the consumption of surplus milk and milk products which would go a long way in building up the health and well-being of the rural people. This has been brought out in a study on economics of dairy farming in Mehsana district which has shown that overall consumption of fluid milk accounted for 33.41 per cent of the total production of milk in 1967 and 29.81 per cent in 1968 in the villages covered by the Mehsana Duddh Sagar Dairy. It has also been observed that the major proportion of milk produced was retained for home consumption in the lower production group and the marketable surplus increased more than proportionately with increase in total production. In the different seasons, the minimum availability of marketable surplus of milk was observed in the summer season and maximum in the winter season. The increase in marketable surplus of milk with the increased production of milk in the villages covered by the dairy project is more encouraging than an increase in marketable surplus by curtailing consumption of milk and milk products in villages not covered by the dairy. Thirdly, the farm family labour which might otherwise have remained partially or wholly idle is made use of in the maintenance of milch animals and production of milk. These inbuilt advantages are difficult to evaluate and are rarely assessed in economic studies. In addition to the above, milk production sustains farm families from utter starvation in areas which might be affected by severe droughts in some years. The experience of milk producers in the milkshed areas of Hyderabad is cited as an example of this advantage derived by farmers who keep milch animals.



4.6 In view of increasing demand of milk and a promising market that has developed in recent years in large cities, towns and industrial areas, a tendency on the part of bigger farmers and rich people to take to dairying as an organised and profitable business is being increasingly noticed. No doubt such organised development of dairy farming on commercial lines would contribute to a large extent to the growth of the dairy industry in the country but such a development should not be permitted to swamp out the small and marginal farmers and agricultural labourers from this field. It is necessary that every effort should be made to promote as much milk production as possible through small and marginal farmers and agricultural labourers to enable this section of people to derive maximum advantages from this enterprise. All assistance in the shape of inputs and services in this field should be directed mainly to benefit this section.

4.7 The Commission, therefore, recommends that the major milk projects under implementation at present and those proposed for the future should bring under their ambit a large proportion of small and marginal farmers and agricultural labourers. There is large scope for doing so and this will help in improving the economy of small and marginal farmers and agricultural labourers besides helping an organised growth of the dairy industry. In this venture, Operation Flood which is the largest dairy project under the Fourth Five Year Plan could play a leading role.

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## SECTION V

### Operation Flood Project

5.1 The largest dairy project under the Fourth Five Year Plan is the Operation Flood. This is even considered as the world's biggest milk drive so far launched in any country. This project is of five years' duration commencing from 1970-71 and involves the following lines of action\* :—

- (a) major increases in the capacity and throughput of dairy processing facilities;
- (b) competitive transfer of the bulk of the urban markets for the traditional supplies of raw milk to the modern dairies;
- (c) resettlement in rural areas of cattle in the cities, which at present serve a large part of these city markets;
- (d) development of the basic transportation and storage network to facilitate regional and seasonal balancing of milk supply and demand;
- (e) development of milk procurement systems in appropriate rural areas in order to provide for raw milk a channel which is more remunerative than the traditional channel; and
- (f) improvement in standards of dairy farming by programmes of animal breeding, veterinary services, feedstuff supplies and management, thereby increasing milk yields per animal.

5.2 Benefits envisaged on successful completion of the project are :—

- (a) Availability of wholesome milk at stable and reasonable prices to the bulk of city consumers, with major effects on protein intake, particularly to vulnerable groups, namely pre-school children, nursing and expectant mothers;

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\* Indian Dairy Corporation—first Annual Report (1970-71)

- (b) improved productivity of dairy farming in extensive rural areas bringing major increases in agricultural output and incomes with special emphasis on improvement of the income of small farmers and landless people;
- (c) removal of dairy cattle from the cities where they represent a growing problem in terms of genetic waste, social cost and public health; and
- (d) establishment of a broad basis for accelerated development of the national dairy industry in post-project period.

5.3 The project falls within the general framework of the Government's animal husbandry and dairy development programmes. With revenues generated by the sale of the produce made from World Food Programme—commodities, investments will be directed to the overall purpose of expanding and restructuring the dairy schemes serving Bombay, Calcutta, Delhi and Madras, so that they can provide the bulk of the milk supplied in those cities and extend the organised procurement of milk from the rural producing areas.

5.4 Through the actions spelt out above, it will be possible for the milk schemes to procure and handle the milk which previously entered the four major cities through traditional channels and to stimulate additional farm production, thereby raising agricultural output and income and at the same time providing urban population with supplies of wholesome milk at reasonable prices. Meanwhile, by economic pressure and the use of project funds, city-kept cattle will be transferred to rural areas for more efficient production. The current waste through premature slaughter of high-yielding milch cattle and their calves in the cities and the genetic drain caused by this practice would thus be ended.

5.5 In accordance with the Plan of Operation mutually agreed to between the Government of India and the United Nations/Food & Agricultural Organisation and World Food Programme, the WFP will arrange to supply during the project period 1,26,000 tonnes of skim milk powder and 42,000 tonnes of butter oil valued at international prices and transfer the same to the Indian Dairy Corporation. The latter in turn, will transfer the WFP-commodities to major cities milk schemes and other approved dairy organisations in India at approximate

valuation of Rs. 4.35 and Rs. 9.67 per Kg of skim milk powder and butter oil respectively. These valuations have been arrived at consistent with the average price of Re. 1/- per litre of raw milk of 6% fat and 9% solids-not-fat, procured in rural areas in order to ensure that utilisation of WFP-commodities neither depresses the price of the liquid milk nor distracts its use.

5.6 On the values aforementioned, the total proceeds to be generated are estimated at Rs. 95.40 crores

The Government of India have undertaken to ensure that the total proceeds will be utilised for the purposes specified in the project and as an addition to such funds as have been allocated for the development of animal husbandry, dairy development and fodder production in the Fourth Five Year Plan of the States.

5.7 This fund would be utilised to build up a national milk grid which will include the dairy projects in the four cities of Calcutta, Bombay, Delhi and Madras and 17 dairies in 10 States of Andhra Pradesh, Bihar, Gujarat, Haryana, Maharashtra, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal and the Union territory of Delhi. Out of this fund animal husbandry development is proposed to be allocated about Rs. 45 crores for augmenting milk production. The Operation Flood project is being implemented by the Indian Dairy Corporation, a public sector organisation set up by the Government of India.

5.8 Milk production enhancement programme of Operation Flood envisages gradual increase in the intake of milk for meeting the demand of milk in four metropolitan cities, through indigenous procurement from the production of a total of 21 lakhs of milch animals. This would comprise 2.25 lakhs of milch animals from these cities to be resettled in rural areas and 18.75 lakh milch animals in the potential milkshed districts of these city dairies. It has been estimated that these 21 lakh animals would comprise 14 lakh cows and 7 lakh buffaloes. The milksheds have been selected in 10 States covering areas in 57 districts (Appendix VIII). The Indian Dairy Corporation is at present engaged in surveying the various milksheds for deciding on the exact areas of operation. The number of districts that would be finally included may undergo some changes as a result of this survey.

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\* This sum which has been provided for the Indian Dairy Corporation has been included in the Central Sector of the Plan.

5.9 In these milksheds it is expected that the average milk yielding capacity of the cows and buffaloes would be 1.96 litres and 3.93 litres per animal per day respectively. To start with, the milk yields of cows and buffaloes could be lower by about 50 per cent and 20 per cent respectively than the abovementioned averages. The difference in production would be made up by ensuring the supply of balanced feed for all these animals and also by the production of sufficient quantities of green fodder by the owners in the respective areas. It has been worked out that the project would develop facilities for the production and supply of 3,575 tonnes of concentrate feed mixtures per day and also production of green forages from 7.66 lakh acres. The Operation Flood also envisages improvement through breeding of the foundation stock so as to increase the production level of the subsequent generations. This would be achieved by an intensive programme of crossbreeding of cows with exotic dairy breeds so as to supplant the population of 14 lakhs of indigenous cows by crossbred progeny over a short span of 5 or 6 years. Simultaneously, increases in production performance of buffaloes would also be brought about by selection, culling of low producers and by breeding with superior sires through artificial insemination.

5.10 Under Operation Flood an intensive animal health service would also be developed so as to ensure prompt and timely attention in the control of disease outbreaks and treatment of ailments. It is envisaged that for providing artificial breeding and animal health coverage, one veterinarian would be provided for every unit of 5,000 milch animals.

5.11 The Operation Flood contemplates to complete its milk production enhancement in 57 districts during its first round of five years. The project also contemplates building up dairy extension service and all the infrastructure that would be required for collection, processing and distribution of the additional milk that would be produced in the project areas. These include expansion of existing city dairy plants, establishment of new city milk plants feeder/balancing dairies and a number of chilling centres and provision of storage and hauling facilities.

5.12 From what has been stated above, it is apparent that the programme of work envisaged by this project provides a package of practices which is essential for improvement of milch stock and also facilities necessary for marketing of milk to ensure

a remunerative price for the producers. In other words, this programme is ideally suited to serve the interests of small and marginal farmers and agricultural labourers for improving their economy through organised dairy enterprise. The Commission, therefore, felt that all areas covered by the Operation Flood project should identify and enrol invariably all the interested small and marginal farmers and suitable agricultural labourers in their programme of milk generation and procurement. This suggestion of the Commission was enthusiastically received by the representatives of the Indian Dairy Corporation and the National Dairy Development Board. The Commission recommends that as agreed to by the Indian Dairy Corporation at least one third of the producers to be helped by the Operation Flood project may be drawn from the group of small farmers and at least another one third from among marginal farmers and/or agricultural labourers.

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## SECTION VI

### **Linking up Small Farmers Development Agency/Marginal Farmers and Agricultural Labourers Projects with Operation Flood and State Dairy Schemes**

6.1 In order to extend the benefit of planned development to the small cultivators and under-privileged sections of the rural population, special programmes, particularly suited to these classes of people have recently been launched by the Government of India. It has been estimated that the small holders and agricultural labourers constitute about 52 per cent and 24 per cent respectively of the total rural households in the country. One major hurdle in the way of small farmers taking up measures for improving their agricultural operations is non-availability of agricultural credit. The All India Rural Credit Review Committee suggested various measures to ensure better flow of credit to these weaker sections. In pursuance of their recommendation, the Government of India formulated two major schemes called the Small Farmers' Development Agency (SFDA) and Scheme for Marginal Farmers and Agricultural Labourers (MFAL).

#### *Small Farmers Development Agency Project*

6.2 Of these, the SFDA is designed to assist small farmers mainly with arrangements for supply and services, improved irrigation, inputs such as seeds and fertilisers, marketing of produce and above all easy availability of credit from co-operative banks and other credit institutions. Though crop production would receive major emphasis, the possibilities of supplementing the income of small farmers and of utilising farm family labour more profitably through subsidiary activities like dairying, poultry raising etc. would also receive special attention. Flow of credit for animal husbandry activities would also be considerably augmented. Thus, SFDA is mainly production oriented and the participants are to be helped to improve their economic status by augmenting both crop and livestock production.

### *Marginal Farmers and Agricultural Labourers Project*

6.3 On the other hand, the project for marginal farmers and agricultural labourers would be concentrating on very small holdings and agricultural labourers and this scheme is more market based and employment oriented. Therefore, the focus under this project would be more on ancillary programmes like dairying, poultry farming, piggery, agro-industry, etc. Bulk of the inputs, credit and subsidies would go to support such activities under this project.

### *Cattle Development Schemes Proposed Earlier not Adequate*

6.4 The implementation of SFDA project has been proposed for 46 districts and the MFAL project for 41 districts. It is observed that both the projects would be common in six districts. Hence the actual number of districts that would be covered by either or both of these two projects would total only 81. The names of the projects and their location in different States are given in Appendices IX and X. Ordinarily each SFDA project is expected to assist 50,000 families in the district and the MFAL project about 20,000 families. The guidelines issued from the Ministry of Agriculture have emphasised that identification of farmers for subsidiary occupations like dairying should be restricted to eligible families who are living at places which are conveniently situated from the point of view of market. A preliminary study of the programmes proposed by various States to assist farmers in dairying shows that the projects would help in providing loans and subsidies for purchase of stock, assistance in construction of cattle sheds and loans for purchase of cattle feeds. In most of the SFDA/MFAL districts only about 1,000 to 2,000 farmers in each district would be identified for the dairy programme. Though in some cases mention has been made of the formation of milk producers' cooperatives and linking them up with milk marketing scheme, no definite programme has been evolved to actually implement this aspect of work either under these projects or through States plan programmes. It is evident that cattle development programmes as now proposed in SFDA/MFAL projects are not likely either to make any sizeable impact on milk production or result in improving the economy of the small and marginal farmers and agricultural labourers. If any positive results are to be achieved, cattle rearing and milk production and marketing in these districts will have to be organised and developed as have been done, for example, in the Kaira District. This would be



necessary if a large proportion of small and marginal farmers and agricultural labourers are to be effectively helped with a dairying programme.

6.5 It has been explained earlier that Operation Flood project and other public sector dairy schemes in the States could be geared to provide the necessary support for improving the economy of small and marginal farmers and agricultural labourers in their respective milk-sheds. As regards such farmers in the districts as are covered by SFDA and MFAL projects, the Commission has made a preliminary examination as to how they could be helped to take to dairying with the assistance of the existing dairy projects and those proposed under the Fourth Five Year Plan.

