CHAPTER II: A CRITICAL REVIEW OF DAIRYING IN INDIA

2.1 Introduction

Agriculture is the mainstay of Indian rural economy; in 1981, agricultural and allied sectors such as animal husbandry etc. accounted for nearly 40 per cent of National Net Domestic Product. Again, of this, dairying alone contributed nearly two-thirds of the total income derived from animal husbandry sector. Over 70 per cent of India's population dwells in rural areas. The complementarity between agriculture and dairying has been more than emphasised in the Indian Planning documents particularly underscoring the imperative need for raising the production and productivity of the dairy sector and the consequent rise in incomes, through scientific methods and institutional innovations. Given the trend of increased dependence of people on land in rural areas, and in the absence of other alternative avenues of gainful employment, closely allied activities to agriculture such as dairying assume greater importance both economically and socially. Available literature bears a great deal of evidence on the role of dairying and its effects on the lives of milk producers belonging to different socio-economic categories in rural India.

This chapter focuses on (i) the place of Indian dairying in the world dairy scene (ii) problems of dairying and the nature and role of traditional dairying in India,
(iii) pre-modernization stages of Dairying in India
(iv) government interventions and Five Year Plans for
dairy development (v) the emergence of cooperative
dairying in India as an instrument to modernise dairying
and bring about social and economic development and
finally, (vi) a brief review of dairying in Andhra Pradesh.

2.2 India in the World Dairy Scene: A Brief Description

India can boast of owning more than a sixth of the World's
bovine stock\textsuperscript{1}. According to the livestock survey reports
of Sarvekshana, 1984 India had 35 million milch cattle
and 22 million milch buffaloes. Of these, over 70 per
cent of the cows and 70 per cent of the buffaloes were
of breedable age\textsuperscript{2}. Milk production in the world is esti­
mated at 400 million metric tonnes. Of this, the developed
countries contribute as much as 85 per cent of it made up
almost entirely of cow milk. Rest of the countries
together contribute 15 per cent. Whereas in Asia, 37 per
cent of the total milk produced is made up of buffalo milk.\textsuperscript{3}

In India, out of the total estimated 32.6 million tonnes of

\textsuperscript{1} FAO Production Year Book, 25, UNO, Rome, 1976.
\textsuperscript{2} Sarvekshana, Vol.VIII, No.1, July 1984, p.4.
\textsuperscript{3} Sunderashan, D, Keynote address given at a seminar on
"Breeding and Feeding for Milk Production", NDDB, Anand
milk, over 24 million tonnes is accounted for by buffalo milk and the rest by cow milk.\(^4\) This amply reveals the vital role buffaloes play in Indian dairying. They contributed over 75 per cent of the total milk in the country although the population of female cows above three years of age is estimated to be 55 million and while in the case of buffaloes just at 30 millions.\(^5\) Yet, when measured in per capita terms, India is among the poorest in cattle wealth.\(^6\) Going by the mere number of litres produced, India produces more than fifty per cent of the total Asian milk production. Yet, on an average, the Indian buffalo in lactation produces a meagre 450 kgs. per lactation - one of the lowest in the world. Of the 432.8 million tonnes of world milk production in 1977, India's share was only 24.9 million tonnes i.e. 5.7 percent of the world milk production.\(^7\)

2.3 Problems of Dairying and the Nature and Role of Traditional Dairying in India

(A) Problems of Dairying

As is widely acknowledged, woefully low volumes of production and marginal productivity of our milch animals have plagued India's dairy farming. Over the years,

\(^4\) Estimates prepared by NDDB, Anand, for its operational decisions, MEU, 1982, p.11.

\(^5\) Sunderashan, D, op.cit. p.1-3.

\(^6\) Ministry of Food and Agriculture, Indian Livestock Census and Indian Livestock Statistics, G.O.I., New Delhi.

viability of both processing plants as well as producers' farms alike has been far from breaking even. As a result commercial profitability could seldom be achieved. The absence of an appropriate institutional and market structure for dairy products, coupled with problems of primitive technology, have further compounded the problem of dairying in India.

As referred to elsewhere in this chapter, a paradoxical situation prevails in Indian dairying: a huge number of animals with abysmally low yields. No more than a meagre 450 kgs. of milk per buffalo and 157 kgs. per cow is realised per annum. It is estimated that the point of profitability arises only when animals in milk produce at least 6 kgs. of milk per day over a year. But at present barely 4 per cent of our milch animals are capable of this level of production. The consequence of the absence of an appropriate market structure and technology can be clearly seen from the research findings that as much as 75 per cent of labour that goes into the raising of milch animals is family labour. Grasses and fodder constitute about 75 percent of the total cost of maintenance of our livestock. Out of this, 90 per cent is supplied by the household itself.

Dairy industry, one of the most less organised sectors, is scattered all over the country in miniscule units consisting of mainly, non-descript animals. A survey inquiring into the size of holding of milch-animal herds amongst different categories of households, revealed that between 70-75 per cent of the total households surveyed belonged to the category of small farmers, marginal farmers and agricultural labourers.\(^9\)

The excess cattle in the dairy economy and the maintenance of un-productive animals at the dairy unit level, constitute one of the most peculiar constraints in Indian dairy farming. This phenomenon could be attributed to the imbalance between animal foods and number of animals. Variable physical conditions, low level of agricultural productivity and unavoidable emphasis on production of food crops are said to be the causes of existing imbalances.\(^10\) The National Commission on Agriculture in 1972-73 had estimated that the country had about 33 per cent surplus cows. Some planners argued that there was an urgent need to cull out unproductive animals so as to make scarce fodder and


feeds available to the productive milchstock. It was hoped that such a measure would also make household dairying more profitable. It has also been independently estimated that we do not need more than 48 million cows and 24 million buffaloes to maintain our current production requirements. Commercial disposal of the surplus cows could bring about 200 million rupees for development purposes. Whereas on the other extreme of this argument, some analysts argued that the value of our cattle and buffaloes is enormous. Milk production alone should not be the criteria in our dairy policy planning. Khurody opines that still sizeable returns from milk, draught power, manure, meat, hides and skin accrue from such animals. However, given the nature of our rural economy and the wider dimensions of our socio-agricultural structure, the problems of surplus cattle had raised persistent controversies over its method of control, regulation etc. Analytical studies made by Rao and Raj have elaborated

on the problem of surplus cattle and their disposal/
retention consequences.

It has also been observed that a vast majority of our animals are of low genetic potential. These animals use up about 60-90 per cent of what is fed to them for their body maintenance, and only a negligible part of the feeds consumed gets converted into milk. Therefore, they are regarded as poor milk converters as compared with the cross-bred animals which hardly need 20 per cent of their food ration for body maintenance and provide almost four times larger quantity of returns in terms of average yield as compared to Indian cows. Evidently, we find that not only the problem of low production but also the high input costs inhibit Indian farmers from feeding their animals in adequate quantities and quality. It is in this context that practices such as selective breeding to upgrade our non-descript milch animals has been recommended. Also cross-breeding of our cattle with imported strains such as the Jersey and Holstein Fresian animals has been adopted. However, these methods of improving our milch stock have invited criticism, of late. Opinions on these appear highly varied and controversial among the planners and the scientists.

Also, the Indian Dairy Industry is subject to severe seasonal fluctuations in production. During winters - the flush season - there is the problem of surplus production and consequently lack of remunerative returns.
During other times of the year, there is less production resulting in shortages. The magnitude of this problem could be gauged from the evidence available even from a relatively well developed dairy tract like Gujarat where the seasonal ratios fluctuate at a minimum rate of 3 per cent to 12 per cent of the milk supply in a year in the months of lean and flush seasons. Owing to the vastness of the country side, heterogenous climates, and different levels of agricultural development, regional variations become sharp and are reflected in the production potential of the economy.

