

Agro-industries characterization and appraisal: Dairy in India



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Preface

This Working Document constitutes one study in a series of agro-industry characterizations and appraisals being carried by the Agricultural Management, Marketing and Finance Service. The purpose of these studies is to improve understanding of the dynamics that have led certain industries to grow rapidly, while creating significant opportunities for participation of smaller scale farmers. Through these studies, we are seeking to:

- draw lessons on how to support positive patterns of change leading to sustainable increases in farm incomes, and
- provide guidance to governments and donors on potential risks and responses.

The main criteria for selecting the case studies in this series have been:

- Rapid uptake of new enterprise by a substantial number of farmers.
- Legitimate public interest in the specific subsector and agro-enterprise.
- Potential for replication/extension to other areas with similar circumstances.
- Basis for drawing lessons on how to support future agro-industry development.

Most studies in the series have focused on diversification into higher valued products as a response to new international market opportunities. These have included, for example, the Robusta coffee industry in Viet Nam, paprika in Zambia, and asparagus in Peru. This study on dairy, and another on soybean (AGSF Working Document 20), covers two successful cases of agro-industry development for the domestic market.

India abounds in bovine wealth, which approximately amounts to one-sixth of the world bovine population. It comprises 200 million cattle and 75 millions buffaloes. Livestock and dairy play a multi-purpose role in rural systems; a cheap source of nutritious food, draught power, fertilizer and a source of income. Dairy especially represents a means of regular income for rural inhabitants, right at their doorstep.

Dairying has been an important and traditional subsystem under mixed farming in India. Until the turn of the twentieth century, dairying was by and large a traditional subsistence-oriented occupation with the main objective of producing milk, only to meet home consumption requirements. Modern milk processing and marketing technologies were introduced in India during the early 1920s, when a number of military farms were established. This process of modernization and market-orientation of the Indian Dairy industry continued step by step until 1969-1970, when the National Dairy Development Board (NDDB) of India launched the world's biggest dairy development programme 'Operation Flood', based on the success of the Kaira District Cooperative Milk Producers' Union Ltd, Anand, popularly known as 'AMUL'. Launching of 'Operation Flood' was an important and significant landmark in the history of dairy development in India. 'Operation Flood' was basically a market-oriented programme

aimed at modernization and development of the Indian Dairy industry on 'cooperative' lines. 'Operation Flood' resulted in significant socio-economic changes and developments in the rural community.

This working document is aimed at those working at ministries of agriculture and extension services, Non-Governmental Organizations (NGOs) and related projects concerned with agricultural development.

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Acronyms

AI	Artificial Insemination
AMUL	Anand Milk Union Limited
APDC	Anand Pattern Dairy Cooperatives
APEDA	Agricultural and Processed Foods Export Development Authority
BO	Butter Oil
BOA	Board Of Agriculture
DCU	Dairy Cooperative Union
DSC	Dairy Cooperative Society
EIC	Export Inspection Council
EU	European Union
GBMS	Greater Bombay Milk Scheme
GHP	Good Hygiene Practices
GMP	Good Manufacturing Practices
GOI	Government Of India
HACCP	Hazard Analysis and Critical Control Point
ICAR	Indian Council of Agricultural research
ICCMRT	Institute of Cooperatives and Corporate Management
IDC	Indian Dairy Corporation
IMDP	Intensive Mini-Dairy Project
LPD	Litres Per Day
MC	Management Committee
MMPO	Milk and Milk Products Order
MPO	Milk Producers' Organization
NCDFI	National Cooperative Dairy Federation of India
NDDDB	National Dairy Development Board
OF	Operation Flood
Rs	Rupees
SCMPF	State Cooperative Milk Producers Federation
SMP	Skimmed Milk Powder
SNF	Solid-Not-Fat
SWOT	Strengths Weaknesses Opportunities Threats
UNICEF	United Nations Children's Fund
UPDDP	Uttar Pradesh Dairy Development Department
WEP	Women Education Programme
WFP	World Food Programme
WMP	Whole Milk Powder
WTO	World Trade Organization

1. Sector overview

1.1 THE INDIAN CONTEXT FOR DAIRY

Millions of rural smallholder milk producers dominate India's dairy industry, contributing 62 percent of total milk produced in the country. The milch animals are fed on crop residues and milch animal dung is used as manure for crops. Indian agriculture is an economic symbiosis of crop and cattle population. Livestock plays a vital role in the economy; animal husbandry is the most important economic activity in rural areas. The dairy sector today provides 80 million farm households with the triple benefits of nutritive food, supplementary income and productive employment for family labour, mainly for women.

Animal husbandry provides self-employment to millions of households in rural areas. Women constitute 71 percent of the labour force in livestock farming; there are 75 million women compared to 15 million men, engaged in dairying. Rural women play a significant role in animal husbandry and are involved in feeding, breeding, management, health care and other operations. Dairying with crossbred cattle and high-yielding buffaloes has become a lucrative business. Studies have shown that dairying in rural areas surpassed crop production in terms of profit in marginal, small and medium-sized holdings. For small-scale farmers with irrigated land, dairying and crop production together, were more profitable than crop farming alone. Owing to the easy cash provided by animal husbandry components, small-scale farmers prefer it to crop production. Further dairying provides a support system to milk producers without disturbing their agro-economic systems.

Dairying is closely interwoven with the socio-economic fabric of rural people in India. Traditionally, dairy animals have performed multiple functions of producing milk for household consumption, dung as manure and fuel, and male livestock providing a source of draught power in agricultural operations. Further, dairy animals have often performed important functions of banking and insurance. Breeding animals act like a savings account, with off-spring as interest. Animals generate a continuous flow of income and provide a cushion against income shocks arising from crop failure. Moreover milk is a cash crop for smallholders, converting low-value agriculture by-products and crop residues, and using family labour as a value-added market commodity.

It is difficult to explain many aspects of small-scale farmers' household behaviour in respect to livestock, purely from an economic and rational point of view. Consequently, treating the livestock production system as a pure input-output type of economic system often misrepresents the Indian reality (GOI, 1996). Traditionally, farmers keep livestock in proportion to the free crop residues and family labour available in their own household production systems and convert these into food, fuel and farm power, making each farm household a virtually self-contained production system with no purchased inputs and few marketed outputs. This age-old trend has undergone rapid change in recent decades. Although the organization of livestock production in small units persists, household production systems are increasingly becoming integrated

into input as well as output markets. As a result of a gradual transition from subsistence to the market system, the economic dimensions of livestock keeping have assumed increasing significance in farm household behaviour (see Kurup, 2001).

Land holdings in India are generally marginal, small and fragmented. Medium and large holdings account for less than 10 percent of the holdings. Landless, marginal (below 1 ha) and small (1-2 ha) land holdings constitute about 80 percent of rural households and own almost 33 percent of the total farming land holdings.

The livestock sector in India is characterized by very large numbers and very low productivity across all species. The sector is highly livelihood-intensive and provides supplementary income to over 70 percent of all rural and some urban households. Cattle are the most popular species and along with buffalo are the species most widely kept by the farming community (see Table 1). Livestock production in rural India takes place as a household activity and seldom employs hired labour. The sector is highly gender-sensitive; over 90 percent of household work related to care and management of livestock are carried out by women.