6.6 It has already been stated that Operation Flood project would be taking up intensive milk production enhancement programmes in about 57 districts in ten States. These districts include twelve SFDA and eight MFAL districts (Appendix XI). Therefore, the needs and the requirements for supporting dairy cattle rearing by the small and marginal farmers and agricultural labourers in these districts in an intensive manner would be suitably taken care of by the Operation Flood programme of work. It is observed that one SFDA and two MFAL districts also lie in or near milk-sheds of the metropolitan cities but they have not been included under the Operation Flood (Appendix XII). The Indian Dairy Corporation which is making some sample surveys in the different States for locating areas of operation may immediately consider the possibility of bringing these districts also under the ambit of the Operation Flood project during its first round of work itself.

#### *Linking up of Operation Flood with SFDA/MFAL Districts*

6.7 The Commission considers that the Operation Flood should also examine the possibility of development of dairying in a number of other SFDA and MFAL districts in the States which have not been included under the project in its first round of operation. The Commission had an opportunity to discuss with the National Dairy Development Board and the Indian Dairy Corporation as to how the small and marginal farmers and agricultural labourers in these districts also could be included in the Operation Flood programme. It was agreed that there was scope for rapidly augmenting milk production and for increasing liquid milk consumption in these districts. It was also

observed that if all the milk produced in these districts could not be marketed or consumed locally the gap between the local surplus production and the local demand could be handled by the Operation Flood by organising adequate processing capacities to facilitate the transport and marketing of this surplus milk in areas having a demand for milk and milk products. It was explained by the Operation Flood authorities that one of the objectives of the project was the development of a Milk Grid throughout the country, so that movement of milk could be made from surplus to deficit areas, which of course may not be same for all periods of the year. Further, these balancing stations would also enable processing of milk into products for use later for making up shortage of fluid milk in lean periods of the year in the same area or elsewhere. The establishment of such a Milk Grid would also be required to take care of the demands of milk in new industrial townships and the progressive population growth taking place in the existing cities.

Therefore, Operation Flood should consider and develop a suitable programme of action for enhancing and stabilising milk production in additional SFDA and MFAL districts during its second round of operation. The financial requirements for supporting this programme could be obtained from the funds that would be generated during the first round of operation and from additional foreign aid and plan allocation. The areas recommended for such action are as follows :—

- |                        |  |
|------------------------|--|
| (1) Assam :            | Gauhati Dairy covering Nowgong, Goalpara and Kamrup districts.   |
| (2) Himachal Pradesh : | Mandi Dairy (Sund ar Nagar) to cover Simla district.   |
| (3) Jammu & Kashmir :  | Srinagar dairy to cover Anantnag and Baramula districts.   |
| (4) Kerala :           | Ernakulam-Cochin Dairy to cover new milk-shed areas to be developed in the hills and Quilon and Cannanore districts. |
| (5) Madhya Pradesh :   | Bhilai-Raipur Dairies to cover Durg and Bilaspur districts.  |

- (6) Mysore : Hubli-Dharwar Dairy and the new Dairy to be located to cover Dharwar and North Kanara districts.
- (7) Orissa : Cuttack Dairy to cover Cuttack Keonjhar and Dhenkanal districts.

*Linking up of State Dairy Schemes with SFDA/MFAL Districts*

6.8 Similarly small and marginal farmers and agricultural labourers in other SFDA/MFAL districts could also be helped by the existing public sector dairy development schemes in the States and those proposed under the Fourth Five Year Plan. This is considered necessary because of the fact that a milk production enhancement programme can only work if there is an assured consumption point in nearby areas or if it can be linked up with a grid system for absorption of all marketable surplus of milk. Without an assured and remunerative market, milk production in rural areas will run into difficulties. Keeping this in view an examination of the proposed SFDA/MFAL districts and the existing State dairy schemes has been made and it is observed that 36 more SFDA and MFAL districts could be linked up with the existing Dairy projects for organised milk production and marketing (Appendix XIII). The Commission realises that these existing dairy projects have been planned on a modest scale and are not capable of handling milk produced by large numbers of farmers in these districts. These dairies will have to be planned now in a proper manner with chilling centres, feeder plants/balancing station etc. so as to be able to absorb all surplus milk produced. There would be need for strengthening the infrastructure, processing capacities and other facilities of these State Dairy projects. It would be necessary for the State Governments to work out estimates of these additional requirements for each of these districts and earmark suitable financial and other support under the Fourth and Fifth Five Year Plans.

6.9 When the Operation Flood project and State Dairy schemes are fully organised on the lines suggested above, milk production in a large way through small and marginal farmers and agricultural labourers would be organised (a) in 57 districts (including 20 SFDA/MFAL projects) in its first round of operation, in 3 SFDA/MFAL districts lying within the milk-sheds of the metropolitan cities and in 14 districts (including 16 SFDA/MFAL

projects) in its second round of operation by the Operation Flood project and (b) in 33 districts (including 36 SFDA/MFAL projects) by the State dairy schemes. In about 7 SFDA and 5 MFAL districts there are at present no dairy schemes which could support milk production as a subsidiary occupation for a large number of small and marginal farmers and agricultural labourers (Appendix XIV). Every effort should be made and all possibilities explored to encourage milk production as a subsidiary occupation by small and marginal farmers and agricultural labourers in these districts also. For this the State Governments should identify possible consuming centres in these districts or study the economic implications of linking up milk production in these districts with any nearby milk project. If these are found feasible, small and marginal farmers and agricultural labourers in these districts also should be brought under the country's milk production programme as early as possible.

6.10 The proposals made above both for Operation Flood and for the State dairy schemes would need a lot of pre-project survey, examination of economics of operation, project formulation and other details. It would be necessary initially to make a quick survey in all these districts to find out the number of small and marginal farmers and agricultural labourers that could be brought under the plan of operation of these dairy schemes. The plan of operation means selection of areas which have easy accessibility from the focal point of operation to be located on the highway, which are known traditionally as an area for production and sale of milk and which should have a good density of cattle population. A gradual coverage of areas should be aimed at sector by sector so as to ensure that in each sector so included all the small and marginal farmers and agricultural labourers are induced to participate in the programme.

6.11 The project formulation should also take into consideration the milk production increases that may be expected in these areas even after a period of four or five years as a result of progressive increase in the enrolment of farmers and the increase in the milk production resulting from improved dairy husbandry practices. It is suggested that the infrastructure arrangements for breeding, feeding and disease control should be adequate so as to take care of the improved high producing progenies that would be replacing the existing stock during this period. One more consideration to be kept in view is that ultimately the projects should be prepared to extend the benefits to all small and marginal farmers and agricultural labourers who will be owning cattle and would be willing to be included in the programme.

6.12 The Commission, therefore, recommends that Operation Flood project should plan to take up milk production enhancement programme in SFDA/MFAL districts which lie in the economic marketing areas of the metropolitan cities but which have not been so far included in the operational area proposed by the project.

6.13 The Commission also recommends that Operation Flood project should consider and develop a suitable programme of action for enhancing and stabilising milk production in a number of additional SFDA/MFAL districts in the States, which have not been included under the project in its first round of operation. The Commission further recommends that the State Governments should consider on a priority basis augmentation of the infrastructure, processing capacities and other facilities of the dairy projects which are located in SFDA/MFAL districts. Similar strengthening is also recommended for those projects with which milk production in some of these districts could be linked up in order to promote milk production by small and marginal farmers and agricultural labourers and to increase the throughput of the dairies. For this purpose sufficient plan resources should be earmarked. The State Governments may also identify possible consuming centres in such of those SFDA/MFAL districts where there are at present no dairy programmes under implementation and/or examine the economic implications of promoting milk production in these districts and linking up its marketing through a nearby milk project.

## SECTION VII

### Approach to Milk Production from Cows and Buffaloes by Small and Marginal Farmers and Agricultural Labourers

7.1. The dairy development programmes for the small and marginal farmers and agricultural labourers should primarily aim at improving their economic status and should ensure that the programmes do not, on the contrary, prove an economic burden to them. The first prerequisite for any such programme is, therefore, the supply of animals which are economic producers. The question as to what level of milk production in the Indian cow can be considered economical has been examined on various occasions in the past. Of course, this would depend upon the areas where the milch animals are maintained, the method of feeding practised, the type of labour utilised, the marketing facilities available, etc. From a study made at the National Dairy Research Institute, Karnal, it has been assumed that a milch animal yielding about 1800 to 2000 kg of milk would be a profitable dairy animal. According to available statistics\* the average annual milk yield per cow in India is only 157 kg (and per buffalo is only 504 kg). The average milk production per cow is 3902 kg in Denmark, 3950 kg in U.K., 2794 kg in New Zealand, 4154 kg in U.S.A. and 3650 kg in Switzerland.\*\* The highest average daily milk production per animal in milk both for cows and buffaloes is in Punjab, which is only 2.28 kg and 3.99 kg per day respectively. It is quite evident from these figures that considerable efforts, on planned and scientific basis, have to be made for ensuring economic milk production by all small and marginal farmers and agricultural labourers. With a view to providing a permanent base for such a development the milch stock will have to be genetically improved for production.

7.2. This improvement for milk production will have to be substantial and effected quickly if the gap between the availability and the demand for milk is to be narrowed down within a foreseeable future, besides helping the economic improvement

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\*Daroga Singh, Murty, V. V. R., and Goel B. B. P. S. (1970)—Monograph on estimation of Milk Production—I. A. R. S. (I. C. A. R.).

\*\*FAO Production Year Book (1970).

of the small producers. For genetic improvement three breeding methods could be adopted. Firstly, the conventional system of intensive selection of breeding animals based on individual milk production supported by a system of progeny testing could be adopted. As a matter of fact, selection has been the method adopted till recently in our country although mostly without simultaneous use of progeny tested bulls. Although such cattle development programmes did result in some improvement in milk yields it was evident that improvement through selection was rather slow and could not keep pace with the rising demand for milk. In the technique of selection, the principle involved is to exploit the genetic variance due to additive gene action. Selection could bring about large improvement in characteristics which have a high heritability. If the heritability is low the improvement from generation to generation by selection becomes small. Therefore, with a heritability of about 20 per cent for milk production in our cattle, even with an intensity of selection of 80 per cent in the female stock, mass selection will enable a genetic gain of only 5 per cent in milk production per generation. At this rate to double milk production per lactation from an average of about 1000 kg in some of our selected herds to 2000 kg it would take about 15 to 16 generations which means about 80 years in terms of time. This method has its value in improving the level of milk production in some of our purebred milch breeds of cattle and buffaloes such as Sahiwal, Tharparkar, Red Sindhi, Murrah, Surti etc.

7.3. The second method used extensively in the case of non-descript and other low producing cattle is grading up, by which the inheritance of an established good breed is introduced progressively from generation to generation by continuous top crossing. In the course of about five generations of such continuous grading up, non-descript or other low producing cattle would be converted to almost similar to the breeds from which the bulls were used. This would take about 25 years and the increase in production level would be limited to the average of the improved breed used.

7.4. *Cross-breeding for Milk Production.*—The third method is crossbreeding using exotic dairy breeds. Cross breeding, scientifically speaking, is the mating of animals belonging to two different breeds. In the case of cattle breeding in India, the term crossbreeding has come to be known as the mating of indigenous cows, purebred or non-descript, with purebred

or grade bulls of exotic dairy breeds. This system has the potentiality of quickly raising milk production in our cows. If an exotic dairy breed with an average of 4000 kg per lactation is used for crossbreeding with local cattle with an average of 1000 kg per lactation, the first generation cross could be expected to produce 2500 kg, if the inheritance is purely additive and 2000 kg if the inheritance is multiplicative. This is of course on the assumption that proper management, feeding and animal health are ensured. Thus in the first generation itself the production can be doubled in the progeny compared to the parent stock and what will be achieved in 80 years by selection could be achieved by crossbreeding in about five years or less. It has been observed from studies that only a small magnitude of non-additive inheritance is involved in milk production and, therefore, genetic mechanism that could be exploited most in India would be the additive action of genes.

7.5. The potentialities of crossbreeding with exotic dairy cattle had been known in our country even during the later half of the last century. Some organised use of exotic dairy breeds for crossbreeding was made in government cattle breeding farms sometime during the beginning of the present century. As a matter of fact crossbreeding became a rule in most of the military dairy farms. The Royal Commission on Agriculture (1928) took note of the fact that higher milk production in cows was a necessity for a profitable dairy business. However, that Commission did not recommend any large scale adoption of crossbreeding of cattle in the country under the then prevailing situation. Therefore for a long time cross-breeding in cattle did not find favour with the planners, administrators and some animal husbandry scientists in the country.

7.6. However, crossbreeding was introduced in the late fifties on an experimental basis in hilly and heavy rainfall areas where the cattle were non-descript and whose productive capacity was low. With the taking up of large dairy projects in different parts of the country the need for augmenting milk production was felt in order to cope up with the demand for milk. As a result of large scale urbanisation and springing up of new townships and increase in the level of income in urban areas, a rapidly increasing demand for milk has developed during the last one or two decades. It has been realised that much more emphasis has to be given on increasing milk production in our cattle and for effecting this it is felt that a suitable cattle breeding policy should be evolved and implemented.