The vicious position of a very large number of cattle and low yields directly results in precarious supply position of feeds and fodder. India is said to be falling short of roughages by 40 per cent and concentrates by as much as 70 per cent. As a result, nearly three-fourths of our cattle are fed on crop residues such as straw and weeds occasionally supplemented with some greens in monsoon. As is acutely felt, fodders are hardly grown - only about 4 percent of the cultivable area is under fodder crops - a feature which is a direct result of (i) uncertainty of returns from dairying because of long gestation period between investment and returns and (ii) competition between food crops and other crops.


Besides mere availability or otherwise of feed and fodder, quality of the same is another aspect of importance. Quality of Indian feeds and fodder is said to be very low as is reflected in their low contents of digestible proteins and carbohydrates.

The discussion so far might have tended to paint a gloomy picture of Indian dairying. However, it would not be correct to assume that Indian bovine population is not of any significant use. Far from it, in fact, the primary objective of keeping animals by a majority of Indian small farmers in dry land areas is, to have male cattle for draught power. Indeed, even dry female cattle are also put to draught purposes.

The direct contribution of animal husbandry to the national income is said to be about 5 to 6 per cent. The indirect contribution seems to be more encouraging. Animal labour accounts for about 20 per cent and dung use as organic fertilizer for about 5 per cent of the total cost of crop production in India. Also the draught power generated by the male animals helps save substantial amounts of money which would otherwise have had to be invested in creating expensive systems of engine power for farming. The dung as fuel and manure as sources of energy and farm input in rural areas make substantial contributions and help save import of expensive fuels such as petrol and fertilizers.

18. Ministry of Food and Agriculture, Studies in the Economics of Farm Management, Govt. of India, New Delhi,
As is widely acknowledged and also asserted earlier, the bovine population in rural India is said to serve a twin-purpose, namely milk production and draught power. Unlike cattle which are maintained for meeting the twin-purpose, buffaloes are however maintained mainly for production of milk (milk products). India produces 65 per cent of its milk made up of buffaloes albeit buffaloes constitute just about a fourth of the total bovine population. Both in terms of percentage of animals in breeding (50 per cent) and the average rates of growth in milk yield (2.4 per cent), buffaloes occupy a higher place than amongst female cattle \(^{19}\). It is noteworthy to observe that the average Indian rural producer supplies four urban residents as well as eleven villagers in his own and other families \(^{20}\).

(B) Nature and Role of Traditional Dairying in India

Rearing of both milch and draught animals has long been a tradition in India. However, it appears, for centuries, this practice was no smooth an activity for the farmers had to strike a precarious balance between the various conflicting forces such as:

(i) The decreasing availability of land for grazing and fodder production

(ii) The need to grow more food to support increasing human population and the consequent increases in requirements of draught power, resistance of bovines to diseases

\(^{19}\) Sundareshan, D, Op.cit.

\(^{20}\) NDDB, Dairying in India, 1982.
and environmental stresses and strains imposed by a tropical climate, etc. The need to expand food and fibre production had an adverse effect on availability of feed and fodder and as a result, erosion of the productivity of our cattle and buffaloes ensued.

Further, because of the same reasons, the primary focus of breeding of cattle shifted from production of good cows to that of mainly producing strong bullocks to till the land for agriculture. These apparently retrograde tendencies were reinforced by the absence of an organised system of marketing milk in most rural areas where milk was produced.

There are about 25 cattle breeds and seven buffalo breeds dispersed all over the country. Though most of the cattle are regarded as draught breeds, they are traditionally classified into three broad types: milk breeds, which display better milk yield but inferior draught power; draught breeds, which show low milk yields but better draught power; and dual purpose breeds, which are general utility breeds. All the buffalo breeds found in the sub-continent are milk breeds.

Milk as a by-product was mainly used for family consumption and for feeding the calves, particularly male cow-calves. Surplus of milk, if any, was sold or used as a medium of exchange. Dairy farming as such was therefore, neither the main nor the subsidiary occupation. This was the situation in the past.

However, changes in the above occurred in the 19th century albeit, the change was on a small scale. With the decreasing returns on agriculture and/or lessened accessibility to labour markets and other avenues of gainful employment, the dependence of the rural masses on dairying increased. Farmers of various categories became more conscious of the possible optimum uses of natural herbage, crop residue, bran, husk, de-oiled cakes and so on for higher milk production. Thus, ushered a stage of pre-commercialisation of dairy farming wherein the animals did not compete with the human beings in any major way. This had resulted in producing/selling surplus milk for markets.

However, the markets were not well developed and the urban demand for milk could not be tapped by the farmers themselves directly. It was at this stage, the "Middle men" trading in rural milk entered the fray only to take undue advantage of the market instability. The rapid process of urbanization brought in its wake a good demand for milk and milk products in the cities. The middle men took recourse to two options (i) buy milk from the producers at the village level at very low prices (ii) take away high-genetically potential animals to the cities and create cattle colonies there.
The latter was more prevalent as it was easier to overcome the problems of transportation by them. With the ever increasing demand for milk in urban areas, these middlemen made enormous profits. All these forces lead Indian dairying into a low equilibrium trap. The cattle colonies lead to an irreplaceable genetic drain of rural milch animals and at the same time had proved to be a strong disincentive for improving milk production in the rural areas. Large scale exploitation of the farmers by these middle men was witnessed. The farmers did not find their returns from milk sales commensurate with their investment of resources and time. A vast majority of these exploited farmers belonged to the poorer agrarian categories of the society. A study conducted in 1971 by NDDB in 18 milk areas of the country showed that households possessing 5 acres or less of land account for 78 per cent of the total number; 22 per cent of the total land owned; 43 per cent of the draught animals; 53 per cent of animals in milk and 51 per cent of milk produced. A similar study revealed that the share of the poorest third of rural households in milch animal ownership was 50 per cent greater than their share in land holding.


As there was no dependable institutional arrangement for marketing the milk and milk products produced by the villagers, nearly 30-35 per cent of the total milk produced in India (estimated to be 30.0 mmt. in 1980) every year used to be converted into ghee at the household level, partly to meet the village demand for the same, and mainly because there was no remunerative liquid market. While this stop-gap arrangement did help the producers in reducing their dependence on 'middlemen' on the other hand, it had lead to lower realisation of prices than they would have otherwise realised through liquid milk sales of high fat buffalo milk, and particularly in the case of cow milk which has relatively low fat content (consequently low value in product and price terms). The operating middlemen in the villages, more often than not, paid them uneconomical returns. Even now, the middlemen continue to thrive on this exploitative-lucrative business in different parts of the country. Specifically, in areas of cow milk production, the farmers faced more severe problems of exploitation. Since the low fat cow milk was not so much in demand by the urban consumers, the middle-men either refused to buy it or paid very low prices. Often the middlemen imposed very inflexible conditions of business such as they would purchase cow milk only if buffalo milk was sold to them. This has resulted in farmers' lower realisation of prices for their buffalo milk and higher profits for the middle-men as the farmers were at their mercy. As there was no other
organised market either within the village or outside, these farmers, perforce, had to accept the prices dictated by the middlemen for the milk purchased, particularly cow milk.

The foregoing analyses indicates the operation of a vicious cycle in the Indian dairy industry. Poor returns from milk obtained from the low genetic animals made the proposition of dairying a very uneconomical one and thus acted against any improvements in allocating land for fodder or to buy feeds to improve milk production. While the draught power orientation of cattle keeping continued to be reinforced, the dominant motive in milk production was to salvage anything that one could, by making intensive use of family labour and crop residues. Small quantities of milk that they produced was largely consumed or sold. Work animals and animals in milk (lactation) received priority in feeding.