Table 1. Livestock population in India: 1992

Species	Cattle	Buffalo	Sheep	Goat	Pig	Total Livestock
No. in Millions	204.00	83.5	50.8	115.28	12.79	470.14

Source: Basic AH Statistics: AH Series 6, GOI, 1992

In 1992, India had some 204 million cattle and 84 million buffalo (see Table 1). Among crossbred cattle, milch animals (78 percent) tend to be concentrated in the marginal and small-sized holdings. Bovine stock holding per household varies considerably with region, both in number and species held; the average holding seldom exceeds 3 animals per household. Also landless labourers own milch animals and earn substantial additional incomes from sale of milk, particularly in the dairy cooperative society (DCS) villages and other areas with a milk marketing infrastructure. Typically bovine stock holding size is larger in Punjab, parts of Haryana and Western Uttar Pradesh. There are a few large dairy farms in the country, mostly institutional farms or commercial dairy farms for milk production in metropolitan cities and other major urban areas.

About 67 percent of the landless, small and marginal rural workforce who own almost 80 percent of total land holdings are engaged in agriculture either as cultivators or farm labour. In a normal year, crop production can generate employment for this workforce for only 90 to 120 days, for the remaining period, they are virtually unemployed. In this setting, dairying provides for the employment imbalance.

2.2 MILK PRODUCTION

The marginal producers and smallholders constitute the core milk production sector; they own over 60 percent of all milch animals; 74 percent of the crossbred milch animals, (GOI, 1997). The milch animal group in India is made up of buffalo, cattle and goats, although goat milk is invariably for home consumption and if traded at all, is mixed with cow or buffalo milk.

Dairying is always part of a mixed farming system, in most cases with no more than two to four dairy cattle / buffalo with very low milk yield.

In 2004-2005 India had an estimated total milk production of 90.7 million tonnes (Department of Animal Husbandry & Fisheries, GOI, 2003). In the 1960s, milk production was hovering around 20 million tonnes and per capita availability of milk was a dismal 127 grams per day, while today India has become the largest milk producer in the world, whose per capita availability of milk has almost doubled to 220 grams per day, notwithstanding the population increase of 2.5 times, over the same period.

Possibly, the most desirable economic feature of India's small-scale dairy industry in the present era is low energy consumption in milk production compared to developed countries. This is mainly because of:

- the use of animal and human power in producing fodder and feed;
- feeding of crop by-products such as straw, rice bran, cottonseed and oilseed cakes whose production does not require any additional energy;
- the predominance of grazing over stall-feeding;
- the use of human power for milking, tending and disposal of animal wastes including dung;
- keeping animals in low-cost sheds or in the open;
- relatively low consumption of concentrated feeds.

In addition to these natural sources, also many innovative practices and management practices, contribute to the success of smallholder dairying. Most of the rural population depend on livestock and milk production for their livelihood. Exploited by middlemen for a long time and not receiving remunerative returns for their production, they had a felt need to come out from such a context. They wanted their own system that they themselves would control and manage, without a need for highly technical, qualified personnel at the village level. As a result an integrated dairying system was developed, on a cooperative basis, which helped smallholders economically and socially by getting a year-round, quality-based doorstep market and regular payment, together with support services for milk production enhancement.

3.3 MILK MARKETING AND DISPOSAL

Marketing and disposal of milk is particularly difficult for small-scale producers. In general, the small-scale milk production system in India could be broadly classified into four main categories:

- Dairying for home consumption; specialized milk production for home consumption where milk is an essential part of the household diet.
- Dual purpose for animals (for milk and draught) where seasonal surpluses of milk are converted into market sales of storable household products.
- Small-scale dairy farming where milk and milk products are converted into market sales.
- Commercial dairy farming where the animal holding is comparatively large and milk and milk products are converted into market sales.

Generally, milk disposal throughout the country is carried out according to four methods:

- through *dudhias* (small traders); traders buy good quality milk from producers at a lower price and then adulterate it by adding water to increase the quantity and sell it in the urban markets at a higher rate, earning more profit, none of the margin returning to the producers;
- through private enterprises owned and run by an individual or in partnership as a private business, such enterprises make huge profits and exploit small producers by buying their milk through agents or middlemen;
- through state-owned city dairies; these dairies also depend on traders and cannot benefit producers, mainly because the producers do not have a direct link with such dairies;
- through collective ownership; for example self-help groups/milk bulking groups/dairy cooperatives. This method was better than others, but because of organizational and managerial defects, the desired progress could not be achieved and producers could not get remunerative returns until the launching of 'Operation Flood' (OF).

2. The role of dairy cooperatives

2.1 AMUL AND THE EVOLUTION OF ANAND PATTERN DAIRY COOPERATIVES (APDCs)

The emergence of AMUL

Two milk producers' cooperative societies were initially organized in June 1946 with 250 litres of milk per day. Kaira District Cooperative Milk Producers' Union Ltd., Anand, popularly known as 'AMUL' was formally registered on 14 December 1946 with five dairy cooperatives.

Growth and development of AMUL

With the formation of the Dairy Cooperative Union (DCU), milk producers ceased being exploited and started receiving lucrative prices for their milk; tests determined the fat content of milk on which prices were based and payment for milk was made twice a day. This resulted in milk producers joining the village cooperatives as they saw the advantages and services they would be entitled to as members. The cooperative societies affiliated with the Union thus increased to eight in 1947.

The Union had no processing facilities until 1948, when it purchased an old, idle chilling plant in Anand. By the end of 1948, the union was handling 5 000 litres of milk per day.

The number of affiliated village DCSs and their milk producer-members kept increasing as did the quantity of milk procured from them. To cope with the increasing milk collection, the Union purchased a new pasteurizing plant, increasing the capacity to 18 000 litres of milk per day. In 1950, the Union sent its first mobile veterinary team to villages as a part of its technical inputs programme (support services).

By 1955, the Union had 107 village cooperatives with 27 000 producer members supplying about 39 000 litres of milk per day. The Union acquired the necessary machinery from the United Nations Children's Fund (UNICEF) for pasteurization, butter and powder manufacture. These plants started operating in 1956-1957. For the first time anywhere in the world, milk powder was manufactured from buffalo milk. The Union also started manufacturing condensed milk from buffalo milk in 1958. The products were then sold under the new brand name AMUL.

The Union's processing facilities were further expanded in 1960 by installing a roller dryer for production of baby food and by adding a cheese section. By this time, the Union had 195 village milk societies with more than 40 000 milk producer members supplying about 65 000 litres of milk per day.

As AMUL grew, it also kept increasing the facilities for providing support services to milk producers through the village cooperatives. As a part of this scheme, it started a cattle feed factory in 1964. This occasion is of particular significance, since the then Prime Minister who inaugurated the plant was impressed with the performance of Anand Pattern Dairy Cooperatives (APDCs). He encouraged the general manager of the Union to work on replicating the Anand Pattern elsewhere in the country. This marks the genesis of the National Dairy Development Board (NDDB), the Indian Dairy Corporation (IDC) and OF.