7.7 The Central Council of Gosamvardhana taking note of the changing requirements constituted a Committee in 1961 to consider the scope of crossbreeding in cattle in the country. This Committee had recommended that crossbreeding could be started in such areas where the holdings are small, agriculture is intensive, cattle are stallfed and where farmers are interested in breeding and raising cows for milk production. The Working Group of Experts constituted by the Government of India in 1961 to review the cattle breeding policy recommended crossbreeding in places where there are facilities for rearing and maintaining high producing milch cattle, and around urban areas and townships to ensure adequate marketing facilities. The Scientists Panel on Animal Husbandry set up by the Ministry of Food and Agriculture in 1965 also recommended crossbreeding in cattle on a priority basis in the intensive cattle development projects and in other milkshed areas.

7.8 *Advantages of Crossbreeding for Milk Production.*—The Fourth Five Year Plan has laid emphasis on crossbreeding of cattle as an important plank for rapid increase in milk production. It has been recommended from time to time that extensive crossbreeding should be undertaken particularly in the Intensive Cattle Development Projects, Key Village Blocks around urban centres and the milkshed areas of large dairy projects. Crossbred animals are likely to prove much more economical for milk production in these areas. The crossbred calves mature earlier than the indigenous ones. It has been observed that the age at first service for crossbred heifers is about 18 months whereas for the indigenous breeds it is around 36 months. The lactation length is usually longer in crossbred cows than in local cattle. Reproductive efficiency is also higher in crossbred cows. It is already known from the results obtained in various areas that crossbred cows yield much more than their indigenous dams. In view of these advantages the demand for crossbred cattle far exceeds their availability in the country. The Commission recommends that the dairying programme with the small farmers should aim at replacement of their indigenous cows by crossbred progenies produced by farmers themselves or by supply of crossbred heifers and calves to them from other sources.

7.9 As mentioned earlier the animals to be supplied to the small farmers should be economic producers. In determining as to what level of milk production would be economical, a number of factors have to be taken into consideration such

as cost of feed and fodder, management efficiency, milk yield, persistency and regularity in milk production, labour cost, price fetched by milk and/or milk products, etc. Some unpublished work of the National Dairy Research Institute\* carried out about 8 years ago indicated that the cost of maintenance of a cow evens out when milk production is about 4.5 litres a day or 1350 litres over an intercalving period of 15 months, when the sale price of milk is Re. 1 per litre. The cost of rearing cows has gone up in recent years. Therefore, it is necessary that milch animals with small and marginal farmers and agricultural labourers should produce at least about 1800 to 2000 Kg per lactation which will enable them not only to pay back the loans but also leave an income for them. This level of production on an average could only be ensured by crossbred cows fed with adequate feed and fodder.

**7.10 Comparative Economics of Milk Production with Crossbred Cows, Local Cows and Buffaloes.**—In Appendix XV, the comparative economics of milk production in buffaloes, crossbred cows and indigenous cows has been worked out on the assumption that the entire feed and fodder required for these animals are purchased by the owner and the entire milk is sold at fair price to a milk collection organisation. A buffalo giving 4 kg of milk per day with 6.5 per cent fat content is expected to give a net profit of Rs.309 to the owner in an intercalving period of 15 months. An indigenous cow will entail a net loss of Rs. 53.75 during the same intercalving period. A crossbred cow giving 6 kg per day will give a net profit of Rs. 544.30 in an intercalving period of 13 months. It is possible with the crossbreeding programme we are attempting, to get crossbred heifers which can yield on an average 1800 kg of milk per lactation. This is the only animal which gives a reasonable return after completely paying for all the feed. This is of particular relevance when we are dealing with agricultural labourers who may have to depend on purchased feed and fodder to a greater extent than a farmer who gets fodder, both green and dry, as byproducts from his land. The economics also shows that the indigenous cow is a losing proposition but because the full requirement of green and dry fodder is rarely purchased by the owner and concentrates are also given very rarely, the apparent profit obtained by the farmer out of the maintenance of such cows is rather illusory. The buffalo programme, *prima facie*, does not appear to show much profit, but we have to take

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\*Ray S. N. Personal Communication.

note of the fact that g buffalo milk can be of higher average fat content than 6.5 per cent that is costed. Figures from Anand show that the Surti buffalo gives as high as 8.5 per cent of fat. Further, green fodder and a part of dry fodder are obtained by the farmer as byproducts of cultivation. Much of these byproducts do not have a money value to the farmer because he may not get a purchaser for them at any a fair price. Animal husbandry pays in a programme of mixed farming as has been pointed out in paragraph 3.4. It is because of the utilisation of byproducts of various weeds and similar material and free grazing by the labourers that a large number of them, for instance, in Haryana and Punjab are able to maintain good milch animals at a profit.

7.11 The margins available in milk production, on costing of all the inputs going towards it, show that the real profit is not very substantial at present day prices of feeds and milk. Particularly when we deal with small and marginal farmers and agricultural labourers, the scheme shall be such that whatever initial investment is made on getting the milch animal it should not entail a heavy drain every year on the farmers resources and it should have some relation to the net profit that is achievable by the business. It is from this aspect that we notice that a crossbred heifer supplied at a cost of Rs. 2000 to a small or marginal farmer or agricultural labourer at 9 per cent interest will not benefit him as it will eat away his profits for several years and in case of accidents will leave him high and dry. The Commission has carefully considered this aspect and the programme of crossbreeding of the indogenous cow already available with the small and marginal farmers and agricultural labourers has been suggested to minimise the capital investment of these small men. Further, even this programme is proposed to be subsidised so that the small man gets the benefit out of these animals within a year or two, instead of waiting for returns for several years.

7.12 Our objective in trying to improve the economy of the small men is to enable a large number of them to cross the poverty level. In their thesis "Poverty in India" V.M.Dandekar and Neelakantha Rath have worked out that at 1968-69 prices, an annual income of Rs.1600 will be necessary for a family of 5 to reach what they call a national minimum consumption level of 2033 calories per person per day. More than 50 per cent of the agricultural labour and more than 38 per cent of the rural population are below this national minimum and these are

obviously amongst the group of small and marginal farmers and agricultural labourers. Unless the programme gives these people a return of four to five hundred rupees per year for the family for immediate consumption, it will not make any significant contribution in removing their poverty. Our proposals for a suitable subsidy in the programme will have to be considered from this aspect, so that the family should enjoy the small profits from this venture as soon as possible.

7.13 *Exotic Breeds to be used.*—The question which arises next is: what type of crossbred cattle should the farmers have, since the number needed would be very large? The Scientists Panel on Animal Husbandry of the Ministry of Agriculture has recommended that the bulk of the exotic inheritance could be obtained through the Jersey breed. To a limited extent other exotic breeds like the Holstein Friesian, Brown Swiss, and Red Dane could also be used in areas where suitable feeding and management conditions could be provided. Jersey breed has been considered most suitable for Indian conditions because of its comparatively smaller size and higher fat content in milk. Where heavier exotic breeds are used, adequate attention will have to be paid to feeding and management. Holstein breed is the best dairy breed excelling all others in milk production. The performance of the Holstein and their crosses would depend upon feeding and management. Therefore, care should be exercised while introducing Holstein crosses with the small farmers and this should be limited to the areas where farmers are adept in handling high quality stock and are in a position to provide the feeding and management necessary for such high producing milch animals.

7.14 A clear cut objective should be laid down while taking up a crossbreeding scheme in the rural areas regarding the level at which the exotic inheritance has to be stabilised in the crossbred population in order to ensure the best possible combination of the high milk yielding potential of the exotic breeds and the stamina and the hardiness of the indigenous cattle. From the available information and studies so far made this could be at 50 per cent or 62.5 per cent of the exotic inheritance depending upon the area. It is necessary, therefore, to simultaneously take measures to produce suitable crossbred bulls and make them available at appropriate time as has been done in the Indo-Swiss Project in Kerala.

### 7.15 *Utility of Crossbred of Bullocks for Draught Purposes.*—

The question which is likely to be raised or as a matter of fact which is already often raised is that regarding the use to which surplus crossbred male stock could be put. Opinion has been expressed that crossbred bullocks are not as efficient work animals as some of our pure indigenous draught breeds which have been specially bred for generations for this character; but the number of animals of such breeds and the areas where they are found are very small in comparison to animals of other breeds and nondescript cattle. It is generally known that 75 per cent of cattle in India are nondescript. In our rural areas the small and marginal farmers usually have only bullocks of inferior quality. Even in areas where good cattle predominate, better type bullocks are rarely seen with the small farmers. Crossbred bullocks would certainly be better than the bullocks maintained by the bulk of small farmers. The common experience so far gained in a number of States like Kerala, Andhra Pradesh, Tamil Nadu, West Bengal, Assam, etc. is that crossbred bullocks are sturdier and better than the bullocks of nondescript type which predominate over large areas in these States.

7.16 Some experiments have been undertaken at the National Dairy Research Institute, Karnal to compare the performance of Sahiwal and Brown Swiss-Sahiwal crossbred bullocks. The results so far obtained show that the crossbreds are as good as the Sahiwal during colder months. During hotter months the crossbreds require more frequent rests. A large crossbreeding project is under implementation at Haringhatta, West Bengal for evolving suitable dairy cattle for that area using exotic breeds on Harayna type cows. This project involves a large herd for crossbreeding and as a result a large number of crossbred male stock is being produced every year. Crossbred bullocks are being used there for transport and cultivation operations along with bullocks of the Haryana breed. The Commission had recently requested the Department of Animal Husbandry, West Bengal, to undertake some studies to compare the work efficiency of crossbred bullocks with that of Haryana bullocks. Accordingly, the Haringhatta station recently undertook a preliminary study of a short duration. The results indicate that the crossbred bullocks are as efficient as the Haryana bullocks during cooler hours of the day. The crossbred animals have a higher speed and have also been found to plough deeper and wider. It can, therefore, be recommended that crossbred bullocks could be used for draught purposes in the rural areas without much difficulty except during

hot periods of the day in summer. To remove all possible doubts about the utility of crossbred bullocks for work, it would be desirable to undertake more detailed studies and also organise demonstrations in the rural areas where crossbreeding of cattle is to be popularised for economic milk production. The Commission is, therefore, getting this matter examined more extensively and will give its findings in its final report. In the meantime, however, on the basis of general impression conveyed to the Commission and keeping in view the size and the draught capabilities of a large majority of the local cattle, mostly non-descript in our rural areas, there appears to be no danger in introducing crossbreeding of cattle of small and marginal farmers with exotic dairy breeds.

**7.17 Milk Pricing Policy.**—It is emphasised that unless the milk producers, small or big, are offered a reasonable price for their milk, which would ensure a margin of profit, they will not be induced to continue or take to milk production in a large measure. There is already a strong and widespread view that cattle and buffalo development is not making the desired progress because of the lack of a rational pricing policy for milk, which will take care of the interests of both the producers and consumers. The Commission is getting this important aspect connected with dairy development examined in greater detail for making suitable recommendations later on. During the discussions the Commission had with some of the State Governments it was brought out that most of the dairy projects in the country were handling buffalo milk only and also that with the present pricing policy these projects would not be providing sufficient incentive for production of cow milk. Fears were expressed that if this situation is not changed it would be difficult and erroneous to introduce extensive crossbreeding of cattle in the milksheds of the dairy projects. Though some of the problems raised are pertinent they are not insurmountable. A number of States are already seized of this problem and steps to popularise cow milk production through extensive crossbreeding are receiving their attention. The need for the dairy projects to handle cow milk and also offer a suitable price for cow milk *vis-a-vis* buffalo milk is under active consideration of the Government of India and some of the State Governments.

**7.18 Two-axis Pricing to milk Recommended**—Therefore, the milk marketing scheme covering SFDA/MFAL district should be so designed as to handle cow milk and pay remunerative price for it. The extreme support for crossbreeding in cattle and encouraging cow milk production

would be to purchase cow milk on the same price as offered for buffalo milk. Such a proposition, even though may sound well for development of cow in the country, may not be a rational policy and would present practical operational difficulties in ensuring the quality and purity of cow milk. It is possible this might encourage unscrupulous producers to dilute buffalo milk with water and sell it as cow milk. To overcome such operational difficulties the National Dairy Development Board has suggested that the cow milk could be purchased at a certain proportionate rate of buffalo milk and that this rate may be determined on the relative values of fat and solids-not-fat (SNF). Such a pricing policy ensures payment for milk on its compositional quality evaluated rationally on its fat and solids-not-fat components. This is termed as the 'two-axis' pricing policy. This would discourage adulteration of buffalo milk and also ensure a common pricing approach to cow and buffalo milk. A ready reckoner for payment of milk could be worked out by evaluating the SNF at a certain percentage of the value of fat. For example, if fat is valued at Rs. 10 per kg. and the SNF valued at 60 per cent of the value of fat the price of buffalo milk with 6.5 per cent fat and 9 per cent SNF will be Rs. 1.19 per Kg. The value of cow milk with 4 per cent fat and 8.5 per cent SNF will be Rs. 0.91 per kg. Conversely, on the basis of usual market price of Rs. 1.25 per kg for buffalo milk, the equivalent price for cow milk if SNF is valued at 60 per cent of the fat value will be Rs. 0.96 per kg. If SNF is valued at 66.66 per cent of the value of fat, the price of cow milk will go upto Rs. 1.07 per kg. It would, however, be necessary to work out the relative values for fat and solids-not-fat for different regions of the country, according to the prevailing market rates.