2.4 Pre-modernization Stages of Dairying

Dairying, till recently, was viewed as simple rearing of milch animals even though some efforts at introducing scientific practices of dairying was done by military farms in the early 1920's. These military farms catered mainly to the needs of the army with a limited objective of raising improved animals and in streamlining the distribution process within the army circles. Random cross breeding of local cows with exotic and pure breeds was prevalent in some plantation areas. The import of purebreed bulls was officially recommended by the Royal Commission of Agriculture in 1920's. Apart from these
isolated attempts at creating an improved milch herd in some pockets of the country, however, dairying largely remained in the hands of the traditional producers, product makers, vendors and the 'middle men'.

In the cities 'tabelas' (milch animal stables) continued to thrive and proliferate. The middlemen procured milk from the hinterland producers at almost throw-away prices and fed the urban consumers with milk at higher prices. To some extent, the World War II gave a fillip to the emergence of private dairies in the major Indian cities and towns. Polson, Caventers and Express Dairies were some of the pioneer modern urban processing and product units. However, these dairies were not concerned with the development of milch herds or the dairy industry as such. They were content with their procurement of milk through 'middlemen' and the profits that accrued as a result.

The need for enhancement of production of milk and planned dairy development was first conceived by the then Imperial Dairy Expert Mr. William Smith in 1920. He encouraged scientific breeding, feeding and management at selected military dairy farms coupled with a proper extension network of services and inputs. As a result, military farms at Bangalore, Ooty hills and Karnal were transferred to the Department of Agriculture in 1923. The Bangalore Unit housed the Imperial Institute of Animal Husbandry while the Karnal unit became a Centre for cattle breeding.
Another milestone in the annals of British Indian dairying was the establishment of Imperial Council of Agriculture Research in 1929 and the transfer of the office of the Imperial Dairy Expert to the Indian departments in 1931. This seems to have given some direction for development of dairying in India. Later Dr. NC Wright, a dairy expert from Scotland who came to review the progress of dairying in India, appears to have given a remarkable impetus to dairy developments.

The recommendations/findings of Dr. Wright seem to have influenced the dairying scenario as is reflected in the subsequent changes brought by the Indian Government (a) the Bangalore Institute had got rechristened two times to eventually take the shape of the National Dairy Research Institute in 1955 (b) academic training programmes and research in dairy technology received integrated attention (c) the Poison Dairy at Anand bridged the gap between the market at Bombay and milk production in Kaira district (d) though Cooperative Dairies were started much earlier in U.P. and Madras, the first farmers' integrated cooperative dairy was established in Kaira District at Anand in 1946. Later, the Kaira Cooperative and the Aarey Milk Colony in Bombay further provided a platform for dairy development to usher in a major way.

The Emergence of Government Dairy Schemes

The country's first official urban milk supply scheme was "The Bombay Milk Scheme" which was started in early 1940's. However, this scheme could not take off as expected and it had to be ultimately closed down.
After Independence in 1947, the "Greater Bombay Milk Scheme" came into existence which was to have a milk plant in Bombay, with the milk supplied by the Kaira District Cooperative Milk Producers' Union Ltd. (AMUL). Later several state supported dairy departments and plants sprang up. For eg. the Integrated Milk Project in Hyderabad and the Delhi Milk Scheme in Delhi.

Animal husbandry and dairying attracted the attention of the planners while making the Five Year Plans. They considered these as important for the overall development in the countryside. Planned efforts at dairy development in the country assumed critical significance since the dawn of independence. With the advent of industrialisation and increased recognition for modernising the traditional business of milk and milk products, perspective plans for dairy development were evolved from time to time through the five year plans. Six Five Year Plans and three Annual Plans have followed one after the other, beginning in 1951. These plans emphasised on the following categories of specific programmes:

1) programmes for modifying the land use patterns; (ii) programmes for building up the cattle for higher productivity; (iii) programmes for development of remunerative markets for milk and milk products; (iv) programmes for education of personnel to man the expanding dairy industry and introduction of cooperative dairying.

Review of Overall Contribution of Five-Year Plans to Dairy Development

The overall contributions of Five-year plans can be summarised as below:

1) Dairying acquired a national-level recognition and a concept of planned approach for overall development was introduced at all levels in the Government structure.

2) Organized marketing of milk and milk products started getting due attention by the private, public and cooperative sector.

3) The multinationals introduced new milk products for the common consumer.

4) An innovation to overcome economic hurdles of marketing brought forth the formulation of toned milk.

5) The concept of the need for intensive cattle development was driven home.

6) India progressed in developing its own cadre of trained technical personnel.

Setbacks: The dairy industry in India suffered the following setbacks as a result of implementation of the five-year plans, which are feared to have nearly nullified their major contributions:

1) The Indian Dairy Industry became consumer-oriented with little or no involvement of millions of small milk producers (of course there were some minor exceptions to this in later plans).
2) All activities connected with milk production enhancement were left in the hands of State-level veterinary or animal husbandry departments which had no avenues of synchronizing these inputs with efficient marketing of the output, i.e. milk.

3) Consequently, production of milk remained an un-attractive proposition for the rural milk producers who had to shoulder the entire burden of sustaining the farm animals.

4) On the other hand, heavy industrialization of the cities increased the consumer demand which was exploited by the private city-dwelling dudhias.

5) The dudhias in Bombay and Calcutta brought thousands of highest-yielding milch animals from rural milksheds usually along with their calves to facilitate easy release of milk by their mothers. Once the lactation was well established, the calf was allowed to starve because it did not pay to rear calves in cities. After one or two lactations, these milch animals were sold to the city butchers because it did not pay to rear dry milch animals. Therefore, new milchstocks were obtained from rural areas. Thus, a steady stream of thousands of best animals from the rural sector was led to the cities -- never to return to their home tract. These animals would have left at least half-a-dozen females each for the posterity, if they had been left in the rural areas.
This anti-dairy development cycle was the major catastrophe for two decades. All the money spent on thoughtfully drawn plans appears to have failed to make the desired impacts.

The foregoing analysis of dairy development via provision of inputs and services and better marketing organisation evidently seem to have come mainly from the state and central governments. While the major programmes for agricultural development have either been only partially successful or have failed to deliver the goods, dairying came to be viewed as a potential instrument through which the lot of the poorest was sought to be improved.

Thus the official approach to dairy development was based on "socio-welfare" considerations and not those fully related to building up of modern dairy industry.

28. Please see the following:


Almost all programmes of rural development such as the SFDA, MFAL, DPAP, IRDP have made provisions for supply of either free or subsidised inputs, cattle loans etc. - a standard feature of the socio-welfare schemes of the government. However, some state governments have made attempts to create dairy organizations to procure milk from rural areas so as to cater to the growing demand for milk by the city men. These efforts, it appears, had a marked consumer orientation with little or no regard for the hinterland producers. Thus proliferated a host of govt. managed dairy plants manned either by the departmental people or handed over to autonomous dairy corporations. Such efforts could bring about little or no change in the structuring of dairy industry except of course in temporarily halting the demand-supply fluctuations. A long term perspective policy for dairy development was conspicuously absent.