To meet increasing milk collection, the Union had to build a second dairy in 1965. By then, in addition to processing milk, it had been manufacturing butter, cheese, milk powders including baby food, *ghee* and by-products. Soon the Union decided to manufacture chocolates, malted milk and high-protein extruded products and accordingly, started a separate unit in 1971 to this end. Around this time, the Union started procuring cow milk as well. In 1970-1971, it procured approximately 32 500 litres of cow and buffalo milk per day from 706 societies with a producer membership of 180 000.

The Union thus continued to grow (see Table 2). This was possible because they had adopted a dairy cooperative system that was highly conducive to increased milk production as well as marketing. Its approach to dairying, integrating milk production, procurement, processing and marketing provided all the required facilities to perform these functions satisfactorily. Therefore, while the milk producer members were happy with a guaranteed lucrative milk price and other benefits year-round, the consumers were also highly satisfied to continuously receive good quality milk at reasonable prices. The Union became the largest milk-handling unit in Asia.

AMUL currently has more than 1 000 village dairy cooperatives with 0.7 million members and on average procures 0.8 million litres of milk per day. AMUL manufactures butter, powder, chocolate, condensed milk, and many other milk by-products and markets them nationally and internationally. The cooperative structure and the system established through the efforts of the townspeople came to be known as the APDCs.

An important reason for AMUL acquiring greater significance than the contemporary dairy cooperatives was that it not only organized milk producers, but also tuned into the process of modernization and commercialization and dealt with issues of development and change. Training and extension education played key roles at every stage in the entire process.

Table 2. Selected indicators of growth and development of AMUL (1950-1951 to 2004-2005; April-March)

Indicators	1950-51	1960-61	1970-71	1980-81	1990-91	1996-97	2004-05
No. of Dairy Cooperatives (DCs)	33	195	706	895	917	970	1 073
No. of Members ('000)	3.97	40.50	180.00	327.00	474.85	552.63	650.00
Milk collected from DCs ('000 tonnes)	5.00	23.91	118.00	169.58	264.83	268.49	303.40

Source: Annual Reports of Kaira District Cooperative Milk Producers' Union Ltd., AMUL, Anand

2.2 SALIENT FEATURES OF APDCs

The salient features that have contributed to APDCs are as follows:

- A single commodity approach ; handles only the milk business.
- Four-tier organizational structure ; an integrated structure owned, managed and controlled by milk producers members themselves, which handles milk production, procurement, processing and marketing, and provides support services for milk production enhancement.
- Democratically elected boards from among their members in all the four tiers, i.e. the village DCS, the district milk union, the state federation and the national federation. The board members are authorized to decide upon the policies for total democratic governance.
- Employment of professionals by the cooperatives and professional managers answerable to the cooperative boards.
- The basic philosophy of the Anand Pattern; combining the power of its people with professional management in a vertically integrated cooperative structure that establishes a direct linkage, eliminating all middlemen, between those who produce the milk and those who consume it, either in the form of milk or milk products. This structure transfers the largest share of consumers' money to the producers, creating an incentive to improve production. It supports production by exposing farmers to modern technology. Placing the farmers in command as the owners of their cooperative involves them in the process of development. The democratic form of the cooperative provides an underpinning for democracy in the country, through a foundation of a democratic institution right down to the village level.
- Transparency maintained in business: by-laws providing continuous and concurrent audit.
- Cash and regular payment to producers for the milk supplied by them.
- Awareness raised on clean milk production and animal husbandry practices, which resulted in higher quality of milk production and breed improvement.

2.3 THE MAIN FACTORS THAT HAVE CONTRIBUTED TO AMUL'S SUCCESS

The entire system of APDCs is owned, controlled and managed by member producers themselves. Since there is no interference of any outside agency, the cooperative management committee (CMC) enjoys complete autonomy in decision-making. The CMC comprises elected members and one to two nominated members. The CMC makes policy decisions whose implementation is carried out by the executives. For proper implementation of policies, the coordination between board members and executives is very important and plays an effective role in the success of the cooperatives.

These milk producer members take part in each and every activity of the cooperative for the development of the institution, which ultimately leads to their own development and benefits.

The cooperatives are not dependent on any outside agency since milk collection, processing and marketing are integrated. Another reason for active member participation is the year-round, assured market and quality-based daily produce and regular payment. For running the processing plant and other management activities, the cooperative hires qualified professionals who are always answerable to the CMC. One of the most important factors in the success of the Anand Pattern is the provision of technical inputs, support services, at very nominal prices, which are adjusted in the milk price.

One of the most effective factors that have contributed to the success of the APDCs is the provision of a complete package of inputs and support services necessary for enhancing milk production for their members at their door step and at a very nominal price. The package includes animal health care through both regular and emergency visits by veterinary doctors, artificial insemination (AI), balanced cattle feed, improved fodder seeds, extension education and training.

These support services are provided to all the producer-members on a sustainable basis right from the creation of the milk producer organizations (see Table 3). The sustainability of the support services is mainly owed to the fact that expenditure on support services are borne indirectly by all the producers themselves. These dairy cooperatives manage all of the day-to-day expenses for milk procurement, processing and marketing. Similarly, for enhancing milk production, they provide support services at a very nominal price, which are adjusted in the milk price. It is claimed that to make any system sustainable, there should be some financial involvement and the felt need of the beneficiaries. This is also true in making these support services sustainable.

Table 3. Provision of support services by AMUL (1950-1951 to 2004-2005; April-March)

Indicators	1950-51	1960-61	1970-71	1980-81	1990-91	1996-97	2004-05
No. Of AI centres	5	26	523	735	809	846	936
No. Of AIs performed ('000)	0.58	9.08	157.55	285.07	681.5	645.72	713
No. of mobile veterinary dispensaries	0	4	16	23	16	53	69
Sale of balanced cattle feed ('000 tonnes)	0	0	36.86	82.33	132.9	136.97	154

Source: Annual Reports of Kaira District Cooperative Milk Producers' Union Ltd. AMUL, Anand

Education and training have played a vital role in the success of APDCs. Continuous education and training among its members, elected leaders and employees at every stage of organization, management, procurement, processing, quality control, monitoring, accounting/bookkeeping and overall supervision have created significant awareness of their duties and responsibilities and enhanced their sense of belonging. Whenever any gap between existing and desired skills are observed, immediate remedial measures are taken by organizing a need-based training programme.

In sum, the AMUL model of the APDC is producer-oriented, people-centred and holistic. It emphasizes integrated development of all the important facets of the dairy industry; production, procurement, processing, pricing, marketing, training and management. Moreover, it advocates the use of appropriate technical, economic and institutional instruments to promote smallholder dairy development.