7.19 One difficulty that would arise in this procedure will be the testing of milk at the source for SNF in an accurate manner. An estimation of SNF is a time-consuming process. It has been suggested that the milk should be tested at source for fat content and can be paid on the basis of actual fat content and 8.5 per cent SNF content. On receipt at the dairy plant the milk from each procurement centre could be sampled and tested for SNF and for fat content. Each procurement centre could be paid a bonus on the basis of extra fat and SNF content which in turn could be distributed to the individual producers in proportion to the milk supplied by them. Milk supplied at less than 8.5 per cent SNF could be discounted on *pro rata* basis.

7.20 The Commission recommends that the two-axis pricing policy should be adopted in all regions of intensive dairy cattle development.

7.21 *Role of Buffaloes.*—Buffaloes will also continue to play an important role under the dairy development schemes. It is estimated that Operation Flood would collect milk from 7 lakh buffaloes in the first round of the project. Buffaloes will also be found in large numbers in the SFDA/MFAL districts in the States of the Punjab, Haryana, Uttar Pradesh, Gujarat, Maharashtra, Andhra Pradesh and Tamil Nadu. As the objective of the milk production enhancement schemes is to help small and marginal farmers and agricultural labourers, it is envisaged that those who have buffaloes should also be assisted. The experience in Anand shows that buffalo keeping has helped a large number of farmers in that area. The productive capacity of Surti Buffaloes in that area has also been improved progressively through a planned and integrated programme. Therefore, the need for better feeding and improved breeding of buffaloes to step up milk production should receive equal attention in other areas also as in the case of milch cattle. As the best milch buffaloes of the world are in our country any genetic improvement in them for milk production will have to be attempted only by selective breeding, preferably based on progeny testing. Such a procedure, as already explained, is time-consuming and would take about 80 years to double milk production in the buffaloes. The States like the Punjab, Haryana and Gujarat which have got high producing buffaloes will have to concentrate on selective breeding with the use of superior purebred bulls of high pedigree. In other states where the local buffalo stock is not of good quality and high productivity grading up with superior bulls of breeds like Murrah, Surti, etc. would be the proper method.

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## SECTION VIII

### **Production of High Quality Milch Animals and Their Supply to Small and Marginal Farmers and Agricultural Labourers**

8.1 As indicated in the earlier sections, the economic foundation of small producers in dairying can only be built around high producing milch animals. Under our present situation, this requirement would be fulfilled mainly by crossbred cows and high yielding she-buffaloes. It is necessary that planned and comprehensive programmes be evolved to ensure the supply of high producing crossbred cows to a large section of small and marginal farmers and agricultural labourers within a reasonably short time. The easiest way to achieve this would be to buy and supply high producing crossbred cows and mature heifers to these farmers. But this is not practicable because of the non-availability of crossbred cows in any large number within the country at present. The cost of these animals is also very high and it is increasing day by day because of short supply and heavy demand. Therefore, the only practicable way will be to plan a programme for the production of crossbred cows by the small and marginal farmers and agricultural labourers themselves making use of whatever local type of cows they already possess, for crossbreeding with exotic dairy breeds. Such a procedure may no doubt take some time to bring benefits to the small farmers but considering the huge number of farmers that would be benefited this time lag is not of much consequence. How this objective could be achieved is explained hereunder.

8.2 *Expansion of Operation Flood Project Suggested.*— Operation Flood project and other dairy projects should organise an intensive artificial insemination coverage for crossbreeding of cows in the milkshed areas of their respective projects. When such an artificial insemination coverage is fully organised and implemented it can be expected that about 40 per cent of the farmers will have crossbred heifers with them as a result of the first round of artificial insemination, allowing a margin for sex ratio, mortality, culling among calves and other factors. Another equal number of farmers may be expected to have crossbred heifer calves during the second round of artificial

insemination which may be two years hence. It is expected that a number of the first group of farmers could also get a second crop of crossbred heifer calves in a period of about another two years. They could also cross their first crop of crossbred calves in about two years' time and may be able to get an improved  $F_2$  crossbred progeny. It will be seen, therefore, that about 80 per cent of the farmers would be having crossbred cows in production within a period of four or five years and 100 per cent in a period of seven years or so and will be actively participating in milk production programme as an economic subsidiary occupation. The above calculations are on the assumption that each small and marginal farmer and agricultural labourer has only one cow. Where the family has two cows, the chances of the farmer getting a crossbred heifer in first round of mating itself will be much higher.

8.3 It has been estimated that Operation Flood would cover about 21 lakh milch animals in the milk shed areas under the project. These would include about 14 lakh cows and 7 lakh buffaloes. It has been agreed that Operation Flood would enrol at least two-thirds of the producers from among small and marginal farmers and agricultural labourers. Therefore, it may be assumed that this project would bring under its programme of crossbreeding about 9.3 lakh cows belonging to smaller farmers. On a reasonable assumption that half of these farmers may own only one cow each and the other half possess two cows each, it can be expected that the Operation Flood Project would be assisting about 6.22 lakh of small and marginal farmers and agricultural labourers. On the assumption that the small and marginal farmers and agricultural labourers will be owning only one buffalo each, the Operation Flood would be assisting for developing another 4.66 lakhs of such people in its operation areas. Thus Operation Flood alone with its present proposed programme of action would be assisting in all 10.88 lakhs of small and marginal farmers and agricultural labourers in about 57 districts. This works out to approximately 19,000 such families in each district. The Commission considers that the coverage should be larger and, therefore, recommends that Operation Flood should undertake extension of its programme of action for milk production through another 10.88 lakhs of small and marginal farmers and agricultural labourers. When this is undertaken it is expected that about 38,000 of small and marginal farmers and agricultural labourers could be economically assisted. It has been ascertained from the authorities of Operation Flood that the dairy plants that have been planned under this project will have an extra absorption

capacity of about 50 per cent and they have also been designed to work for an extra shift if and when found necessary. Therefore, there will not be much difficulty in the future for these dairies to handle additional quantities of milk from the expanded areas now proposed for their operation. But additional infrastructure, personnel and other facilities will have to be provided for extension of breeding, veterinary coverage, balanced feed supply, fodder production, collection and transport of milk and other requirements. A coverage of at least 38,000 families of small and marginal farmers and agricultural labourers per district will be necessary to attack the problem of rural poverty to any significant extent. The Indian Dairy Corporation/National Dairy Development Board should work out additional requirements of funds for this purpose and the Government of India should allocate sufficient plan finances to the Operation Flood Project for this additional programme.

**8.4 Increased Coverage of Area by State Dairy Projects.**—On similar lines it would be necessary that State Dairy Projects to which milk production in most of the other SFDA/MFAL districts will be linked should also programme to assist at least 38,000 small and marginal farmers and agricultural labourers in each of these districts. The programme of cattle development, milk collection, processing and marketing should be organised on the same lines envisaged under the Operation Flood Project. In view of the position that the additional requirements for this purpose are likely to vary from district to district, the State Governments should work out in detail a programme of action and the financial requirements thereon. The Government of India and the State Governments should allocate sufficient resources for this purpose under the Fourth and the Fifth Five Year Plans. If the above suggestions are implemented in about 107 districts covered by the Operation Flood and SFDA/MFAL programmes, about four million families of small and marginal farmers and agricultural labourers would be assisted to improve their economic status through milk production programme over a period of about five to seven years.

**8.5 Assistance for Rearing Crossbred Heifers.**—These farmers should be encouraged to properly rear the crossbred heifers which could replace later on their indigenous low producing cows. If the crossbred heifers are properly reared and fed, they could be expected to take the bull at around 18 months of age and come into production at around 28 months. For this, the smaller farmers may need assistance particularly

for feeding of concentrates and some good forages. It has been estimated that the cost of feeding balanced concentrates and sufficient forages from 3 months to 28 months would amount to about Rs. 1400 per heifer. The cost of concentrate portion alone would amount to about Rs. 960 per heifer. It should be possible for the smaller farmer to provide the necessary forage requirements from their own resources in the form of by-products of crop cultivation, stubbles, grazing etc. It will be necessary for the projects to arrange only for the supply of concentrate feeds to the farmers. It is recommended that the small and marginal farmers who have produced crossbred heifers be extended financial assistance in the form of half subsidy and half loan and agricultural labourers two-thirds subsidy and one-third loan for the purpose of concentrates. This would mean that each farmer would get Rs. 480 as subsidy and Rs. 480 as loan. A labourer will get Rs. 640 as subsidy and Rs. 320 as loan. This approach would be much better than asking farmers to buy cows at a higher price even though with a subsidy of 25 per cent or 33-1/3 per cent, as provided in the SFDA/MFAL projects. Of course, there will be a time lag for the farmers to benefit from the former approach but this is not a very important consideration when it is remembered that it is impossible to obtain adequate number of crossbred animals from open market to supply to such a large number of farmers to be brought under the programme as envisaged in this report. The farmers who are able to obtain a heifer calf through the first round of artificial insemination could be encouraged to keep their local cows and further breed for another round to try for a second crossbred heifer the rearing of which need not be subsidised by the projects.

8.6 In the preceding paragraph we have discussed the need for giving a feed subsidy to the small and the marginal farmers and the agricultural labourers for looking after their crossbred heifer calf till it comes to milk. We have explained in paragraph 7.10 how the annual income that can accrue to one of these families from a crossbred heifer is only of the order of about Rs. 500 and as such it is necessary that any loan liability on the participant should be such that he is left with a net income of at least Rs. 400 for the family from the beginning of the programme. We have recommended in paragraph 8.5 that a small or marginal farmer should get a subsidy of Rs. 480 for a heifer calf and an agricultural labourer Rs. 640. Only if this is accepted, the amount of loan that a small and marginal farmer will have to repay will be limited to Rs. 480 and that of an agricultural labourer to Rs. 320. Repayment of the loan can only start after the animal starts

capacity of about 50 per cent and they have also been designed to work for an extra shift if and when found necessary. Therefore, there will not be much difficulty in the future for these dairies to handle additional quantities of milk from the expanded areas now proposed for their operation. But additional infrastructure, personnel and other facilities will have to be provided for extension of breeding, veterinary coverage, balanced feed supply, fodder production, collection and transport of milk and other requirements. A coverage of at least 38,000 families of small and marginal farmers and agricultural labourers per district will be necessary to attack the problem of rural poverty to any significant extent. The Indian Dairy Corporation/National Dairy Development Board should work out additional requirements of funds for this purpose and the Government of India should allocate sufficient plan finances to the Operation Flood Project for this additional programme.

8.4 *Increased Coverage of Area by State Dairy Projects.*—On similar lines it would be necessary that State Dairy Projects to which milk production in most of the other SFDA/MFAL districts will be linked should also programme to assist at least 38,000 small and marginal farmers and agricultural labourers in each of these districts. The programme of cattle development, milk collection, processing and marketing should be organised on the same lines envisaged under the Operation Flood Project. In view of the position that the additional requirements for this purpose are likely to vary from district to district, the State Governments should work out in detail a programme of action and the financial requirements thereon. The Government of India and the State Governments should allocate sufficient resources for this purpose under the Fourth and the Fifth Five Year Plans. If the above suggestions are implemented in about 107 districts covered by the Operation Flood and SFDA/MFAL programmes, about four million families of small and marginal farmers and agricultural labourers would be assisted to improve their economic status through milk production programme over a period of about five to seven years.

8.5 *Assistance for Rearing Crossbred Heifers.*—These farmers should be encouraged to properly rear the crossbred heifers which could replace later on their indigenous low producing cows. If the crossbred heifers are properly reared and fed, they could be expected to take the bull at around 18 months of age and come into production at around 28 months. For this, the smaller farmers may need assistance particularly

for feeding of concentrates and some good forages. It has been estimated that the cost of feeding balanced concentrates and sufficient forages from 3 months to 28 months would amount to about Rs. 1400 per heifer. The cost of concentrate portion alone would amount to about Rs. 960 per heifer. It should be possible for the smaller farmer to provide the necessary forage requirements from their own resources in the form of by-products of crop cultivation, stubbles, grazing etc. It will be necessary for the projects to arrange only for the supply of concentrate feeds to the farmers. It is recommended that the small and marginal farmers who have produced crossbred heifers be extended financial assistance in the form of half subsidy and half loan and agricultural labourers two-thirds subsidy and one-third loan for the purpose of concentrates. This would mean that each farmer would get Rs. 480 as subsidy and Rs. 480 as loan. A labourer will get Rs. 640 as subsidy and Rs. 320 as loan. This approach would be much better than asking farmers to buy cows at a higher price even though with a subsidy of 25 per cent or 33-1/3 per cent, as provided in the SFDA/MFAL projects. Of course, there will be a time lag for the farmers to benefit from the former approach but this is not a very important consideration when it is remembered that it is impossible to obtain adequate number of crossbred animals from open market to supply to such a large number of farmers to be brought under the programme as envisaged in this report. The farmers who are able to obtain a heifer calf through the first round of artificial insemination could be encouraged to keep their local cows and further breed for another round to try for a second crossbred heifer the rearing of which need not be subsidised by the projects.