The Emergence of Cooperative Dairying in India

A. The Growth of Amul:

Around 1948, the Kaira District Cooperative Milk Producers Union Ltd. popularly known as 'AMUL' was born. It started with an initial collection of just 250 litres of milk per day. Today, Amul handles over ten lakh litres of milk per day, in the peak season. It's operations cover the entire Kaira district spanning over 950 villages. Over 3 lakh dairy farmers are its members. Its share capital amounts to nearly 80 lakh rupees. Its value of sales exceed
7000 lakhs (700 million) and its assets over 100 million. It manufactures a wide range of products such as milk powder, butter, cheese, weaning foods, chocolates and malted beverages. Besides, Amul has provided facilities for veterinary care and cattle feed supply to its farmers.29

The growth of Amul has taken place over a length of three decades. The strength of the Amul union lies in its tremendous ability to respond to the needs of the farmers on time with scientific application and missionary dedication.

Structurally, Amul is a unique example of a vertically and horizontally integrated development structure. It operates on a 3-tier system of organization and coordination. At the base level i.e. village-level (first-tier) there are what are called Primary Milk Producers' Cooperative Societies. These societies are manned by their elected representatives (elected from amongst the member-producers only) of the village. A paid secretary looks after the day-to-day affairs of the society under the guidance and supervision of the elected board of presidents/directors. The Board normally consists of 9 members. 3 members at a time retire each year by rotation and 3 new members are inducted. From among the board members a member is elected as Chairman for a period of one year.

Milk is purchased by the society and payment is made on the basis of fat content of milk. Payments for the milk purchased are made in accordance with the rules and regulations passed by the board.

These primary societies federate into a union at the district level. Thus the District Producers' Unions come up (second-tier). The district unions are equipped with necessary processing and input facilities. The union is also run by a body of elected representatives (elected from amongst the chairmen of the village societies). The union procures milk from these societies and processes and markets it. The union also undertakes the responsibility of providing input services such as veterinary care, A.I., cattlefeed, fodder seeds, etc.

For marketing purposes, the district unions in Gujarat have federated into a state federation. The state federation markets the products of the unions on some commission. The profits generated by the federation are passed on to the unions and the unions in turn pass on the benefits to the primary village societies. Eventually the village primary cooperative societies plough back the profits to their participating producers. Thus, the whole chain of action is an integrated one - from production - procurement - processing to marketing. At every stage there are organic links between the tiers. This makes Amul as one of the most unique vertically integrated organizations in the country-side. To sum up, the entire structure is owned by the producers themselves.
B. Introduction of Operation Flood Programmes

Impressed with the implementation methodology and the achievements of the six district cooperative milk unions of Gujarat, the Government of India established the National Dairy Development Board (NDDB) whose sole mission was to replicate the Anand (Amul) Pattern all over the country. In 1970, the NDDB launched a nation-wide programme called 'Operation Flood-I' designed to create a 'Flood' of rurally produced Milk. The project envisaged an investment of 100 crores aiming primarily to create 18 milksheds in the country on the lines of the Anand Pattern. The objectives of OF-I are:

a) increasing the capacities of the city milk plants and establishing new plants;

b) building rural Feeder Balancing Dairies (FBD) guaranteeing a market for all milk offered by producers and a stable supply of milk to consumers at all times;

c) developing a basic transportation and storage network to facilitate regional and seasonal balancing of milk supply and demand;

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30. NDDB, Anand, 'Dairying in India', "1978-79".
d) organising milk procurement systems based on cooperatives in the milksheds supplying the four main cities viz., Bombay, Delhi, Calcutta, and Madras.

e) raising standards of dairy farming by improved programmes of feeding and management, animal breeding, veterinary services, feed supplies and extension services; and

f) competitively changing the bulk of the urban markets from the traditional supplies of raw milk to the modern dairies in the four main cities, and in the process of doing so to resettle in rural areas the milch cattle at present based in these cities.

The replication of the Anand Pattern Cooperatives was undertaken by the state govts. with the help of the 'spearhead teams' of the NDDB. The NDDB provided all the necessary technical services to the projects. The Indian Dairy Corporation provided the required finances.

Although scheduled to be completed by June 1975, GF-I suffered some major delays and was ultimately terminated in March 1981. According to the reports of the Indian Dairy Corporation (IDC), 18 Anand Pattern unions were formed under the programme which included 18,0422 village cooperative societies; 2.6 million members and a total procurement of 2.78 million litres per day.

32. NDDB, Anand, "Dairying in India: 1979-80". 
According to a report by NDDB, animal health cover had been extended to over 11,800 villages through 172 regular mobile veterinary units. Milk processing capacities in the milksheds were increased to 33,980,000 litres per day and 16 new cattle-feed plants were completed. The four modern dairies in the metro cities increased their throughput from 900,000 litres per day (in 1970) to over 2,300,000 litres per day. Some of the cooperatives did exceedingly well while some were yet to make a significant mark. However, the programme had generated great expectations. As a result, even before the first OF programme was formally terminated, the Govt. of India invited the NDDB to implement OF-II— a programme nearly five times larger than OF-I in terms of investment (Rs. 500 crores).

OF-II was envisaged to establish the Anand Pattern Cooperatives in 150 districts of the country to cover about 10 million rural milk producers. This phase was to be implemented between 1978-85. It also envisaged to enable groups of 5-7 unions in contiguous milkshed areas to form Dairy Cooperative Federations (Cluster Federations). About 25 such Federations were to become the basis of OF-II.

The objectives of Operation Flood II are:

1. To enable some ten million rural milk producers' families to build a viable, self-sustaining dairy industry by 1985.

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2. To enable the milk producers to rear a National Milch Herd of some 14 million cross-bred cows and upgraded buffaloes during the 80's.

3. To erect a National Milk Grid which will link the rural milksheds to the major demand centres with urban populations totalling some 150 million.

4. To erect the infrastructure required to support a viable national dairy industry.

5. To enable milk and milk products to form an appropriate part of a stable, nutritionally adequate national diet—currently estimated at an average per-capita availability of 180 gms. of milk per day, to be achieved for a population of 750 million during the 80's.

On completion of OF-II, milk production in the country would go up from 6.9 million litres a day to 10.3 million litres. A white revolution would thus have ushered in the country by 1990 through cooperatives.

C. Results and Achievements of Cooperative Dairying in a nutshell (OF-I and OF-II Programmes).

We present briefly in the following pages with the help of graphs and charts, the achievements of Cooperative Dairying in India through the replication of the Anand model implemented (Operation Flood I & II) by the NDDB and the state governments.
(i) Milkshed Coverage

The first phase of Operation Flood covered 18 milksheds. These formed the 'catchment areas' from which milk was drawn into the four metro-cities. Operation Flood-II aims at enveloping nearly another 150 towns which involves development work in 155 milksheds. Starting with a modest coverage of 5 milksheds in 1970-71, the programme had reached a target of 136 milksheds by 84-85. Figure 1 shows the progress made thus far in this regard.

(ii) Village Cooperatives

The village Milk Producers' Cooperatives constitute the life-line of dairy cooperation. Rigorous efforts have been made to form cooperatives, not withstanding the social-structural problems in the countryside. By 1985, about 40 lakh milk producers had organised themselves into about 40,000 village milk producers' cooperative societies all over the country. This achievement indeed is very dramatic in view of the short span of time within which it has been achieved. Figure II indicates the gradual progress made in formation of cooperatives upto 84-85.

(iii) Milk Production and Consumption

Milk production before the launching of Operation Flood was estimated at 20.74 million mt. per year and per capita milk consumption at 107 grams per day. However, both milk production and consumption appear to have
Figure I

OPERATION FLOOD
Milkshed Coverage

Source: Operation Flood: A Progress Report, IDC, Jan. 86.

Note: For the period 1975-83, the milksheds include those of the World Bank-assisted projects included under Operation Flood.