2.4 STRUCTURE AND FUNCTIONS OF APDCs

AMUL formed the basis for the APDC, which is a four-tier structure. The basic unit in this model is the DCS at the village level. Membership is open to all who need the cooperative's services and who are willing to accept member responsibilities. Decisions are taken on the basis of one member, one vote. No privilege accrues to capital and the economic returns, whether profit or loss, are divided among the members in proportion to patronage.

Each cooperative is expected to carry out continuing education for its members, elected leaders and employees. All the dairy cooperatives in a district form a district milk union, which ideally has its own processing facilities. All the unions in a state are normally members of a State Cooperative Milk Producers Federation (SCMPF), whose prime responsibility is the marketing of milk and milk products outside the state.

There is also a fourth tier, the National Cooperative Dairy Federation of India (NCDFI), which is a national-level body that formulates policies and programmes designed to safeguard the interests of all milk producer organizations. Each tier of the Anand organizational structure performs a unique function: procurement and services by the village cooperative; processing by the district union; marketing by the state federation; advancing the interests of the cooperative dairy industry by the national federation. The Anand model has therefore evolved into an integrated approach to systematic dairy development, as seen in Figure 1.

Figure 1. Structure and functions of the APDC



2.5 THE NATIONAL COOPERATIVE DAIRY FEDERATION OF INDIA (NCDFI)

The NCDFI is the fourth tier of the APDC. All the state-level federations are members of NCDFI. They become members by paying the requisite entrance fee and purchasing shares. The NCDFI board consists of all the chairpersons/managing directors of the state federations/state unions/territory unions.

The main function of the NCDFI is to promote the dairy industry on a cooperative basis. It offers services in procurement, processing and marketing of milk and milk products from one state to another within the country and is also responsible for international marketing. NCDFI also coordinates the supply of milk and milk products to institutional consumers such as the army. Further, it organizes and operates the national milk grid. It helps the member federations in the purchase, storage and distribution of machinery and equipment.

The state dairy cooperative federation

The district dairy cooperative unions are federated into a state-level cooperative milk marketing federation by subscribing to it at least one share. The federation is responsible for developing and implementing policies on cooperative marketing of all member unions' liquid milk and milk products, the product-price mix, cooperative provision of joint services (such as AI and breeding) and cooperative marketing of support services to members. Out of its net profit, the federation distributes the profit share among all the member unions according to the milk procured by them and the provision of by-laws.

The federation board consists of the elected chairpersons of all member unions and the federation's managing director; other members are representatives of registrar cooperative societies and nominees of NDDDB. Only the elected chairpersons of the member unions have voting rights and elect the chairperson of the federation.

The federation board is advised by its programming committee, which is composed of each member union's chief executive, the federation's chief quality control officer and one or more non-voting co-opted technical representatives of NDDDB. The federation's managing director is the committee's chairperson, and the general manager, its secretary. The programming committee meets once every month and is also responsible for day-to-day implementation of the board's policies and plans.

District cooperative milk unions

All the registered village dairy cooperatives are affiliated with and members of the district cooperative milk producers' union, which enables them to jointly own a dairy processing plant and cattle feed plant. In order to become a member of the union, a registered society has to pay a nominal entrance fee and must purchase at least one share of the union.

The union is controlled by a board of directors consisting of 16 to 17 members, of whom 12 are democratically elected from among the chairpersons of the member village dairy societies. The remaining 4 to 5 members include the union's managing director as a member secretary, one or two representatives of financing institutions and a nominee each from registrar cooperative societies and the federation. These five members are not eligible to compete for

the post of chairperson, who is elected by ballot by the board of director members. One-third of the elected board members retire every year by rotation so that each member carries out his duties for three years. This ensures continuity in management.

The board frames the general policy for the union and employs the managing director/general manager. While the board determines the number, type and pay scales of personnel, it is the managing director/general manager who appoints the junior staff.

The union carries out five important elements: (i) procurement, processing and marketing of milk; (ii) provision of technical inputs (support services); (iii) strengthening of the dairy cooperative movement; (iv) organization of extension activities; (v) rural development services. The union owns and operates a dairy plant, a cattle feed plant, fodder and bull mother farms, semen collection stations and a centre for animal husbandry activities. In addition, the union carries out research, development and other promotional activities for the overall benefit of milk producers. The union provides macro-level inputs such as compounded cattle feed, fodder seeds and various veterinary services including round-the-clock emergency visits at the producers' doorstep. The total cost of these programmes is included in the milk price structure. It is therefore at the union level that professionals are hired for specialized purposes that individual producers cannot afford.

The union distributes among producers dividends on their shares and bonus in relation to the quantity of milk supplied by them during the year. The milk products processed by the union are marketed through the federation. A special feature of the Anand Pattern is that the unions are under continuous audit to maintain financial propriety.

Village dairy cooperative societies (DCSs)

The basic unit in the Anand Pattern is the milk producers' cooperative society, a voluntary association of milk producers in a village who wish to market their milk collectively. Every milk producer who has at least one milch animal that is owned can become a member of the cooperative by paying a nominal entrance fee and purchasing at least one share. At a general meeting of all the members, the representatives are elected to form a managing committee, which runs the day-to-day affairs of the cooperative society by setting the policies and appointing necessary staff. Out of nine managing committee members, one member is elected as chairperson.

Every morning and evening the society buys the surplus milk from its producer-members. The producer is paid for milk usually within 12 hours (for morning milk, in the same evening and for evening milk, the next morning). The payment is made on the basis of fat and SNF (solids-not-fat) content of the milk supplied by the individual producer. The district milk union organizes the transport of collected milk twice daily (whenever the dairy society has no bulk coolers) or according to the schedule based on the quantity of the milk collected and the capacity of bulk coolers from all its affiliated member cooperatives.

The producers in this system are not only ensured regular and remunerative payment for their milk, but also have access to the milk production enhancement inputs, support services, to further improve their productivity and income. The micro-level support services such as veterinary first aid and AI are organized by village societies. One of the staff members of the

society is trained to carry out these functions. Societies also market the liquid milk locally at the village level. In addition, supply of balanced cattle feed and fodder seeds and milk products are also channelled through societies.

In addition to regular payment and support services, members also receive the price difference, dividend and bonus deriving from the net profit of the society's business as per the provisions of the society's by-laws.

2.6 THE NATIONAL DAIRY DEVELOPMENT BOARD (NDDDB)

The public sector impressed by the socio-economic changes that had been brought about by the dairy cooperative organization, proposed a national level organization that could replicate the APDCs. The GOI created the NDDDB in September 1965. Then, under the National Dairy Development Board Act of 1987 passed by parliament and made effective on 12 October 1987, a restructured NDDDB, a body corporate of national importance, was formed.