8.6 In the preceding paragraph we have discussed the need for giving a feed subsidy to the small and the marginal farmers and the agricultural labourers for looking after their crossbred heifer calf till it comes to milk. We have explained in paragraph 7.10 how the annual income that can accrue to one of these families from a crossbred heifer is only of the order of about Rs. 500 and as such it is necessary that any loan liability on the participant should be such that he is left with a net income of at least Rs. 400 for the family from the beginning of the programme. We have recommended in paragraph 8.5 that a small or marginal farmer should get a subsidy of Rs. 480 for a heifer calf and an agricultural labourer Rs. 640. Only if this is accepted, the amount of loan that a small and marginal farmer will have to repay will be limited to Rs. 480 and that of an agricultural labourer to Rs. 320. Repayment of the loan can only start after the animal starts

giving milk. The loan may be made repayable in the three years starting from the time the cow gives milk and the loan may be adjusted against the daily payment for the supply of milk to the milk collection unit. In the normal course these loans will bear an interest of 9 per cent. The interest burden will itself, therefore, be substantial. Either the interest rate for this programme may be reduced to 6 per cent or the account so adjusted that the subsidy borne is adjusted against the price of the feed for the early part of the programme and the price of feed for the latter part adjusted against the loan which will bear the interest. The programme will ultimately benefit 4 million households of small and marginal farmers and agricultural labourers. The cost of the subsidy will, therefore, be of the order of Rs. 225 crores. Though this will appear to be a staggering amount for a programme, we have to bear in mind that this is not payable all in one lot. The birth of the heifer calves will be spread over a period of five years and the programme will complete at the end of the 8th year for the last batch of heifers. The amount will, therefore, really be adjustable over a period of eight to nine years. The annual contribution will, therefore, be of the order of Rs. 25 crores. We recommend that this amount of subsidy may be given for the entire programme of milk production through small and marginal farmers and agricultural labourers for rearing crossbred and improved buffalo calves in the 107 districts or so, that we are recommending, as a centrally sponsored programme. Though the amounts appear to be large, we have to note that for a cost of about Rs. 480 per family we are bringing 4 million families from a poverty level to a reasonable stage of self-sufficiency in their basic requirements of food and clothing. The annual net income per family will be more than Rs. 500. The cost-benefit ratio in this investment is, therefore, one of the best in the various schemes we are contemplating for the uplift of the small man.

8.7 It has already been suggested that the farmers who are not lucky to get a crossbred heifer in the first round of crossbreeding with artificial insemination or who might lose them while rearing, should be encouraged to try once again through the next round of artificial insemination within a year or two. However, a system will also have to be evolved to bring into active milk production programme as many of such farmers and also marginal farmers and agricultural labourers who may not own any cow to start with. This would mean either providing a weaned crossbred heifer calf for rearing or supply of an advanced pregnant heifer or a freshly calved crossbred cow or a high yielding milch animal to these farmers with the subsidy and loan to meet

the cost of rearing, or the purchase price of the animal. Such a programme will bring these farmers into the milk production programme and benefit them at an earlier stage of the project. It is, therefore, necessary to formulate an alternative large scale programme for production of crossbred heifer calves or cows and supplying them to these farmers. Preliminary discussions held by the Commission with the State Governments and other institutions indicate that areas in Rajasthan, Malnad in the South, Madhya Pradesh, Gujarat and Assam may have potential to support such ventures.

### *Import of Bulls & Cows of Exotic Dairy Breeds*

8.8 An immediate programme that has to be organised to support dairy cattle rearing and milk production by small and marginal farmers and agricultural labourers is to organise an efficient artificial insemination service and adequate fodder production. As far as Operation Flood is concerned, they are expected to cover 14 lakh cows under crossbreeding for milk production. This large population would be covered over a period of 3 years at the rate of 5 lakh cows per year. In the initial stages of the programme it is considered desirable to organise artificial insemination with liquid semen and gradually replace it with frozen semen; in the meanwhile necessary training of personnel, import of equipment and establishment of frozen semen laboratories could be organised. It has been estimated by the National Dairy Development Board that about 1000 bulls of exotic dairy breeds would be required for the massive artificial insemination under the aegis of Operation Flood project with the liquid semen programme. The Dairy Board has also estimated a requirement of about 2000 cows of exotic dairy breeds to establish foundation herds with a view to covering exigences and for production of exotic bulls adapted to tropical environmental conditions. This would also avoid dependence on recurring import of bulls for the programme in future years. As far as possible, the bulls and cows may be imported from countries and areas where they have been reared under climatic environments similar to ours. The Operation Flood should programme for the immediate purchase of these bulls and cows of suitable quality with the funds available with it for this purpose. The Commission recommends that the Government of India should make available foreign exchange for this purpose on a priority basis. In respect of similar work in SFDA/MFAL districts not likely to be covered by Operation Flood, the State Governments concerned should also consider formulating and implementing programmes on similar lines.



### *Scheme on Crossbred Heifer Production in Rajasthan*

8.9 Rajasthan Government have under consideration a project for colonising a large number of nomadic cattle breeders around existing tubewells and new tubewells to be bored in Jaisalmer district where UNDP ground water survey has indicated a large underground water potential. The project envisages installation of 10 new tubewells besides energising 5 existing wells. A comprehensive programme of settlement of nomadic cattle breeders, development of pastures and fodder production, intensive crossbreeding of cattle through artificial insemination, adequate animal health and dairy extension coverage and purchase and transportation of milk to Jodhpur has already been drawn up to be implemented under the Rural Works Programme sponsored by the Government of India. As a complementary to this project, the Animal Husbandry Department of Rajasthan has also prepared project outlines for the purchase of crossbred heifers from these settled erstwhile nomadic breeders and other areas in the State and rearing them upto advanced pregnancy state for supply to SFDA/MFAL projects in Rajasthan and other States. This heifer rearing project is proposed to be undertaken at the Government of India farm at Jetsar so that the surplus dry and green fodder from Suratgarh and Jetsar farms could be made use of. This project would make available about 2,000 ready-to-calve crossbred heifers every year at an estimated cost of Rs. 1,500 each.

8.10 The Commission recommends that the Ministry of Agriculture may have this proposal scrutinised from technical and financial angles and afford appropriate financial assistance and sanction for its early implementation in view of its potentiality to support dairy programmes under SFDA/MFAL projects. If Rajasthan Government agree to hand over all the heifers for distribution in areas covered by the Operation Flood then the funding of the project could also be considered by the Indian Dairy Corporation.

8.11 In the Malnad area of the South (Kerala, Tamil Nadu and Mysore), there are already a large number of crossbred cattle with the farmers. Also a large proportion of labourers in the plantations keep cattle. The farmers in these areas keep large cattle stock near forest areas, depending mainly on forest grazing. There are plenty of grazing facilities in Malnad and because of high altitude the climatic condition is favourable for rearing crossbred cattle. There is large scope in these areas for implementing a project of heifer-calf production upto weaning stage for supply

to milk project areas in the plains. Discussion with the United Planters Association of South India (UPASI) indicated that they would be prepared to help their regular labourers in milk production and calf-rearing programmes. The heifer calves so raised could be purchased in large numbers for small and marginal farmers and agricultural labourers who could be provided 33-1/3 per cent subsidy on the cost price of these calves and also loans and subsidies for rearing them upto production state. The State Governments concerned and the Operation Flood project in collaboration with the UPASI could study the economics of such a programme for early implementation. It may be possible to organise similar programmes in grassland areas of Madhya Pradesh, in Banni-Saurashtra regions of Gujarat and in the hilly areas of Assam.

8.12. The Commission recommends that in view of the urgency of the programme, the Government of India may consider implementation of such schemes during the Fourth Plan period itself and their continuation on an expanded basis under the Fifth Five-Year Plan as centrally sponsored schemes.

8.13. For the purpose of popularising crossbreeding of cattle for milk production in areas covered by the Operation Flood and with small and marginal farmers and agricultural labourers in SFDA/MFAL districts, the interest and leadership provided by private institutions should be harnessed wherever available. The lead given by the Bharatiya Agro-Industries Foundation in Maharashtra provides a good example. This Foundation has already started organising cattle development work through progressive goshalas, sugarcane growers cooperatives, private dairy farms, institutions, etc. It has started a crossbreeding programme of cattle which involves, according to their estimate, 80 per cent of small farmers. The existing facilities available with the Foundation could be augmented considerably and suitably dovetailed with the milk production enhancement programme of Operation Flood and the State schemes for small and marginal farmers and agricultural labourers.

#### *Breeding and Salvage of Superior Buffaloes from Cities*

8.14. Farmers could be assisted in the purchase of good quality buffaloes from the breeding tracts with the usual subsidy. The possibility of salvaging dry buffaloes and superior buffalo calves from cities like Bombay and Calcutta should be examined. In Bombay, arrangements could be made for artificial insemination of she-buffaloes at the proper time in early lactation. If

contracts could be entered into for buying these impregnated animals when they go dry, it would be possible to distribute a number of good quality buffaloes to the rural producers. As the period between the purchase and the time of calving may be about 5-6 months these pregnant animals could be handed over mainly to those of the small farmers who have a higher level of land holding in the milk sheds of Operation Flood or other dairy projects. The price paid for the animal and the feeding cost upto calving could be given as part loan and part subsidy to the small farmers. It would be necessary to carry out an intensive survey of the situation in Bombay and Calcutta and work out details of such a scheme in consultation with the Maharashtra and West Bengal Governments. The Operation Flood project could also consider salvaging buffalo calves at an early age of one or two months and rearing them at a suitable place. The economics of such a scheme should be considered from the angle of small and marginal farmers and agricultural labourers.

8.15. For organising breeding coverage for buffaloes under Operation Flood and in other districts, an assessment of the population to be bred and an estimate of bulls required would have to be worked out. After that it would be necessary to identify the sources of supply. It is understood that the Indian Dairy Corporation is undertaking a survey of the areas to be brought under their operation and would thereafter make arrangements for locating the supply sources for good breeding stock. Similar surveys would be necessary in respect of other districts.

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## SECTION IX

### Credit And Insurance

#### *Need for Timely Credit*

9.1 The small and marginal farmers and agricultural labourers taking part in the milk programme must be assured of the necessary credit, both medium and short-term, for their operations. The programme we have envisaged contemplates these participants developing their own crossbred heifers through an artificial insemination programme using the nondescript cows that they have now with them. The programme also contemplates supply of weaned crossbred heifers or pregnant heifer calves for rearing from centralised production centres of crossbred heifers in suitable cattle areas in the country like Rajasthan and the Malnad of South India. It further contemplates purchase of milch animals for supply to these farmers. In addition, the programme contemplates improvement of buffaloes through better husbandry practices and distribution of salvaged superior she-buffaloes and calves from the city stables to the farmers in the rural areas. Medium-term credit will be required in all these programmes for purchase of the animals, where necessary, and for rearing the heifers till they come to milk. Short-term credit will be required for purchase of feed to supplement whatever feed is available with the farmers. Unless there is a system by which the farmers taking part in the programme can get the required credit on time, they cannot benefit from the programme.

#### *Functional Cooperatives for Milk Production*

9.2 The functional cooperative system appears to be the best suited for this particular business. In the Kaira District Co-operative Milk Producers Union Ltd., there are over 700 village primary cooperatives which are linked up into a union at the district level. The primary cooperatives organise the credit, both short-term and medium-term, for the members for the purchase of buffaloes and feed. The primary cooperatives arrange for the collection of the milk and its supply under contract to the processing plant run by the district union. Arrangements have been made for paying daily the price of the milk supplied by each

member. Arrangements have also been made to adjust part of the price paid for the milk against capital and interest on the loans given to the member. The district union organises the transport of milk and runs a feed plant for supply of concentrates through the primaries to the members. It maintains a veterinary and animal husbandry service which provides artificial insemination and health cover for the milch cattle of all the members of the primaries. The Union also arranges for the short and medium-term credit for the primary societies.

9.3 The dairy cooperative system organised by the Kaira District Cooperative Milk Producers' Union Limited is a fully functional one, which provides for the production, collection and processing of milk and the infrastructure needed for the enterprise. The functional cooperative system for milk supply was considered by the Rural Credit Review Committee (Venkatappiah Committee, 1969) and was mentioned with approval. The Reserve Bank of India has, however, been pressing for the primary agricultural credit societies to deal with credit for milch animals and inputs, wherever the primaries are viable. In a business like milk production, where milk is supplied daily and payment has to be made daily, unless the milk collection and payment organisation and the credit organisation are one and the same, adjustment of accounts is always bound to be delayed and unsatisfactory. The veterinary and animal husbandry service is vital to the milk production programme. If this function is separated from the credit, there will again be a conflict of interest and delays. We are, therefore, firmly of the view that the functional cooperative organisation for milk production must be fully supported in the cooperative thinking, irrespective of whether there are viable primary credit societies in the area or not. The milk business is completely separate from other business of the farmer. The economics of this business is self-contained and will be best met by a functional cooperative structure as described by us and mentioned with approval by the Venkatappiah Committee.