* Anticipated achievement.
Figure XI
OPERATION FLOOD
Anand Pattern Village Milk Producers' Co-operatives

Source: Same as Fig. I

Note: In the case of a few milksheds where data for 1970 to 1977 were not available, estimated figures have been used. For the period 1975-76, the data include those of World Bank-assisted projects.

*Anticipated achievement.
shown an upward trend after the introduction of Operation Flood. Milk production has reached 38.7 million mt. per year and per capita milk consumption up to 144 grams per day by 1984-85. A glance at Figure III would reveal the achievements made on this front.

(iv) Rural Milk Procurement
Milk production being a highly seasonal phenomenon with yields twice as high in winter as that of the lean summer months, it is important for the producer to get all his surplus milk purchased by the cooperative. Milk procurement by the cooperatives although was not very encouraging up to the 80s it has picked up very rapidly from 82-83 to reach a staggering figure of 7.90 million kg. per day during the flush season of 84-85 from a meagre 0.65 million kg. per day in 1970-71. The year-wise progress of the above is shown in Figure IV.

(v) Throughput of Metro-dairies
The throughput of metrodairies from 0.91 million litres per day has gone up to 2.95 million litres per day. This means that the average throughput has almost trebled over time. Thus OF is ensuring a fair deal to the consumers as well. Figure V shows the progress achieved.

(vi) Throughput and Milk Powder Imports
Evidently, imports of milk powder did not seem to have risen with increase in throughput; they have any way remained
Milk Production and Consumption in India

MILK PRODUCTION
[MILLION MT]

PER CAPITA MILK CONSUMPTION
[AVERAGE GRAMS PER DAY]

*Anticipated achievement.

Source: Same as Fig. I
Figure IV

OPERATION FLOOD
Average Rural Milk Procurement
(million kg per day)

Source: Same as Fig. I

Note: In the case of a few milksheds where data for 1970-77 were not available, estimated figures have been used. For the period 1975-80, the data include those of World Bank-assisted projects.

* Anticipated achievement
OPERATION FLOOD
Throughput of Metro-Dairies
(average million litres per day)

Source: Same as Fig. I

*Anticipated achievement.
close to the 70-71 level. Commercial imports of dairy products ceased in 1976 - the imports since then have been gifts accounting for about 1 per cent of India's milk production. All the dairy products now made in India are Indian without any imported contents. Figure VI shows the finer details.

Dairying in Andhra Pradesh

Andhra Pradesh is rich in its livestock and accounts for about one-tenth of India's cattle population. In 1977, A.P. ranked second highest in the total buffalo population and seventh in the country in cattle population. The value of livestock is estimated at Rs. 220 crores.

According to the 1982 Livestock Census, there are 43.64 lakh adult cows and 43.45 lakh buffaloes. However, details of 1977 livestock census are being used in this paragraph due to lack of details of the same in 1982 (Table 2.1). Out of the 41.74 lakh cows and 36.68 lakh buffaloes in the state in 1977, only 32 per cent of cows and 52 per cent of buffaloes remain in milk during the year. The average milk-yield per milch animal is estimated to be 1.04 kg. for a cow and 1.93 kg. for a buffalo. However, drastic progress seems to have occurred in regard to

---


Indigenous milk powder production and share of imported milk powder in the throughput of the Indian Dairy Industry.

Source: Same as Fig. I

*Anticipated achievement.*
Table 2.1 Livestock Census of A.P. 1982

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<th>1982</th>
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<td><strong>Cattle</strong></td>
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<tr>
<td>Males under one year</td>
<td>576857</td>
<td>623627</td>
<td>-7</td>
</tr>
<tr>
<td>Males 1-2 years in case of CB and 3 yrs. in indigenous</td>
<td>904107</td>
<td>578249</td>
<td>+56</td>
</tr>
<tr>
<td>Males over 2 years in CB and 3 in indigenous</td>
<td>5177687</td>
<td>5400922</td>
<td>-4</td>
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<tr>
<td>Total Males</td>
<td>6658731</td>
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<td>Females under 1 year</td>
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<td>Female over 2 yrs. in case of CB and over 3 yrs. in indigenous</td>
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<td>+06</td>
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<tr>
<td>a) In milk</td>
<td>1674452</td>
<td>1302963</td>
<td>+29</td>
</tr>
<tr>
<td>b) Dry</td>
<td>1677994</td>
<td>1756818</td>
<td>-4</td>
</tr>
<tr>
<td>c) Not calved even once</td>
<td>566237</td>
<td>603387</td>
<td>-6</td>
</tr>
<tr>
<td>d) Others</td>
<td>345619</td>
<td>456561</td>
<td>-14</td>
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<tr>
<td>Total Female</td>
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<tr>
<td>Total Cattle</td>
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<td>1 to 3 years</td>
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<td>301425</td>
<td>+21</td>
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<tr>
<td>Over 3 years</td>
<td>1097075</td>
<td>1275040</td>
<td>-14</td>
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<tr>
<td>Total males</td>
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<td>2159006</td>
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<tr>
<td><strong>Females</strong></td>
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<td>Under one year</td>
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<td>1-3 years</td>
<td>1120275</td>
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<td>Over 3 years</td>
<td>4345818</td>
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<td>a) In milk</td>
<td>2584515</td>
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<td>b) Dry</td>
<td>1280103</td>
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<td>392194</td>
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<td>d) Others</td>
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<td>Total Female</td>
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<td>Total Bovine</td>
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availability of breedable females. The breedable cow population of over 3 years age was about 38.75 lakhs and that of the buffaloes 34 lakhs. Thus, in all, there were over 72 lakh breedable milch animals of over 3 years age in the state by the end of 70's. The total milk production in the state is estimated to be over 40 lakhs litres per day and the per capita consumption of milk at 75 gms per day. In terms of anticipated milk production, A.P. ranks fifth with a production level of 2.6 million tonnes in 1984.

Organised efforts at planned dairy development in the state began with the introduction of the Pilot Milk Supply Scheme at Hyderabad in 1960. Later, the same project took a gigantic shape with the UNICEF assistance called "Integrated Milk Project". The Central Dairy at Hyderabad and the Milk Products Factory (MPP) in Vijayawada were an offshoot of this. The dairy department was converted into a Dairy Corporation in 1974 (APDDC). The Corporation was set up with an authorised share capital of Rs. 15 crores. At the time of formation of the Corporation, there were 41 dairy units, one MPP with an installed capacity of 6.31 lakh litres/day. At present, 54 dairy units are functioning in the state which include 6 MPPs, 10 district dairies, 24 milk chilling centres, 19 mini-milk chilling centres, 9 milk cooling centres and 10 mini cooling centres.

A new era of Cooperative dairying dawned on A.P. in October 1981 when the APDDC had agreed to become a Cooperative Federation (APDDCF) to replicate the Anand Pattern of dairy cooperatives. Of course, earlier to this District Guntur was included in OF-I. Thus came up the popular "Sangam Dairy" in Guntur in the 70s.

At present milk is being procured from over 9300 villages through over 6000 collection centres/cooperative societies covering about 5 lakh producers of whom nearly 75 per cent belong to small farmers and the weaker sections. The annual payments to the producers crossed 50 crores. The turnover of the corporation had increased from Rs. 13 crores in 74-75 to about 40 crores in 79-80. Milk procurement has increased multifold from 686 lakh litres in 74-75 to 2190 lakh litres during 79-80 with an average of 7 lakh litres per day, the average peak procurement being 10.21 lakh litres per day in 1982-83.

The sale of milk has increased from 610 lakh ltrs. in 74-75 to 1196 lakh litres during 1982-83. Daily about 3.40 lakh litres are sold in about 43 towns catering to the need of one million consumers.