The major objectives of NDDDB are:

- Promote viable producer-owned and controlled organizations primed to produce, procure, process and market milk and its products, as well as other commodities, so as to:
 - (i) maximize productivity and optimize the producers' share of the consumer price paid;
 - (ii) influence and foster the development of the dairy and other agricultural industries.
- Generate funds to finance producer-owned organizations.
- Provide assistance for planning projects and appraising them for financing.
- Provide training for farmer leaders of the cooperative sector, as well as for the professionals employed therein.
- Provide cooperative-oriented education for all those involved in building cooperatives.
- Provide services to enable effective management of cooperatives.
- Monitor achievements against physical and financial targets and take necessary corrective measures.
- Monitor the financial viability of projects.
- Create a data bank on all related activities to be shared with similar organizations.
- Promote industries to ensure fulfilment of the needs of the developmental projects undertaken by NDDDB.
- Apply research and development and identify new technologies.
- Respond to other developing countries' requests to organize their developmental programmes on cooperative lines.
- Undertake any other special projects at the request of the central or state governments.

2.7 OPERATION FLOOD

The evolution of OF

For four to five years, NDDDB spent time trying to convince states to agree to make available necessary funds for dairy development on the basis of APDCs, but no breakthrough was

possible. It became obvious that if the NDDDB was to carry out the objectives for which it was established, it must have its own programme and funds to replicate the Anand Pattern, thus OF evolved. With a mission to make dairying a vehicle for a better future for millions of grassroots milk producers in rural India, NDDDB in 1970, launched OF.

A concept of food aid in the form of dairy products was the only alternative left for dairy development in the country. By adopting this strategy, the commodities of skimmed milk powder (SMP) and butter oil (BO) from the European Union (EU) and World Food Programme (WFP) were used for the generation of funds. NDDDB had taken the initiative and took over the entire responsibility for receiving such food aid commodities.

In converting donated commodities into liquid milk and selling it through metropolitan dairies, the NDDDB adopted two strategies:

- to sell it at prices at par with locally produced milk so that the local market would not be depressed;
- to invest the funds generated in setting up milk sheds in the hinterlands of the metropolitan cities.

The main objectives of the OF programme were to establish dairy cooperatives in the hinterland milk sheds and to channel the rural milk produced to flood the metropolitan dairies. OF had three phases. The third and final phase ended in 1996 with India becoming the world's largest milk-producing nation within three decades, the details of which are given below.

Operation Flood-I

In 1969, NDDDB submitted a proposal to start operations in 10 states, constituting 18 milk sheds in the hinterland areas surrounding four metropolitan cities. Accordingly, a plan of operation was agreed on between the GOI and WFP for assistance to the project in March 1970. WFP committed 126 000 metric tonnes of SMP and 42 000 metric tonnes of BO for a project period of five years. OF-I was formally launched on 1 July 1970. During this period, the programme covered 39 milk sheds and organized 13 270 DCS; 1.7 million farmers were enrolled as members. These milk sheds with their DCSs collected on average 2.5 million litres of milk per day. The processing capacity of 3.58 million litres a day was enough to handle the peak collection of 3.39 million litres per day (LPD).

Operation Flood-II

The success of OF-I clearly demonstrated the replicability of the Anand Pattern in milk sheds throughout the country. On 2 October 1979, OF-II was therefore launched, designed to create a viable dairy industry to serve the nation's needs for milk and milk products during the 1980s on the foundation built by OF-I. OF-II continued until March 1985. During this phase, coverage increased to 136 milk sheds, and 34 523 DCSs were organized; average milk collection per day increased to 5.78 million litres and milk handling capacity to 8.78 million litres per day. In this phase, the expansion of processing capacities was matched with the creation of infrastructure such as a national frozen semen system to support the AI programme to improve the breed of animals. Vaccine production was established and a delivery system implemented to strengthen

capacities of the animal health care programmers and to emphasize manpower development services to train professionals with the required managerial and technical skills.

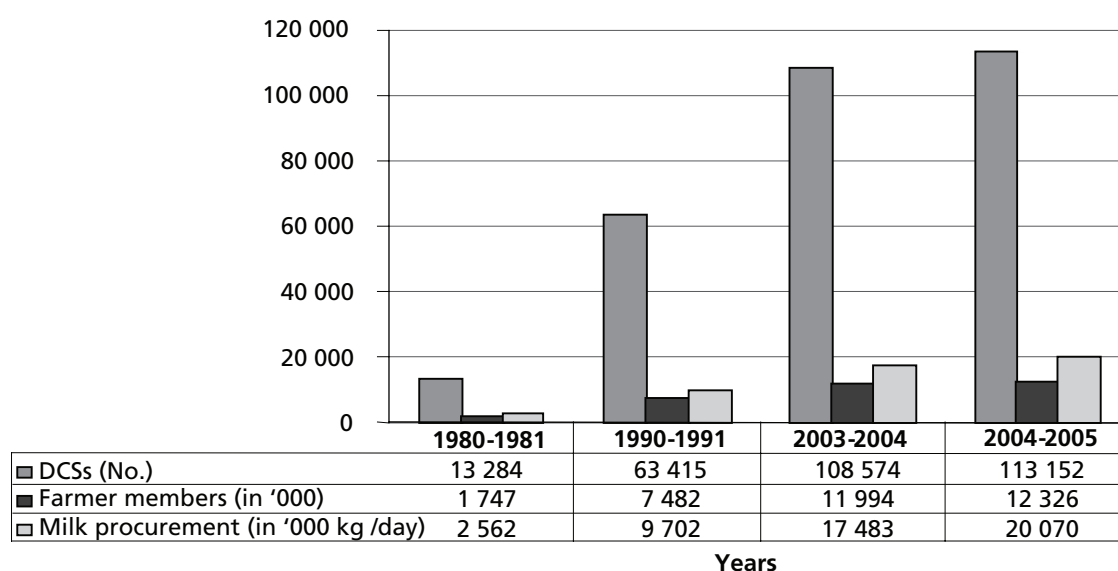
Operation Flood-III

OF-III was taken up with particular emphasis on promoting measures to consolidate the achievements gained during the earlier phases by improving the productivity and efficiency of the cooperative dairy sector and its institutional base for its long-term sustainability. During the 1987-1996 phase and by the end of OF- III, coverage of milk sheds grew to 170, the number of DCSs organized increased to 72 744, milk collection increased to 11 million LPD and processing capacity to 19.4 million LPD.

OF led to the creation of more than 113 000 village-level dairy cooperatives and 172 district milk unions with a membership of 13 million farmers nationwide. These cooperatives procured an average of 20 million LPD and marketed an average of 15.62 million LPD in 2004-2005.

Although the cooperatives together collect about 20 million LPD, this is only about 16 percent of the total marketable surplus milk available in the country. Another approximately 4-5 percent must be collected by the privately organized sector. Thus, unorganized traders handle most of the milk, but the presence of the cooperatives acts as a psychological barrier in stopping traders from exploiting farmers.

Figure 2. Operation Flood achievements at a glance



Source: National Dairy Development Board Annual Report 2004-2005

3. The impact on smallholders and rural development

The advent of dairying has been a boon for dairy farmers and of particular importance to those segments of the society that have been traditionally weak, the small landholders, landless labourers and women. It has provided a year-round source of income for people who previously could only depend on payments from small seasonal crops or from occasional labour. It is estimated that up to 60-65 percent of the income of this group (marginal and small-scale farmers) now comes from dairying (Shukla and Brahmankar, 1999).