9.4 Under Operation Flood, it is contemplated that, where a district union under the cooperative system cannot be organised in the near future it would be desirable to have a corporation to handle all the functions which the district union in the functional cooperative system handles. As long as the primary cooperative societies are linked up to the corporation exactly as the primary cooperatives are linked to the district union in the functional cooperative system, there is technically no inherent difficulty in running such an organisation. The corporation or the district

union of cooperatives will have to get the funds for the long, medium and short-term credit from other agencies. We have in the Interim Report on Credit Services for Small & Marginal Farmers and Agricultural Labourers recommended that the source of credit may be a commercial bank which is nominated as the Lead Bank of the area. A similar arrangement should meet the needs of the milk production programme.

*Functions of the Primary Milk Producers Cooperative Societies*

9.5 The primary dairy cooperative society at the village level has a special significance in the milk production programme. Milk has to be collected in very small quantities from a large number of farmers and agricultural labourer households in the village. The responsibility for seeing that the milk is of the right quality rests on a low paid staff attached to the milk collection centre. In Anand, this staff is maintained by the primary village cooperative and is fully accountable to the cooperative for its actions. Milk collected daily in the village is sent in bulk to the processing centre and is assessed there for quality and quantity. If there is any deficiency in either quality or quantity at the village, the penalty is levied on the entire bulk. Therefore, every member of the village cooperative is interested in seeing that there is no mischief done at the village level in the collection and the despatch. If, on the other hand, the primary village cooperative idea is not accepted and a departmental collection centre is organised, supervision of this vast structure from the central unit will be difficult. The primary village cooperative for milk collection is responsible for the success in the milk trade in the Kaira District Cooperative Milk Producers' Union Limited. We, therefore, recommend that even if the district unit may be a corporation, the village unit must be primary cooperative of all the persons supplying milk from the village to the district unit. Where neither a cooperative union nor a corporation can be organised, the village unit must at least be formed into a body of primary producers, which will be responsible for the supply of quality milk to the plant.

*Linking up of Primary Societies with Tehsil Farmers' Service Societies and the District Level Organisations.*

9.6 The programme we have recommended is expected to cover about 107 districts during the next decade, out of which 69 districts fall under the SFDA/MFAL projects. The functional cooperative union or a corporation at the district level with primary cooperative societies at the village level would be the best structure for the organisation of the milk programme in these districts. In our Interim Report on Credit Services for Small &

Marginal Farmers and Agricultural Labourers, we have recommended that a Farmers' Service Society should be organised at the tehsil/block level, which should take over the responsibility for organising short, medium and long-term credit for its members. We have also recommended that the Farmers' Service Society should, by itself or through other agencies, organise the infrastructure and the service necessary for the various agricultural programmes. We have also recommended that for certain important programmes of production like milk, cotton, etc., a district union may be formed which will undertake collection, processing and marketing of the produce and also provide for the infrastructure and service where necessary. When that recommendation is put into effect, the only change that we contemplate in the functional cooperative system we have envisaged for the milk programme would be as follows:

- (a) The primary dairy cooperative societies will continue to deal directly with the district unit regarding collection of milk and supply of inputs and services.
- (b) As the Farmers' Service Society will in the initial stages be dealing only with the small and marginal farmers and agricultural labourers, their short-term credit requirements for the milk programme would thenceforward be met by the Farmers' Service Society itself but disbursed through the primary society.
- (c) The medium-term loan for purchase of milch animals for all the members of the village dairy cooperative society may be met by the Farmers' Service Society and disbursed through the primary society. This means that even for the larger farmers, the medium-term credit for purchase of milch animals would be provided by the Farmers' Service Society. As medium term credit requirement is of large amounts and particularly for milk which is even now a difficulty credit sector, it may be necessary for the limited purpose of the milk programme, which has to be comprehensive for the village, to allow the Farmers' Service Society to deal with the medium term credit requirements for milch cattle of the larger farmers also.
- (d) The Farmers' Service Society will also join membership of the district union which runs the milk programme. A suitable accounting system will have to be developed to automatically credit a portion of the price for the milk paid to the farmers every day to their loan account in the service society.

### *Insurance Cover for Milch Stock*

9.7 It has been reported that the flow of credit for purchase of animals is very much restricted as the credit giving institutions feel rather shy to step into this field in a large way because of the greater risks involved. To minimise these risks, these institutions demand simultaneous insurance coverage on the animals when the credit is advanced for the purchase of the animals. Such insurance, apart from providing a collateral security to the financing agencies, will play a large role in safeguarding the interests of smaller farmers. It is desirable, therefore, that insurance of cattle should be encouraged in a large way under the SFDA/MFAL and other similar projects. One deterrent to the implementation of this proposal is the high rate of premia charged by the insurance agencies. In the Punjab, one insurance company has agreed to a premium rate of 4.5 per cent for buffaloes. An intensive animal health coverage proposed in the project areas along with other inputs would go a long way in reducing mortality risks among the animals and a tie up of insurance cover to such project areas may be able to induce the insurance companies to reduce the premium rates on the lines of similar reduction advocated for supervised crop production. Another incentive for insuring animals could be that the credit giving agencies may lower the rate of interest for loans advanced in respect of insured animals or the financing institutions may consider the whole or the part of the premium to be built in the interest structure. As the SFDA/MFAL agencies are providing a risk coverage of 3 per cent of the credit given, the banks may consider giving a rebate in the interest structure to this extent in respect of insured animals because of the fact that the insurance also provides the security against the loan advanced. To reduce the risks, the insurance agencies may lay down an extra requirement as to the special level of production to be satisfied by the animals to be insured. It is considered desirable to bring crossbred heifers also under insurance cover. Till such time as suitable procedures are evolved for this purpose, the project may create a separate fund to cover any risks in the rearing of crossbred heifer calves. The Central and State Governments should consider these suggestions and evolve a suitable procedure which would encourage the provision of insurance cover to a large number of milch animals with small and marginal farmers and agricultural labourers without very much burdening them with the payment of interest, premia and repayment of loans. The Commission would be examining in greater detail the general question of insurance coverage of agricultural commodities including livestock in consultation with the Life Insurance Corporation and make suitable recommendations later on.



## SECTION X

### Other Inputs and Services

#### *Fodder Development and Balanced Feed Supply*

10.1 So far, we have mainly discussed the needs and arrangements for making available high producing milch cattle to the small and marginal farmers and agricultural labourers, and making suitable marketing arrangements for the milk produced. For the success of such a massive programme of milk production through lakhs of small and marginal farmers and agricultural labourers, it is imperative that in addition to the supply of high producing animals, simultaneous provision has to be made for adequate feeds and fodder, credit and subsidies, suitable price for milk produced, animal health cover, etc. It is also necessary to provide incentives to encourage the farmers for taking interest in this venture.

10.2 All out efforts have to be made to encourage these farmers to produce as much of home-grown forage crops as possible. The possibilities of introducing forage crops in rotation with other arable crops have to be examined in greater detail and attempts made to induce the farmers to include fodder crops in the rotation. Wherever irrigation facilities exist, high nutritional forage crops like lucerne, berseem, cowpea, etc. can be grown in rotation with other crops with great advantage. The planting of grasses along the margin of the bunds, nalla sides, river banks, etc. will have to be encouraged. Grasses and hay available from forest areas should primarily be reserved for the feeding of milch animals maintained by landless agricultural labourers in the districts located near the forest areas. Green forages supplemented by good quality hay is the naturally balanced ration for ruminants. Milk yields of cows and buffaloes could be greatly increased by feeding highly nutritious legumes and non-leguminous forages both green and dry. Apart from its nutritional soundness this system of feeding with a judicious combination of green and dry roughage is most economical for milk production. Unless adequate fodder development programme is launched, there is no hope for a flourishing dairy industry in the country. The fodder development programme has to be an aggressive one and the

involvement of the State agricultural departments in this programme on a priority basis is essential. It is necessary to strengthen the dairy husbandry extension organisation with sufficient funding with the specific objective of augmenting fodder production, its conservation and judicious use. An assured supply of balanced concentrate feed mixture at a reasonable price is also an inescapable pre-requisite in the planning for the rearing of dairy animals for more milk. The feed will be balanced and nutritive if only the right type ingredients are mixed in appropriate proportions. The cost could be made reasonable if advantage is taken to use locally available feeds to the extent possible and the feed ingredients are purchased in bulk during favourable seasons. This is possible only if Operation Flood and other dairy projects serving the small and marginal farmers and agricultural labourers take up the direct responsibility of production and sale of balanced feed. The Government of India could explore the possibilities of obtaining coarse grains as aid from World Food Programme as had been done under World Food Programme Project Agreement No. 348 entitled 'Improvement of milk supply through balanced feeding of cattle' or under bilateral aid from foreign countries. Such aid should only be sought until such time as sufficient quantities of coarse grains do not become available within the country. A suitable pricing policy for these coarse grains received as gifts will have to be worked out keeping in view the possible market price for such grains in the country at the end of agreement periods. Any element of subsidy to be given to small and marginal farmers and agricultural labourers in the sale of ready mixed feed should come from the funds allocated for this purpose under the SFDA/MFAL projects. The Commission is given to understand that the Indian Dairy Corporation has already submitted a proposal for such aid to the Ministry of Agriculture for onward transmission to World Food Programme. If the proposal materialises, the money generated by the use of the coarse grains in the ready mixed feeds could also be utilised to meet expenditure for the infrastructure support in the State dairy schemes covering SFDA/MFAL districts enumerated in Appendix XIII.

### *Animal Health Cover*

10.3 In the implementation of a programme of cattle improvement involving large numbers of high producing animals including crossbred cows, the necessity of providing an adequate animal health cover needs no special emphasis. The infrastructure that will be provided to support this programme

should ensure a well knit animal health cover organisation which should be able to provide prophylactic and treatment services at the door of the farmer at the appropriate time. As already explained, animals of high production are more susceptible to infections and other disorders because of additional stress imposed on their physiology due to high production. It has already been explained as to how the provision of an intensive veterinary service by the Kaira District Cooperative Milk Producers' Union Ltd. has played a major role in including the farmers of the areas to take to milk production in a large way and to progressively improve the quality of production in their animals. Taking into consideration this experience, it is understood that the Operation Flood is contemplating in its plan for milk enhancement to organise a strong veterinary coverage so as to provide the services of one veterinarian for every 5,000 head of cattle. Similarly the SFDA/MFAL districts that will be covered by other dairy projects should also be provided with similar intensive animal health service facilities.

#### *Foot and Mouth Disease Vaccine Production*

10.4 One important and urgent requirement in all areas where large scale introduction of high yielding milch animals is contemplated is the control of foot and mouth disease. This disease has proved a great hazard to cattle development and milk production particularly in areas where crossbreeding has been undertaken. As many as 6,000 outbreak of this disease occur annually involving 3 to 4 lakh animals. This disease affects milk production, reduces breeding efficiency and causes heavy mortality particularly among crossbred young stock. Fortunately, vaccine to control this disease is available and has been put to use with success in various parts of the world. But the availability of this vaccine in India is very limited at present and with increasing crossbreeding work undertaken in the country, the demand for this vaccine is growing substantially from year to year. The multiplicity of virus types causing this disease makes the control of the disease more difficult than others. At present, a polyvalent vaccine using O, A, C and Asia-1 types is being manufactured at the Indian Veterinary Research Institute, Mukteswar. This Institute is now able to produce only about 25,000 to 30,000 doses a year of the polyvalent vaccine. There are plans to expand the production of the vaccine at this Institute and also to establish very soon a new vaccine production centre at Bangalore with the assistance of the Danish Government. It is reported that these two centres may be able to produce and supply about

10 lakh doses a year in another 3 or 4 years' time. It is understood that the Government of India is also exploring the possibilities of production of this vaccine by established pharmaceutical firms. It is apparent that so far the efforts made have not been adequate so as to ensure production and supply of this vaccine in sufficient quantities within the foreseeable future. The Commission feels concerned that the priority attention needed in this direction has not so far been given to this very important and most essential pre-requisite for a successful milk production breakthrough. It is emphasised that foot and mouth disease vaccine production should go parallel to extension of crossbreeding work in the country and there should be a tie up with these two efforts. The Government of India is urged to give topmost priority attention for the production of this vaccine in the country without any further delay.

10.5 As the periodical vaccination of animals would be a must in areas of intensive milk production, the Operation Flood has considered that the production of foot and mouth disease vaccine will also have to form a crucial part of their function so as to enable them to effectively implement their milk enhancement programme. During the discussions the Commission had with the Chairman and Directors of the Indian Dairy Corporation, they indicated that they would like to take up production of foot and mouth disease vaccine that would be required for controlling this disease in areas covered by the Operation Flood in different States. They also indicated that they would like to approach foreign countries to provide necessary expertise and aids. They are informally exploring the possibilities of obtaining aid from foreign countries for the establishment of a few foot and mouth disease vaccine production centres on a regional basis. Taking into consideration the urgency and extreme need for production of large quantities of foot and mouth disease vaccine in the country as early as possible, the Commission recommends that the Indian Dairy Corporation may be encouraged to implement their contemplated programme of setting up foot and mouth disease vaccine production stations. The Commission also recommends that every effort should be made to accelerate, on an emergency basis, the production of this vaccine in the existing and the proposed units under the Indian Council of Agricultural Research and by other agencies. It is emphasised that the vaccine produced should be of high quality and the production should be organised on an efficient basis.