Plans for further cooperativisation and modernization of dairying are afoot and OF-II is being implemented in 16 districts of 23 districts in the state, with an outlay of

Compiled from various documents of the APDDCF and "From a Few Litres of Milk to Flood", APDDCF Pamphlet, 1985.
50 crores, financed by the IDC with 70 per cent loan and 30 per cent grant. Under OF II, a total of 2161 village cooperatives have been organised with the enrollment of 1,62,000 members. Milk procurement by the Cooperative Societies accounted for 60 per cent of the total procurement in the state. Figures 1 to 6 indicate graphically the progress of dairying in the state on the parameters discussed above.

An overall analysis of dairying in A.P. reveals that significant contributions have been made by the dairy sector towards both the growth of the regional economy in general and the growth of the small farmers and other weaker sections in particular. Organised dairy industry is said to be providing direct employment to over 7000 persons and indirect employment to thousands of rural families. It should be noted that, of the 8.6 lakh milk producers selected in the OF areas, about 83 per cent belong to agricultural labourers and small and marginal farmer families. Given the new impetus to dairying in the state through the OF programmes, the state seems poised for a 'big leap' in dairying and a 'Big push' in rural development as an outcome of the former.
Milk Procurement (in lakh litres)

Source: From a few litres to Milk Flood', APDDCF pamphlet. Same source for figures 3 to 6 also.
Amount paid to the Milk producers (Rs. in crores)

Fig IX

No. of milk producer families benefitted (in lakhs)

Fig XI

* covers 18 months
## Progress of Dairy Development in Andhra Pradesh

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<td>Milk sales (in lakh litres)</td>
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DAIRY DEVELOPMENT IN ANDHRA PRADESH

LEGEND

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<td>NON OPERATION FLOOD AREA</td>
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Map (iii)
CHAPTER III: SURVEY OF RESEARCH LITERATURE ON COOPERATIVE DAIRYING

In this chapter we present a brief review of relevant literature relating to the research findings highlighted by some empirical studies on cooperative dairying and rural development. Presented are in section I findings of studies that uphold cooperative dairying as having had a positive impact. The findings summarised in section II relate to those which indicate/apprehend a negative impact of cooperative dairying on rural development.

3.1 Section I

In an earlier section, the nature of a mutually reinforcing relationship between the animal and crop husbandries has been elucidated. Research farm data have consistently tended to support the hypothesis that mixed farming, consisting of crop and animal husbandry, is both more remunerative and labour intensive as compared to pure crop raising. Of greater interest, however, is the fact that actual farm data also tends to support these results.

Most of the studies confirm to a very substantial extent the findings of Pandey and Bhogal: (i) milch animals contribute significantly to the total family income and employment under the existing crop and milk production pattern on typical farms but the relative importance decreases with
an increase in the size of holdings; (ii) taking into consideration the availabilities of fodder and human labour, medium size mixed farms enjoy comparative advantage over small and large farms; (iii) farm income and employment could be increased substantially on all size groups of farms through adoption of optimal crop and milk production plans with improved production processes. Such findings all over appeared to have prompted a large variety of public interventions to adopt dairy farming as one of their major programmes of attack on rural poverty - the beneficiaries of which largely included small and marginal farmers and landless labourers. Reports of the National Commission on Agriculture and of the Govt. programmes such as the IRDP (animal husbandry as one of its major components) bear a testimony to this fact. The Editor, Times of India has similar observations to make.

The above might perhaps suffice it to drive home the universality of dairying as a major rural development strategy. However, it should be noted that the benefits of dairying are neither universal nor automatic. They are subject to the condition of fulfilling a large variety of conditions.

Mellor points out that increased milk production represented one of the most important potentials for increasing the intensity of operation, especially of the small farms. Although the basic potential was proven there were a large number of important economic questions concerning bottlenecks and optimum ways of facilitating increased dairy production.
He pointed out that there was a series of problems with respect to the marketing of milk. He suggested that we need to know more about the marketing problems and added that studies could be designed to indicate the best way of collecting milk from the point of view of milk producers. He opined that the applied work in Kaira district gave a reasonable basis for hypotheses concerning the best collection system, but more work was needed on that subject in other areas.

Interestingly, some research findings indicate that milk production per animal as well as the total marketed surplus of milk tend to be higher in case of the weaker sections. Also several researchers have shown that the distribution of bovines in India is much less skewed as compared to the distribution of land. In fact, in his classic analysis of the structure of India's bovine stock held by the small and marginal farmers, Vaidyanathan reveals that it consists of a noticeably larger proportion of adult males than the average thereby indicating growing specialisation in milk production as the farm size decreases. Moore has also shown from his analysis of survey data from 13 villages that, small farmers not only specialize in milk production but also show considerably greater efficiency in the use of scarce feed/land units to produce maximum milk by adjusting the size and quantity of their milch animal holdings. Ganguly's analysis also indicates that in quite a few of the regions that he had studied, the milk yield per animal in milk had
a negative correlation with the size of the land holding. The high productivity of the milch animals held by the small farmers and landless labourers is explained usually in terms of greater investment in dairying of family labour which they have in plenty and greater care of the animals to which the animal productivity responds positively.

Results of another study made by Ram and others indicate that the milk yield for both cows and buffaloes has been higher in case of small and marginal farmers and the landless milk producers as compared to medium and big farmers. The overall contribution of these people to total marketed surplus of milk in the area was to the extent of sixty per cent. To Bhattacharya this appeared but natural, in his study, because in addition to their higher yield per milch animal, 70-75 per cent of the households in the country possessing cows and buffaloes fall under the category of small farmers, marginal farmers and landless labourers. These facts underscore the urgent importance to raise their milk production further. It also amply spells out as to what dairying holds for their income raising activities.

The small land holdings which appeared to be uneconomical hitherto are providing viable now on account of the adoption of progressive dairy farming. It is reported that the emergence of new dairy units is giving every hope for farmers who own small plots of land.
Studies made by Mellor\textsuperscript{14}, Thakur\textsuperscript{15}, Vyas and Jodha\textsuperscript{16} reveal that development of dairying has now widely been recognised as an effective measure for providing nutritionally balanced diet for our people as also in improving the social and economic conditions of the weaker sections. They opine that progressive dairying appears to have created new and sustained hopes for small and marginal farmers and agricultural labourers. Unlike traditional agriculture, they say, cooperative dairying offers ample equal opportunities for increasing their incomes per unit of any factor of production. Given the right mixture of infrastructural support, the most desirable 'bottom up' approach to dairying can be effectively brought about, which was not true of the green revolution programme.

Positive results of the above propositions can be seen from the study made by Thakur\textsuperscript{17} in three districts of Gujarat which shows that the milk production, marketed surplus of milk, adoption of improved agricultural inputs, and the income per household have substantially gone up as a result of cooperative dairying, particularly amongst the landless, who are reported to have earned as much as 65-70 per cent and the small farmers to the extent of 25-30 per cent of their total income from dairying. Agriculture, simultaneously, also seems to have made progress as a result of dairying.

Evidence on the above lines is further corroborated by the results of a study conducted in Kaira district by Patel et. al\textsuperscript{18}. Their study reveals that dairy farming was the single
largest source of income to the landless families with earnings ranging from 65-70 per cent of their total income from dairying. Prices received by the milk producers of all categories in the dairy villages surveyed, have shown that there was a marked increase in prices received as compared to hitherto prices offered by private middlemen. This resulted in an increase in their annual incomes per milch animal to about Rs.600. The study also observed that establishment and growth of the milk cooperatives had negative correlation with per capita consumption of milk by the milk producers. The dairy producers in general consumed more milk (i.e. 199 ml. per day as against the national average of 110 ml.) than their counterparts in villages without cooperatives. Such a high level of milk consumption was possible amongst the producing families as they were producers themselves and milk was not a scarce commodity for them. This aspect finds evidence in Amin's study also, which reports people produce more milk, consume more and sell more when there are conditions of assured demand/market for milk. Similar findings have been reported by Patel and others also.