Over the period, dairying has also acquired the contours of a fully-fledged industry in the country and has positively improved the life of those engaged in this business, directly or indirectly, bringing significant socio-economic changes. This impact can be categorized into the following:

- social impact;
- economic impact;
- impact on infrastructure;
- impact on improved food aid security and nutrition.

3.1 SOCIAL IMPACT

Since membership is open to all, lack of discrimination, in caste, creed, gender and financial status has succeeded in breaking down barriers for those with milch animals. Remarkable new awareness has been developed and observed among the producers.

Resolving social inequity

This social stigma still exists in many parts of rural India. At all the collection centres of APDCs, morning and evening, hundreds of adults as well as the children of milk producers belonging to all castes come and stand in queue to deliver milk, developing a habit of discipline. The mix of various ethnic and social groups twice a day for a common cause and to their mutual improvement has resulted in reducing social inequity.

Democracy

Elected representatives of the members manage the DCSs and are responsible for all the policy decisions. All the members are entitled to cast their respective votes (one each) to elect the management committee members. This annual election of the management committee and its chairperson by members raises the participants' awareness of the value of their vote and their rights to elect the right person for the right job.

Hygiene and cleanliness

All the producers are frequently kept informed on the importance of observing hygiene and cleanliness of animals and milkers at the time of milking and at the milk collection centre. It has been observed that such learning is carried with them in their daily living habits.

Superstitions

There were prevailing beliefs in most of the rural areas that milk is a holy commodity and is not meant to be sold and that certain contagious diseases such as rudderpost should not to be treated because they are a curse of God. Regular income and veterinary aid through cooperatives have helped members leave such superstitions behind.

Health care

The privilege of collecting the milk from members places an obligation on the cooperatives to provide inputs to increase the milk production. Accordingly, the unions operate elaborate veterinary services at their doorstep to take care of cattle health. Exposure to various modern technologies and their applications by the veterinarians to treat their animals have made farmers more aware of healthcare for their family members as well.

Nutrition

As a part of support services, the cooperative society arranges visits to the cattle feed plant and the sale of balanced cattle-feed at the village dairy society. At the cattle feed plant a nutritionist explains the contents of the feed concentrate, proteins, vitamins and minerals, and why they should be fed to a pregnant cow or buffalo. Female members may relate this to the growing foetus, thus indirectly become educated in human nutrition.

Birth control

AI services are provided by the district milk union through milk societies in order to improve the breed and productivity and to control the lactation period of cows and buffaloes. Male and female members are taken separately to visit the AI centres where they are shown how semen is collected from a bull and where conception and birth are explained. They also examine live semen through a microscope, which may lead to raising questions about human reproduction and possibly to birth control.

Womenfolk

Until recently it was widely accepted that a woman's role was limited to remaining inside the house and to carrying out the day-to-day household work. Now, with the passage of time and extension education by the village dairy cooperative, the Women Education Programme (WEP), women are also becoming active members of the dairy cooperatives and are participating in all the activities. The regular income through milk sale has given them status in the family and society.

3.2 ECONOMIC IMPACT

The economic impact of Anand Pattern dairying can be seen in two forms; direct and indirect.

Direct economic impact

About 113 000 village dairy cooperatives have created employment for nearly 565 000 people in their own villages without disturbing the socio-agro system and exodus from the rural environment has thereby been arrested to a great extent.

Many studies have shown that significant income of the rural household in milk sheds is being derived from dairying. Since dairying is a subsidiary occupation for most of the rural population, such income helps them not only to liberate themselves from household poverty, but also to elevate their social and economic status.

Dairying has also given a home and self-employment to rural people, especially to the landless and widows at no additional cost. Regular and remunerative payment and flow of cash from urban to rural areas has helped farmers become self-reliant, instead of depending on moneylenders.

Impact on income generation through milk

The impact study on OF (Shukla and Brahmanekar, 1999) provides interesting insights into the impact of dairy production on the economy and on the behaviour of smallholder producers in the DCS villages, (see Table 4). In sum, landless, marginal and smallholder producers (the core group) accounted for over 75 percent of the membership of the DCSs; about 76 percent of the milch animals owned by DCS members belonged to the core group; a large number of landless producers owned milch animals and earned substantial incomes from dairy production; dairy production contributed on average 40 percent of the household income in the east, 32 percent in the north, 21 percent in the south and 34 percent in the West of India.

Table 4. Share of household income from different sources (in percentages)

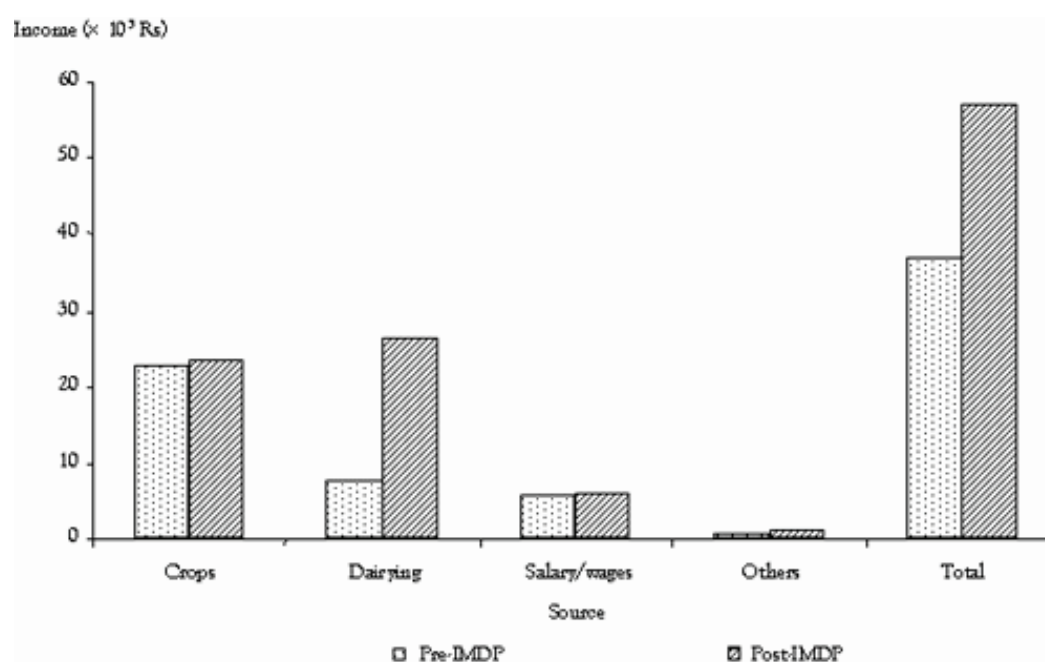
Household	Dairying	Crop Husbandry	Others	Total
Landless	53.08	0	46.92	100
Marginal	30.14	46.55	23.3	100
Small	29.67	53.75	16.58	100
Semi-Medium	26.25	58.98	14.76	100
Medium	25.33	62.77	11.91	100
Large	19.02	71.48	9.5	100
All	27.28	55.36	17.36	100

Source: Shukla and Brahmanekar, 1999.