10.6 Another important consideration in respect of animal health service particularly for dairy animals is the problem of tuberculosis and brucellosis. These diseases have been a major

source of loss in production and also a cause of serious concern in regard to public health. The Commission, therefore, considers that with the introduction of high yielding milch animals with the small and marginal farmers and agricultural labourers through Operation Flood and other dairy projects, it would be necessary to undertake periodical testing to assess the prevalence of tuberculosis and brucellosis. Wherever the incidence is found to be high, it would be necessary to formulate suitable control measures. Production of suitable vaccine for the control of brucellosis should be augmented at the existing biological products stations. The Indian Dairy Corporation may also undertake, as contemplated by them, the production of this vaccine required for use in Operation Flood project areas.

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## SECTION XI

### Acknowledgements

11.1. The Commission takes this opportunity to thank individuals, institutions and officers of the Central and the State Governments for their valuable suggestions either through correspondence or during personal discussions. We wish to thank particularly the Chairman and the Directors of the Indian Dairy Corporation and the Chairman, Members and the Secretary of the National Dairy Development Board for giving valuable advice and suggestions during the discussion held with them. Thanks are due to the Chairman and General Manager of the Kaira District Milk Producers' Union Ltd., for making arrangements for studying the working of the Union and for supplying all relevant information.

11.2. We also wish to place on record our appreciation of the valuable work done by Shri T. Narayanan, Animal Husbandry Specialist, Department of Agriculture (on loan to the Commission), who has personally analysed the data received from various sources and has given valuable help in the preparation of the Report. We also wish to thank Shri A.V.K. Sastry, Joint Director, Animal Husbandry Statistics, Department of Agriculture, for rendering valuable help in analysing and supplying data and Dr. P.R. Nilakantan, Deputy Commissioner, Livestock Health, Department of Agriculture, for his suggestions in the preparation of this Report. Our thanks are also due to Shri M.L. Manrai, Assistant Director (Research Division) for this valuable help. To Shri R.S. Sangwan, Senior Technical Assistant (Animal Husbandry) our special thanks are due for his untiring assistance in the various stages of preparation of the Report.

B. SIVARAMAN  
*Vice-Chairman*

<i>Members</i>	<i>Members</i>	<i>Members</i>
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Randhir Singh	T.A. Pai	N.K. Panikkar
M.V. Krishnappa		Capt. Rattan Singh

J.S. SARMA  
*Member-Secretary*

New Delhi  
30th December, 1971.

APPENDIX I

*Statement showing the distribution of number of households owning cattle and average number of bovines per household in different size-groups—Krishna and Guntur—1969-70.*

Range of the size of holding (ha.)	Per-centage house-holds	Average size of holding (ha.)	Average number of bovines per household			
			Adult females	Adult males	Young stock	Total
<i>(a) Krishna area</i>						
Non-cultivator . . .	23.0		1.3	0.2	0.8	2.3
≤0 . . . . .	30.8	0.54	1.6	0.4	1.1	3.1
—2.0 . . . . .	21.2	1.58	2.4	1.0	1.5	4.9
—4.0 . . . . .	14.6	3.17	3.2	1.6	2.2	7.0
—8.0 . . . . .	6.6	6.48	4.6	2.3	3.3	10.2
Above 8.0 . . . . .	3.8	17.60	7.5	3.8	5.3	16.6
<i>(b) Guntur area</i>						
Non-cultivator . . .	22.0		1.2	0.1	0.8	2.1
≤0.8 . . . . .	35.1	0.54	1.4	0.4	1.0	2.8
—2.0 . . . . .	23.1	1.58	1.8	0.9	1.3	4.0
—4.0 . . . . .	12.7	3.19	2.4	1.4	1.8	5.6
—8.0 . . . . .	5.0	6.44	3.2	1.9	2.3	7.4
Above 8.0 . . . . .	2.1	17.66	4.9	2.7	3.7	11.3

SOURCE :—Progress Report (1967-68) —Scheme on "Estimation of availability and cost of production of milk" (Krishna Delta Area—Andhra Pradesh—ICAR)



APPENDIX II

*Statement showing the distribution of number of households owning cattle in different size groups—Mehsana Region (Gujarat)—1967-1968.*

	1966-67	1967-68
1. Number of breeders who are not operating land . . . . .	2 (6.06)	5 (6.17)
2. 0-2 hectares (Small cultivators) . . . . .	8 (24.24)	15 (18.52)
3. 2.01-6.0 hectares (Medium cultivators) . . . . .	20 (60.60)	42 (51.85)
4. 6.01 and over (Large cultivators) . . . . .	3 (9.10)	12 (23.46)
TOTAL . . . . .	33 (100.00)	81 (100.00)

SOURCE :—Report on "Economics of dairy farming in Mehsana District of Gujarat State"—1971 (Sardar Patel University).

### APPENDIX III

*Statement showing the distribution of number of households owning cattle and average number of bovines per household in different size-groups—Dhulia Region—1969-70*

Range of the size of holding (ha.)	Percentage of households	Average size of holding (ha.)	Average number of bovines per household			
			Adult females	Adult males	Young stock	Total
Landless . . . . .	10.46		1.8	0.2	2.3	4.3
≤2.0 . . . . .	26.70	1.29	1.1	2.3	2.1	5.5
—4.0 . . . . .	26.47	3.17	1.4	2.7	2.2	6.3
—6.0 . . . . .	13.86	5.98	1.9	3.1	3.3	8.3
—8.0 . . . . .	11.07	7.33	2.2	3.3	2.7	8.2
—14.0 . . . . .	6.92	11.53	3.1	3.7	3.5	10.3
—20.0 . . . . .	2.50	16.20	4.1	4.5	4.3	12.9
Above 20.0 . . . . .	2.02	28.00	5.7	5.3	5.1	16.1

SOURCE :—Progress Report on estimation of availability and cost of production of milk—Dhulia Region (Maharashtra).

APPENDIX IV

*Statement showing the distribution of number of households owning cattle and average number of bovines per household in different size-groups—Hissar Region—1963-66.*

Range of the size of holding (ha.)	Percentage of households	Average size of holding (ha.)	Average number of bovines per household			
			Adult females	Adult males	Young stock	Total
Non-cultivators	17.0		1.22	0.26	1.28	2.76
—2	17.6	1.63	1.34	0.62	1.48	3.44
—4	17.3	3.55	1.60	0.97	1.82	4.39
—6	14.9	5.58	1.74	0.96	1.88	4.58
—8	9.4	7.64	2.03	1.03	2.24	5.30
—10	7.0	9.64	2.03	1.02	2.34	5.39
—12	5.1	11.68	2.17	0.99	2.25	5.41
—15	3.3	13.91	2.20	0.95	2.49	5.64
—18	3.1	16.59	2.49	0.97	2.83	6.29
—21	1.7	19.96	2.57	1.11	2.77	6.45
—24	1.2	23.34	2.78	1.10	3.06	6.94
—30	0.9	27.27	2.69	1.08	2.90	6.67
—40	0.8	34.75	2.86	1.42	3.18	7.46
Above 40	0.7	52.51	3.15	1.39	3.30	7.84

SOURCE :—Final Report on Study of Economics of raising cattle and buffaloes (ICAR)—Hissar District, 1963-66.

## APPENDIX V

*Copy of D. O. letter No. OPF. 1 (1 to 10) SCR-71/620-630 dated 6-9-1971 from Dr. S. C. Ray, Member-Adviser, National Dairy Development Board to the State Governments of Andhra Pradesh, Bihar, Gujarat, Haryana, Maharashtra, Punjab, Rajasthan, Tamil Nadu, U. P. and West Bengal, requesting for survey/information of areas to be identified for milk enhancement programme of Operation Food Project*

In the implementation of Action-item No. 7 (Technical inputs for increased milk production) under the operation Flood Programme, the Technical Sub-Committee set up by the Indian Dairy Corporation has considered :

The milch animals in the rural milkshed of your State which are to come within the direct purview of the Programme should be 1,25,000 distributed over 10 compact Project Areas and each such area shall have 12,500 (twelve thousand five hundred) milch animals. Furthermore, while selecting a Project Area, the following factors shall be kept in view :

- (a) that it has easy accessibility from the focal point of operation to be located on a highway,
- (b) that it is known traditionally as an area for production and trading milk, and
- (c) that it should have density of cattle population so as to ensure availability of 12,500 milch animals within a scatter of not more than 10 miles at any direction from the focal point.

2. In making the final selection of a Project Area, a survey will further be carried out to obtain information on the following :

- (i) the number of owners of 12,500 milch cows and/or buffaloes,
- (ii) the number of milch cows/or buffaloes kept by each owner,
- (iii) the number of other cattle kept by owners of 12,500 milch cows and or buffaloes,
- (iv) the number of owners (of 12,500 milch cows and/or buffaloes) having land-holding :
  - (a) nil
  - (b) one hectare and less,
  - (c) more than one hectare but not more than two hectares
  - (d) more than two hectares but not more than 3 hectares, and
  - (e) more than 3 hectares
- (v) percentage of area of the above land-holdings having irrigation facilities, in each category (a) to (e) above,
- (vi) amount of rainfall in the area in different seasons of the year,

- (vii) pattern of cropping in different categories of land-holding,
- (viii) yield per acre of the principle crops giving the approximate range of performance of individual farmers ;
- (ix) daily milk yield per animal in milk at the beginning, at middle and at the end of lactation,
- (x) the number of animals-in-milk in different parts of the year,
- (xi) how much of the milk produced is sold and at what price? giving seasonal fluctuations, if any.
- (xii) what is the marketing practice? Are there cooperative and/or middleman operators?
- (xiii) milk produced whether sold as such or after conversion into products, and
- (xiv) any other information relevant to the survey.

3. The National Dairy Development Board has been entrusted by the Indian Dairy Corporation to carry out the survey in collaboration with appropriate State functionaries. The survey teams of the Board for different regions are being set up and are long would commence their work. I am sure that the Secretary, National Dairy Development Board has already written or soon be writing to you in this connection for such help and assistance as may be needed.

4. Milk production enhancement programme of Operation Flood in the country's milkshed areas is bound to be a potent means in building up our rural economy. The programme becomes all the more significant because of the fact that by and large our milk producer are small and marginal farmers—in some places even landless agricultural labour. This aspect of Operation Flood has attracted special attention of the National Commission on Agriculture. At a joint meeting held some time ago in Anand, the Vice-Chairman of the Commission, Shri B. Sivaraman, felt keenly interested in the nature of survey the NDDDB was about to undertake in selecting project areas in the States participating in Operation Flood.

5. In order, however, to focus attention of the leadership of our national planning, Shri Sivaraman, specially laid stress on immediate gathering of information on specific items which the State authorities would be able to supply through limited field enquiries by Departmental staff.

6. Accordingly, I am approaching you with the request to kindly arrange collection of information departmentally on items (i), (ii), (iii) and (iv) (a), (b), (c) (d), and (e) of para 2 above specifically, and as much as possible on other items of a limited scale say in 2 out of 10 prospective project areas answering to requirements stated at (a), (b) and (c) in para 1. The project Areas so chosen on each may lie in the districts of.....

In the view of the extreme urgency, the information sought above may reach Dr. P. Bhattacharya, Member, National Commission on Agriculture, Vigyan Bhavan Annex, New Delhi-11 latest by the 21st September, 1971 with a copy to me. It is quite possible that the Project Areas you are going to choose are already in the milkshed of your State's dairy projects. In that case, the relevant data could already be with the officers of the Projects. However, if for any reason, the coverage suggested prove difficult to achieve, information on at least one Project Area of any one of the districts mentioned may kindly be made available on or before 21st September, 1971.

With kind regards.

APPENDIX VI

*Total Farm business income and share of income from dairying  
in various sizes of farms*

NADIAD (KAIRA)				DEHGAM (AHMEDABAD)		
Size of farm	Farm business income per farm	Income from dairying per farm	% of income from dairying to total	Farm business income per farm	Income from dairying per farm	% of income dairying to total
<i>Adopters*</i>						
Small (Below 5 acres)	1510.87	1150.93	78.18	1702.33	724.00	42.53
Medium (5 to 10 acres)	3353.37	1916.87	57.16	2942.20	749.50	25.47
Large (more than 10 acres)	10492.43	3851.00	36.70	5820.24	1046.88	17.99
All Farms	4097.70	1985.20	48.44	4449.10	915.47	20.58
<i>Non-adopters*</i>						
Small (below 7.5 acres)	751.91	452.91	60.23	1145.33	480.67	41.97
Medium (7.5 to 15 acres)	2080.67	1211.83	58.24	2351.36	758.91	32.28
Large (more than 15 acres)	6002.00	2556.00	42.59	3747.00	770.00	20.55
All Farms	1192.60	674.80	56.58	2194.60	650.20	29.63

\*Adopters and non-adopters represent cultivators who had grown hybrid bajra and those who had not grown hybrid bajra respectively in 1967-68.

(Vyas V.S., Tyagi D.S., Misra V.N. (1969)—Significance of the new strategy of agricultural development for small farmers—page 94.)