In terms of the proportion of value added by dairying to total agriculture in the state, dairying seems to have significantly contributed to the economy of Gujarat. A study conducted by Desai and Patel in Kaira and Mehsana districts illustrate amply the above. Cooperative dairy industry in Kaira added Rs. 35-54 million every year between 1960-61 and 72-73 to the
economy of the district while it was 14 to 29 million during the same period in Mehsana District. On an average, a primary milk producer in Kaira district got an additional income of Rs 170 to 330 per month while the corresponding figures varied between Rs 165 and Rs 531 in Mehsana district. The major share of value added in both the districts went to labour in terms of salaries and wages at various levels. More importantly, the share of social infrastructure was about Rs 12 millions and Rs 1.4 million in Kheda and Mehsana districts respectively during 1972-73. The impact at the village level was further pronounced and shown to be more significant as follows (i) more than a third of the sample of primary producers in Kheda and a fourth in Mehsana were small farmers with less than 5 acres of operative land holdings (ii) small farmers contributed 32 and 20 per cent of total production respectively in Kheda and Mehsana districts (iii) all categories of farmers believed that dairying had become a dependable source of supplementary farm income and had augmented and regularised their income with the result that it raised their credit worthiness (iv) dairy animals received better medical treatment now because of their economic value. The treatment was efficiently offered by the village cooperatives. Balanced cattle feed was made available through plants owned by the unions and (v) the existence of modern dairies checked the exploitation of milk producers by private agencies and helped them avoid distress sales of farm produce as they developed grain holding capacities by virtue of dairy income.
In his socio-economic survey of a village named Valasan, Amin reported that the net income from sale of milk was nearly one half of the total agricultural income. Similarly, Misra's case study in Karnataka on dairy development at the village level, shows that the marginal and small farm households registered the highest volume of participation in dairying, amongst all the categories of farmers, and were also the greatest beneficiaries.

Dairying is reported to be as one of the major sources of income (33.39%) for marginal households.

In terms of reductions in costs of milk production and increases in prices, Katar Singh and Das reveal that the relevant cost of production of milk in their cooperative sample villages in Periyar, Sabarkantha and Bikaner districts was less than 50 per cent of the average prices realised.

With regard to technical changes brought about by the dairy cooperatives, Puri made an elaborate study in Kaira District. The important findings brought out by him in terms of technological impacts are: (i) a significant increase in the milk yield i.e. from 3.2 kgs. to 4.5 kgs. in buffaloes in the last 10 years; (ii) commendable reduction of time period i.e. from 21 months to 16.5 months between two calvings in buffaloes (intercalving period); (iii) span of lactation increased from 270 days to 305 days; (iv) milk production almost doubled in the region; (v) milk consumption in the rural areas increased
by over 40 per cent while procurement of milk by organised dairy continued to register higher and higher levels of procurement.

Indeed, the primary cooperative societies not only seem to have become efficient agents of higher economic returns to producers but also became major vehicles in reaching out socio-economic benefits to the producers at the village level. The substantial gains that the participating producers enjoy at the village level have been well summarised by a visiting International Team of Dairy Experts: (i) regular cash payments to the producers for their milk sold to the cooperative ensures continuous flow of income throughout; (ii) village societies efficiently provide a right mix of technical input services and management practices to the farmers at the right time; (iii) continuous extension and follow up of production enhancement programmes by the village societies; (iv) fair quality assessment equipment of milk available with the society, ensures a fair price for producers' milk; (v) village societies in collaboration with the district unions arrange for training programmes in animal health, production, prices, leadership etc., (vi) village societies arrange for transport of milk and supply of cattlefeed and other inputs.

To sum up in the words of Thakur, dairying has assumed a new dimension which should be treated as something more than subsidiary dairying. Furthermore, cooperative dairying assumes a
special significance as an effective instrument of socio-economic uplift of small and marginal farmers and the landless. He also hastens to add that dairying can help us to achieve what has not been possible to do through the spread of green revolution with respect to the weaker sections of the society. Similar conclusions have also been drawn by Chawla and Khanna and Khan and Rao-Jude.

In the opinion of Kamat, the Amul Cooperative has blazed a new trial in the dairy industry of India. He considered Amul as not only a giant complex which had helped the farmers but also as one which cared for the urban consumers as well. He advocated for the replication of 'Amul' in other parts of the country too. Ulrey observed in his study of Amul, that the integrated system evolved by Amul seemed to have set an excellent example of sound working relations of Governmental agencies and private enterprise for rural development. In another study of Amul conducted by the SIET, it was concluded that the union had brought in new hopes especially for the small farmers and the landless. Such hopes seem to have already lead to realistic achievements in the words of Baviskar who regards Amul dairy of "having brought many benefits to the producers of his study village. He says the cooperatives provide a guaranteed market and a fair price, supply feed at low cost, provide regular and efficient veterinary and extension services at the village itself. No private enterprise will do all this for the producers. The producers are now free from exploitation".

The studies reviewed so far seem to have mainly focussed on the economic and other benefits that accrued as a result of cooperative dairying. The three major kinds of impact which dairy development can be understood to have had are technical, economic and social. Technical impacts are amenable to quantification in terms of assessing the change as reflected in improved physical input-output relationships. Economic impacts can be measured in terms of putting a valuation on each input and output involved. However, when it comes to measuring the nutritional and social impacts that dairy development can bring about, their analysis, as is possible and meaningful in technical and economic impacts, becomes difficult as precise measurements cannot be made particularly, when attempting to measure the social impact for concrete reasons such as:

(i) it is very difficult to clearly separate cause from effect in human affairs and (ii) meaningful comparison is not possible based on qualitative parallels. Comparisons make sense (and are easy to make) only when there are valuations to be compared. There are no proven methods of putting acceptable valuations on social change aspects. Therefore, studies of this kind are heavily bound to be qualitatively oriented and assessed with little quantitative analysis made. Very few studies are available on these aspects. However, the limited number of studies available go to point out the significance of understanding the social impacts. In this context, the study made by Somjee and Somjee may be illustrated. Their study, conducted in three villages of Kaira district succinctly brings
out the various dimensions of intangible benefits which emerged as a result of cooperative dairying. They point out how the milk cooperative ushered as a conjoint economic activity which cut across the ethnic divisions and created conducive room for equal participation in economic opportunities and benefits, irrespective of social-hierarchial considerations. They contrast the village Milk Cooperatives with the village Panchayats and conclude that the caste factions in the latter do not significantly affect the former. Further they add, "the cooperative acts as an instrument of social justice in the hands of the socially oppressed groups. More importantly, their study brings out that the lower sections of the population benefitted most. And that the real meaning of organization, participation, technology, social consciousness and concern for development in the minds of farmers, was singularly facilitated by the presence of dairy cooperatives. Moreover, the importance of time in regulated activities, economic rationale, perceptions of improved health, environment etc. were also reported to be a result of cooperative dairying.