On the household economic front, there are many micro-studies establishing the impact of dairy production on household income in smallholder production systems. One of the most documented schemes in India on this front is the Intensive Mini Dairy Project (IMDP)

of the Uttar Pradesh Dairy Development Department (UPDDP). This is primarily a rural employment scheme, enabling eligible milk producers in DCS areas access to commercial credit for replacing their local milch animals with two to four crossbred cows or improved milch buffalo, enabling better household resource utilization. A comprehensive review of the project, (an impact study involving over 10 000 project units), carried out in 1994 by the Institute of Cooperatives and Corporate Management Research and Training (ICCMRT), shows that introduction of two crossbred cows onto the farm dramatically increases the income from dairy production without altering the quantum of income from other sources, as shown in Figure 3.

Figure 3. Rural household incomes: the influence of crossbred cows.



Note: IMDP = Intensive Mini Dairy Project

Source: based on data from the Institute of Cooperative and Corporate Management Research and Training (ICCMRT), 1994

Indirect economic impact

The entire system is owned and operated by the producers themselves. Hence, they are able to make use of support services such as veterinary aid, AI and extension services. The balanced cattle feed is also made available to them at a cheaper rate than that of other feeds. Further, as better scientific feeding and management practices are introduced, the yield per animal is significantly increased. This has also resulted in reducing production costs. This indirect benefit had definitely improved the financial conditions of rural farmers.

The establishment of a regular and remunerative market has eliminated the middlemen and checked exploitation of farmers. This has helped reduce distress sales of milk and milch animals, thereby again improving their economy.

Impact of dairy production on smallholders

Milk production in India is the result of efforts by marginal producers and smallholders; they constitute the core milk production group and own 66 percent of milch animals (NSSO, 1992). The popularity of large ruminants (cattle and buffalo) with this class of landholders is primarily because of the 'complementary' between land and animals in their traditional crop–livestock farming system. The animals subsist largely on the free crop residues/crop by-products available in the household and in return contribute dung for fuel and for enriching the soil, and farm draught power for crop production. With increasing integration of these farm households in the output markets, cattle and buffalo also generate substantial daily incomes for the farm household, enhancing the viability of both the household and the farming system. Dairy production also enables them to utilize idle family labour and enjoy higher family nutritional standards (see Table 5).

Table 5. Observations on milk producer households in dairy cooperative society (DCS) villages.

Impact indicators	Observations	
1. Participation of weaker sections	Over 75% of the DCS membership are landless, marginal and smallholder producers	
2. Milk retention at home	47% of the milk produced is retained at home, daily	
3. Milk marketed	53% of the milk produced, daily	
4. Milk consumption/capita per day	339 grams	
5. Milch animal holding	Animals per household (number)	Percentage of animal holdings
5.1 Landless (15.3%)*	1.82	9.9
5.2 Marginal (38.2%)	1.63	39.8
5.3 Small (21.9%)	2.05	25.9
5.4 Semi-Medium (10.3%)	2.45	12.2
5.5 Medium (4.2%)	2.88	3.3
5.6 Large (10.1%)	3.75	8.9
6. Family labour	Average time spent on livestock management: 4.3 hours/day (55%)	
7. Share of family labour for livestock care	Men – 60% of their working time; Women -35% of their working time	

Note: Figures in parentheses are the percentage of DCS members by landholding category.

Source: Shukla and Brahmkar, 1999.

3.3 IMPACT ON INFRASTRUCTURE

Participating farmers have become aware of their responsibility to the community. Every year they generously contribute a portion of their cooperative's profit towards the overall development of the village, such as:

- improving the village approach road condition;
- providing facilities to youth through establishing village libraries;
- contributing to educational institutions and village primary health centres;

- providing and updating day-to-day knowledge by putting television sets in DCSs;
- providing a telephone facility to members for better and fast communications;
- contributing to establishing the drinking water supply system in the village.

Cooperative dairying has therefore shown a significant socio-economic impact in rural development.

3.4 IMPACT ON IMPROVED FOOD AID AND NUTRITION

Several studies have revealed that India is better-off now in the area of production of food grains, than before. The present trend of increasing production and productivity of grains is likely to continue, so that even in a drought year, a large shortage of food grains is extremely unlikely. Given the current global situation, India may continue stockpiling grain (a large portion of which is subject to high post-harvest losses). Hence, diversion of land resources to other cropping activities such as fodder or cultivation of grains for fodder purposes would not affect overall grain availability.

The real problem though, is that even with additional grain availability, malnutrition persists because those in real need have insufficient purchasing power. The milk producers' organizations (MPOs) do make a contribution towards generating additional income for these poor groups and help build a symbiotic relationship between animal and crop husbandry; income generated from one creates demand for the output of the other, in other words, output of one becomes feed for the other.

The primary effect of MPOs are to provide greater income to the participating families; the source generating the income matters little to them, hence the pertinent question to raise is; What do the farmer-households do with this additional income?

As the per capita expenditure increases, so does the expenditure on food products. In other words, there is a proportionate increase in the consumption of food as spending power increases. Thus, additional income provided by MPOs to families below the poverty line actually helps them increase their food intake.

MPOs provided income at regular intervals; usually on a daily basis, but sometimes also once a week. Given the low purchasing power of rural households, items of essential consumption not produced by the families themselves, such as salt, sugar, vegetable oils, spices, lentils and vegetables, have to be purchased daily. The provision of additional cash income daily or weekly undoubtedly helps the families increase their purchase and consumption of such essential commodities.

Milk has two major components: milk fat and milk protein. Milk fat costs three times as much as vegetable fat. Similarly, milk protein is three times as costly as vegetable protein, from pulses and soybeans, for example. Milk is therefore a comparatively expensive food, hence there is no logic in the suggestion that a poor farmer with a meagre income enabling the farmer but one square meal a day, should retain whatever milk the farmer produces for personal consumption. Simply, the small-scale farmer should consume the most expensive nutrition available. Would it

not make better sense to advise the farmer to market this milk to the better-off and to use the proceeds to purchase three times as much nutrition in the form of vegetable fat and vegetable protein?

3.5 THE INVOLVEMENT OF WOMEN IN DAIRYING

Agriculture and related fields provide the largest sector for women's employment, largely determining their socio-economic status. This is the sector where the women's role as unpaid labour in productive activities is most prominent and is responsible for their non-working status. Although Indian women participate actively in the broad range of agricultural activities, dairying is a major occupation where they are responsible for management as well as labour. Several farm-level studies confirm the substantial role of women in livestock management and dairying production.

Although women handle most of the productive aspects of animal care, feeding, watering, cleaning, milking, collecting dung etc, and despite their substantial role in the activities relating to the dairying, socio-cultural conventions have severely limited their access to organized public programmes and activities in the dairying sector, thus restricting their participation in the cooperative system. In general, it is the men who have assumed the membership of the cooperatives.

Employment of women is an index of their economic and social status in society. They constitute 90 percent of marginal workers with some regional variation. The OF programme recognizes that:

- dairying at the household level is largely a woman's domain;
- the products and income from dairying can be controlled by women;
- dairying can be practised at a small scale.