## APPENDIX VII

*Average monthly income (from sale of milk and milk products) of farmer in the cattle development area vis-a-vis contemporary control area*

Season	Income per animal in milk			Income per milch animal (Buffaloes in milk and dry)		
	CD Area	Control Area	% increase	CD Area	Control Area	% increase
	Rs.	Rs.		Rs.	Rs.	
Winter						
1968-69	96.34	56.69	69.94	74.69	35.71	109.16
Summer						
1969	99.39	71.05	39.89	85.52	59.07	44.78
Monsoon						
1969	96.30	69.15	39.26	84.38	61.07	38.17
Overall	97.35	64.59	50.72	80.72	49.84	61.96

Srivastava R.K., (1970)—Impact of Cattle Development programme on Rural Economy in the Kaira District—Paper presented at Symposium on Livestock Statistics at IARS, New Delhi.

APPENDIX VIII

*List of districts to be covered by Operation Flood*

S. No.	Name of State	Operation Flood districts
1.	Andhra Pradesh . . . . .	1. Krishna 2. Guntur 3. West Godavari 4. East Godavari
2.	Assam . . . . .	—
3.	Bihar . . . . .	5. Patna 6. Shahabad 7. Chapra 8. Gaya
4.	Gujarat . . . . .	9. Sabarkantha 10. Baroda 11. Kaira 12. Ahmedabad 13. Mehsana 14. Banaskantha
5.	Haryana . . . . .	15. Gurgaon 16. Karnal 17. Rohtak
6.	Himachal Pradesh . . . . .	—
7.	Jammu & Kashmir . . . . .	—
8.	Kerala . . . . .	—
9.	Madhya Pradesh . . . . .	—
10.	Maharashtra . . . . .	18. Thana 19. Nasik 20. Satara 21. Poona 22. Dhulia 23. Sangli 24. Jalgaon 25. Kolaba 26. Kolhapur



APPENDIX VIII—*contd.*

S. No.	Name of State	Operation Flood districts
11.	Mysore . . . . .	--
12.	Orissa . . . . .	--
13.	Punjab . . . . .	27. Ferozpur 28. Jullundar 29. Bhatinda 30. Ludhiana 31. Gurdaspur
14.	Rajasthan . . . . .	32. Alwar 33. Bharatpur 34. Bikaner
15.	Tamil Nadu . . . . .	35. Madurai 36. Salem 37. Coimbatore 38. Thanjavur 39. Tiruchirapalli
16.	Uttar Pradesh. . . . .	40. Balia 41. Meerut 42. Muzaffarnagar 43. Bulandshahar 44. Ghazipur 45. Varanasi 46. Mirzapur
17.	West Bengal . . . . .	47. Darjeeling 48. Hooghly 49. West Dinajpur 50. Bankura 51. Malda 52. Murshidabad 53. Burdwan 54. Nadia 55. Howrah 56. Midnapore 57. Calcutta (including Alipote, 24-Parganas).

SOURCE : Map of India furnished with the Operation Flood Project proposals for approval by the Inter-Government Committee of UN/FAO/WFP.

APPENDIX IX

*List of SIDA Projects*

S. No.	Name of State	Name of Project
1.	Andhra Pradesh	1. Nalgonda
		2. Cuddapah
		3. Srikakulam
2.	Assam	4. Nowgong
		5. Goalpara
3.	Bihar	6. Purnea
		7. Patna
		8. Champaran
4.	Gujarat	9. Sabarkantha
		10. Surat
		11. Junagadh
5.	Haryana	12. Ambala
		13. Gurgaon
6.	Himachal Pradesh	14. Sirmur
7.	Jammu & Kashmir	15. Jammu-Kathua
		16. Anantnag
8.	Kerala	17. Quilon
		18. Cannanore
9.	Madhya Pradesh	19. Chindwara
		20. Ratlam-Ujjain
		21. Bilaspur
10.	Maharashtra	22. Thana-Nasik
		23. Ratnagiri-Satara
		24. Bhandara
		25. Mysore
11.	Mysore	26. Bidar
		27. North Kanara
		28. Nagaland
12.	Nagaland	29. Dhenkanal
		30. Bolangir
13.	Orissa	31. Ganjam

## APPENDIX IX—contd.

S. No.	Name	Name of Project
14.	Punjab . . . . .	32. Sangrur-Patiala 33. Amritsar-Ferozpur
15.	Rajasthan . . . . .	34. Bharatpur 35. Alwar 36. Udaipur
16.	Tamil Nadu . . . . .	37. South Arcot 38. Madurai 39. Tirunelveli
17.	U.P. . . . .	40. Fatehpur 41. Badaun 42. Pratapgarh 43. Rae Bareilly
18.	West Bengal . . . . .	44. West Dinajpur 45. Darjeeling 46. Hooghly.

**APPENDIX X**  
*List of MFAL Projects*

S. No.	Name of State	Name of Project
1.	Andhra Pradesh . . . . .	1. Nalgonda 2. Visakhapatnam
2.	Assam . . . . .	3. Mikir Hills 4. Kamrup
3.	Bihar . . . . .	5. Ranchi 6. Shahabad
4.	Gujarat . . . . .	7. Bulsar 8. Baroda
5.	Haryana . . . . .	9. Ambala 10. Hissar
6.	Himachal Pradesh . . . . .	11. Simla
7.	Jammu & Kashmir . . . . .	12. Baramula 13. Poonch-Rajouri
8.	Kerala . . . . .	14. Quilon 15. Cannanore
9.	Madhya Pradesh . . . . .	16. Durg 17. Raisen-Sehore
10.	Maharashtra . . . . .	18. Ratnagiri-Satara 19. Parbhani
11.	Mysore . . . . .	20. Tumkur 21. Bijapur
12.	Orissa . . . . .	22. Cuttack 23. Keonjhar
13.	Punjab . . . . .	24. Hoshiarpur 25. Jullundar
14.	Rajasthan . . . . .	26. Bhilwara 27. Ajmer
15.	Tamil Nadu . . . . .	28. Salem 29. North Arcot
16.	U.P. . . . .	30. Mathura 31. Ballia

APPENDIX X—*contd.*

S. No.	Name of State	Name of Project
17.	West Bengal	32. Purulia
		33. Bankura
18.	Delhi	34. Delhi
19.	Goa	35. Goa
20.	Manipur	36. Manipur
21.	Pondicherry	37. Pondicherry
22.	Tripura	38. Tripura
23.	Meghalaya	39. K & J Hills
		40. Garo Hills
24.	Nagaland	41. Nagaland

APPENDIX XI

*List of SFDA, MFAL Districts covered by Operation Flood*

SFDA		MFAL	
State	District	State	District
1. Bihar	1. Patna	1. Bihar	1. Shahabad
2. Gujarat	2. Sabarkantha	2. Gujarat	2. Baroda
3. Haryana	3. Gurgaon	3. Maharashtra	3. Ratnagiri-Satara
4. Maharashtra	4. Ratnagiri-Satara	4. Punjab	4. Jullundar
5. Punjab	5. Thana-Nasik	5. Tamil Nadu	5. Salem
6. Rajasthan	6. Amritsar-Ferozpur	6. U.P.	6. Ballia
7. Tamil Nadu	7. Alwar	7. W. Bengal	7. Bankura
8. West Bengal	8. Bharatpur	8. Delhi	8. Delhi
	9. Madurai		
	10. Darjeeling		
	11. Hooghly		
	12. West Dinajpur		

APPENDIX XII

*SFDA/MFAL Districts outside Operation Flood but lying within  
milk sheds of the metropolitan cities*

- 
- |                     |  |
|---------------------|--|
| 1. Madras . . . . . | South Arcot (SFDA)<br>North Arcot (MFAL) |
| 2. Delhi . . . . .  | Mathura (MFAL)                           |
-

**APPENDIX XIII**

*List of SFDA/MFAL districts which have already dairy plants in or near the district*

S. No.	Name of State	Name of district	Name of State Dairy Project to be linked with
1	2	3	4
<b>(A) SFDA</b>			
1.	Andhra Pradesh	1. Nalgonda	1. Hyderabad
		2. Srikakulam	2. Vishakhapatnam
2.	Bihar	3. Purnea	3. Barauni
3.	Gujarat	4. Junagadh	4. Junagadh
		5. Surat	5. Surat
4.	Haryana	6. Ambala	6. Ambala
5.	Himachal Pradesh	7. Sirmur	7. Nahan
6.	J & K	8. Jammu-Kathua	8. Jammu
7.	Madhya Pradesh	9. Ratlam-Ujjain	9. Indore
8.	Maharashtra	10. Bandara	10. Nagpur
9.	Mysore	11. Mysore	11. Mysore
		12. Bidar	12. Gulbarga
10.	Nagaland	13. Nagaland	13. Dimapur
11.	Punjab	14. Sangrur-Patiala	14. Patiala
12.	Rajasthan	15. Udaipur	15. Udaipur
13.	U.P.	16. Fatchpur	16. Kanpur
		17. Badaun	17. Aligarh-Moradabad
		18. Rae Bareilly	18. Faizabad
<b>(B) MFAL</b>			
1.	Andhra Pradesh	1. Nalgonda	1. Hyderabad
		2. Vishakhapatnam	2. Vishakhapatnam
2.	Bihar	3. Ranchi	3. Ranchi
3.	Gujarat	4. Bulsar	4. Surat
4.	Haryana	5. Hissar	5. Hissar
		6. Ambala	6. Ambala



---

1	2	3	4
5. Madhya Pradesh	7. Raisen-Sehore	7. Bhopal	
6. Mysore	8. Tumkur	8. Bangalore	
7. Nagaland	9. Nagaland	9. Dimapur	
8. Punjab	10. Hoshiarpur	10. Dasuva	
9. Rajasthan	11. Ajmer	11. Jaipur	
10. W. Bengal	12. Purulia	12. Kharagpur	
11. Goa	13. Goa	13. Panaji	
12. Manipur	14. Manipur	14. Imphal	
13. Pondicherry	15. Pondicherry	15. Pondicherry	
14. Tripura	16. Tripura	16. Agartala	
15. Meghalaya	17. K & J Hills	17. Shillong	
	18. Garo Hills		

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**APPENDIX XIV**

*Statement showing SFDA and MFAL districts which have no dairy project*

S. No.	Name of State	SFDA district	MFAL district
1.	Andhra Pradesh	1. Cuddapah	—
2.	Assam	—	1. Mikir Hills
3.	Bihar	2. Champaran	—
4.	J & K	—	2. Poonch-Rajouri
5.	Madhya Pradesh	3. Chhindwara	—
6.	Maharashtra	—	3. Parbhani
7.	Mysore	—	4. Bijapur
8.	Orissa	4. Ganjam	—
		5. Bolangir	
9.	Rajasthan	—	5. Bhilwara
10.	Tamil Nadu	6. Tirunelveli	—
11.	U.P.	7. Pratapgarh	—

APPENDIX XV

*Comperative economics of milk production by buffaloes, crossbred cows and indigenous cows*

	Assumptions		
	Buffaloes	Crossbred cows	Indigenous milch cows
Average weight (kg.) . . . . .	460	410	360
Lactational yield (300 days) (kg) . . . . .	1200	1800	750
Fat % in milk . . . . .	6.5	4.0	4.5
Dry period (days) . . . . .	150	90	150
Cost of animal (Rs.) . . . . .	1200	1800	700
Sale price of milk (Rs/kg) . . . . .	1.25	0.96	1.12

Cost of green fodder Rs. 4.00 per quintal.

Cost of dry fodder Rs. 10.00 per quintal.

Cost of concentrate Rs. 60.00 per quintal feeds.

Nutritive value of 100 kg. of :

	Kg.	
	DCP	TDN
(1) Green forages (maize, jowar, etc.) . . . . .	1	14
(2) Dry fodder . . . . .	0	40
(3) Concentrate feed . . . . .	15	75

*Total requirements of feed and fodder*

	Indigenous milch					
	Buffalo (450 days)		Crossbred cow (390 days)		Cow (450 days)	
	Qty. (kg)	Cost (Rs.)	Qty. (kg)	Cost (Rs.)	Qty. (kg.)	Cost (Rs.)
Green fodder . . . . .	6750	270.00	5850	234.00	6750	270.00
Dry fodder . . . . .	3600	360.00	2730	273.00	2700	270.00
Concentrate feed . . . . .	713	427.80	773	463.80	363	217.80
Total cost . . . . .		1057.80		970.80		757.80
		or		or		or
		1060.00		970.00		760.00

Interest on cost of animals (9%) . . . .	135.00	175.50	78.75
Misc. expenses such as equipment, veterinary aid, etc. . . . .	50.00	75.00	25.00
Grand total cost	1245.00	1220.50	863.75
Income from milk . . . . .	1500.00	1728.00	765.00
Income from dung . . . . .	54.00	46.80	45.00
Total income . . . . .	1554.00	1774.80	810.00
Gain (+) or loss (—) per lactation . . . . .	+309.00	+554.30	—53.75
Gain (+) or loss (—) per month . . . . .	+20.60	+42.64	—3.58

- NB: (1) Cost on labour not included; the idle labour capacity with small and marginal farmers and agricultural labourers' family to be utilised.
- (2) Price of milk calculated on 'two-axis' basis; the value of SNF has been calculated at 60 per cent of the value of fat.
- (3) If the value of SNF is calculated at 66.66 per cent of value of fat the income from crossbred cows would be still higher.

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