Palakshappa in his study, reports that dairying has created a new and encouraging role for women. The poor women no longer depend on household chores for others on payment. Now they live with more dignity with their own money earned through dairying. The coming in of more money through the success of dairy cooperatives has improved the members' confidence in themselves and in their future. The stake of middle and lower castes in village affairs is increasing.
Kurien, the architect of modern cooperative dairying in India, says "the village milk cooperatives become dynamic institutions which as centres of various economic and welfare activities, also stimulate new service or multiple cooperatives, educational and health committees, etc. The benefits thus seem to be resulting from the effective organisation of village level dairy cooperatives run on efficient principles of cooperation and management, appear as a sufficient indication of perceptible impact made by the coops, as regarded by many. The high capability of these dairy cooperatives appear to provide for collective bargaining and the advantages of the economies of scale - the combined effect of which would go a long way in organising the dairy sector on modern lines. This in the words of Alagh may eventually lead to the elimination of characteristics of 'dualism' arising out of co-existence of traditional dairying with modern dairy plants in the Indian dairy sector.

The results of the studies reviewed so far indicate that there is an urgent need for expanding the dairy industry in terms of: (i) raising productivity per dairy animal to raise milk production in the country; (ii) providing assured marketing facilities for milk in all the villages on a continuous basis; (iii) enhancing the incomes and nutritional levels of the rural producers.

In order the above objectives to be met cooperativisation seem to be the best alternative for the desired development of dairy industry and the rural producers. The village level
producers' Milk Cooperatives have come to be regarded as an effective alternative to building up strong organisations of the farmers - capable of managing the integrated concept of production, procurement, processing and marketing - with a view to channeling back higher returns and other benefits to the producers.

While the foregoing studies generally indicate positive impacts of cooperative dairying on the lives of various categories of farmers, however, some studies have contrary findings to reveal that there had been little or no impact of cooperative dairying on the socio-economic conditions of its participant producers. This aspect is dealt with in Section-II.
Section - II

In this section are reviewed some findings of studies which suggest that cooperative dairying in India has had little or no impact at all in the counter-side. Also, the programmes of dairy development being currently pursued and reviewed critically by social scientists are touched upon.

George strongly believes that the dairy production technology advocated by Indian dairy planners is characteristic of Anand region meaning thereby certain crucial implications for its suitability of replication all over the country as decided by the Govt. of India. She argues, milk production technology being pushed by the dairy planners fundamentally involves (i) Cross-bred cows from indigenous dams and sires of the Jersey, Holstien-Friesian and other imported strains, and (ii) milchstock diets composed of factory mixed cattlefeed and green fodder are not appropriate and may even prove counter-productive. She further adds it is the buffalo and not the zebu-cow that is the premier milch animal contributing substantially to the total output of milk. She quotes Patel and Pandey to substantiate this point.

Further she raises several critical questions with regard to the caste and scale neutrality in dairying, suitability of replicating the Anand Pattern and so on.

Commenting on the feeds and fodders situation Nair opines that agricultural resources are rarely diverted from production
of food: whatever green fodder is used in animal nutrition is grown on small strips of land on the periphery of agricultural lands. Further evidence on this comes from the study of IIMA which says that even 20 years after the founding of the Kaira union, only 0.1 per cent of cultivable land in Kaira was used to produce lucerne (a fodder crop). Shah indicates that there was actually a decline in the area under green fodder in Kaira between 1967 and 1977. In sum, the studies cited above, expressed apprehension over the success of the policy of raising hybrid/improved cows in the face of a growing crisis in fodder cultivation and its availability.

Highlighting the problems of procurement and prices, Chakravarthy and Reddy show that procurement through organized channels generally has a rapid acceleration for some time followed by stagnation and decline over time. In their study area Ananthapur, A.P., they found a declining trend in the enthusiasm and participation of the farmers. The price offered by the Primary Producers' Cooperatives is reported to be very low. Selling milk to the society at Rs. 1.52 was considered a marginally losing proposition. The contacts of the functionaries concerned with the implementation of the dairy development programme, were found to be largely confined to the higher categories amongst the members such as big farmers and higher caste members. As a result, the lower category and lower caste farmers had to primarily depend upon the society presidents and secretaries. A study
by Nyholm et al.\textsuperscript{43} conducted in Bangalore also reveals similar findings. The authors found out that the process of modernization generated by dairying benefitted only medium and large farmers for, in the absence of an appropriate cooperative system, they argue, this is a natural consequence. Patel\textsuperscript{44} too, in his study of a village in Kaira found that the Anand Pattern Cooperative dairying could not benefit the landless significantly.

With regard to the policy of culling 'useless' animals advocated by the modern dairy planners there have been strong criticisms against such a strategy. Batra\textsuperscript{45} opines that there is no need for culling the animals 'as the number of livestock owned by each household was consistent with the maintenance capacities and needs of the household'. Huria and Acharya\textsuperscript{46} apprehend that culling would lead to expensive imports of fuels - as less cows would mean less bullocks and subsequently higher dependence on engine power. Also, he reminds us of the possible dangers of reliance on chemical fertilizers in place of the traditional cattle manure. According to Harris\textsuperscript{47} most of the animals that are temporarily dry, barren, and feeble are owned by the people who live on the smallest and poorest farms. So that when economists talk about getting rid of 30 million cows, they are really talking about getting rid of 30 million cows that belong to poor families'. The same author also fears that culling of cattle would adversely affect the leather industry on which several Indian low caste-poor are dependent upon.

The dairy planners too, for eg. the NDDB\textsuperscript{48} also opine that, contradictory although, that more than two-thirds of India's
bovines exist in fact on agricultural waste and even in milk tracts little land is devoted to green fodder. Perhaps, it is for this reason that so little of land is devoted to fodder cultivation. And given the fact that so many animals cannot productively use the scarce fodder, the NDDB might have recommended culling of less productive cattle. If it is so, then, this point needs to be pondered upon critically. Here, it is noteworthy to point the findings of a survey by Singh all these studies indicate unequivocally that feeds availability in India is far short of requirements even at the present low level of feed consumption of Indigenous livestock

The point of lack of policy coordination between crop and animal husbandry has been voiced by Whyte who says 'India lacks, as do most developing countries, a policy of integrated land use based on the correct ecological and economic criteria designed to serve the basic needs of the population'. The fall out of the above may well mean that India's unproductive milch cattle are part of a malintegrated system of crop and milk production. Within this critique, dairying in India is dismissed as 'a scavenger Industry', based on the feeding of crop residues and some little concentrates to animals of very low productivity.

However, Nair argues that the structure of livestock production in Asia is significantly different from that in the rest of the world. Through the ages Indian Cattle have been an integral part of the agricultural system but primarily as
suppliers of draught power and manure. Milk is thus in India only a by-product of the inter-dependence between agriculture and animal husbandry: and dairying although widespread is rarely a specialised or primary activity but almost always subsidiary to crop production.52

George53 voices her concern over the neglect of the native breeders and breeding. Similar concern finds support in the documents of the Royal Commission on Agriculture in India54 which says "If enquiry were to be made into the history of such breeds......we believe it would be found, in most cases, that their excellence was due to the care bestowed on them by the professional cattle breeders, usually nomadic......they usually worked under unfavourable conditions, but their skill in selecting and tending cattle was .... considerable". However, here, she does not mention the volume of their operations and the number of such breeder groups across the regions and also, what was their status (in terms of availability and efficiency across the regions) in the 70s when the new dairy policy come to be implemented. Of late, there has been vehement criticism in some quarters as regards the objective of operation flood's intention of providing adequate nutritional diets through improved dairy practices and the consequent higher incomes. Critics apprehend that the current dairy policy infact exacerbates the already bleak situation of nutritional levels in rural areas. Early evidence towards this is provided by Desai55 from his study of a village which reports complaints by its inhabitants that the activities of the Kaira Union deprives their families
and especially their children of milk. Some taluka level studies too, by AERC\textsuperscript{56} blame the activities of Amul as responsible for inadequate consumption of milk by the marginal farmer and landless households.