Initially when OF was launched, membership in most of the India's village-level DCSs were heavily dominated by men. Now the picture has gradually changed in favour of women. Presently, some 2 476 all-women dairy cooperative societies are operating in the country. Out of 11 million members, 1.9 million are women, i.e. 17 percent of the total. Even in some of the DCSs, there is female as well as mixed membership; however, women constitute only 3 percent of the total management committee members.

In order to further strengthen the involvement of women in dairying, the NDDDB initiated a cooperative development programme in 1989. The programme was designed to promote and support self-reliant, autonomous, member-owned and controlled cooperatives. The programme strategy included member education designed to create a constituency of members to exercise their rights and responsibilities as owners of cooperatives; training of management committees of village DCSs, milk union boards, and personnel to improve their capacity to respond to members' demands and initiatives. In recognition of the very important role played by women in dairying, and more so, their potential to positively contribute to the dairy cooperative movement, attention was focused on women's education and encouraging women leaders as a part of this programme.

4. Sustaining commercial viability

4.1 SERVICES FOR DAIRY PRODUCTION

Other than the government, there is the dairy cooperative system, which provides high quality livestock services, both veterinary and AI, to its members. These services are limited to the cooperatives' areas of operation and account for less than 10 percent of total services in terms of areas covered. In the case of AI, however, the cooperatives also have a large network of village-based institutions, consisting of over 12 000 DCSs with AI facilities where farmers can get AI services delivered to their villages. A few voluntary and non-governmental agencies and the state government through their departments of animal husbandry provide livestock services, but they present an insignificant percentage of the total.

The state governments through their departments of animal husbandry also provide all services for dairy production. The departments have very large networks of veterinary institutions (polyclinics, veterinary hospitals, veterinary dispensaries and livestock aid centres) spread throughout the states and provide free veterinary services. In 2001, the total number of veterinary institutions in India was about 51 000. The veterinary hospitals and dispensaries are invariably staffed by qualified veterinarians and the livestock aid centres by para-vets (livestock inspectors). The state governments employ about 36 000 qualified veterinarians and 70 000 para-vets to deliver these services. Some 30 000 of these institutions also provide AI services. The emphasis of these departments is on curative veterinary care as a welfare measure; they have grossly neglected preventive veterinary care. Consequently, India has several animal epidemics ravaging the animal populations and causing annual losses amounting to about 100 billion rupees. Furthermore, the poorest of the poor in the country, the smallholders, bear the brunt of these avoidable losses.

The services of government institutions are delivered at the institutions where the farmers have to take their animals for treatment. The departments of animal health have very severe budget constraints and spend almost 90 percent of their budgets on salaries and other establishment costs. There is no money left for supplies and the institutions receive only a token supply of medicines and consumables for animal treatment. Consequently, farmers have to buy their veterinary medicines and consumables from local trade. The services are poor and have only a limited reach owed to the institutional delivery. Because of the overwhelming presence of local governments in the service delivery sector, free markets for these services have not developed. There are only an insignificant number of private practitioners of animal health services. A similar situation exists for AI. India does not have a livestock extension support service except in the dairy cooperative system. There is need to review this situation by appropriate authorities in order to enable stakeholders to obtain the services in a timely manner, at a convenient place and at a cheaper rate.

4.2 POLICIES

The objective of agricultural policy is to protect the interests of both producers and consumers of agricultural commodities. Unlike agricultural commodities, there is no minimum support price given to milk in India. However, the price of milk solids (fat and SNF) is administered. The government provides veterinary inputs such as AI, health care services and fodder seeds/cuttings at subsidized rates.

The dairy industry was reserved for cooperatives and protected until the 1990s. Milk procurement, processing and supply to urban consumers was generally in the hands of the cooperative sector. The entry of big private players in the processing sector was restricted through the licensing system. Some of the subgroups of the dairy industry such as ice cream were reserved in the small-scale sector. The economic reforms introduced in 1991 brought major changes in the dairy industry; the industry was liberalized and opened for private participation and private investment, foreign capital and new technology were allowed. Further, all the milk products except malted foods are covered in the category of industries for which foreign equity capital participation up to 51 percent is automatically allowed. The dividend-balancing and export obligation conditions, which applied to 22 consumer goods industries including dairy products, were withdrawn in 2000 (WTO 2002).

As a result of positive changes introduced in the dairy sector, many private firms entered the processing sector by setting up milk plants. The unregulated entry of private players in the processing sector resulted in the sale of adulterated/contaminated milk to consumers. Thus, for the orderly development of the dairy industry, the government again brought back the licensing system in the form of Milk and Milk Products Order (MMPO) in 1992, under the provisions of the Essential Commodity Act, 1955 (GOI, 1992). This order required state registration of dairy plants producing 10 000 to 75 000 litres of milk per day or manufacturing milk products containing 500 to 3 750 tonnes of milk solids per year. The plants producing over 75 000 litres of milk per day or handling more than 3 750 tonnes of milk solids per year had to be registered with the central government. MMPO, defined the concept of 'milk shed', which refers to the region from which the marketable surplus of milk finds its way to a processing plant. The registering authority specifies the milk shed area for the collection of milk by the registering unit. The main objective of the order was to increase supply of milk of desired quality in the interests of consumers, and maintain specified hygienic conditions in the premises where milk and milk products are handled, processed, manufactured and stored.

The GOI occasionally amended MMPO, to make the dairy sector more liberal and facilitate faster growth. The MMPO amendment in 2001 raised the exemption limit for compulsory registration of plants from 10 000 to 20 000 LPD and the limit from 75 000 to 100 000 litres. MMPO was last amended in 2002. The salient features of new amendments were as follows:

- No restriction on setting up new capacity; however, a certificate of registration/ permission has to be obtained from the registering authority.
- The provision of assigning milk shed has been removed.
- The dairy establishment shall conform to sanitary and hygienic requirements, food safety measures and other standards.

- A unit handling 200 000 litres of milk per day or 10 000 tonnes of milk solids per annum should be registered by the concerned state government or union territory.
- The provision to grant registration in 90 days has been reduced to 45 days.

The number of private processing dairy plants has increased in recent times because of an enabling policy environment. In fact, the opening up of the dairy industry has created a competitive environment, which will increase efficiency and supply of the quality of milk and milk products to consumers at reasonable prices.

4.3 EXPORT-IMPORT POLICIES

The commercial import of dairy products was restricted from 1975 to the mid-1990s, the tariff rates being kept at a higher level. However, this scenario changed during the 1990s. For the first time, import of SMP, followed by BO was liberalized in 1994. The exports and imports of dairy products channelled through NDDDB earlier, were diverted. However, fearing that free export of dairy products may lead to large-scale diversion of milk to manufacture products and create artificial scarcity of liquid milk supply, quantitative ceilings were imposed on exports. Further, exporters are required to get registration-cum-allocation certificates issued by the Agricultural and Processed Foods Export Development Authority (APEDA). Presently, export quotas are maintained for whole and infant milk, pure milk and butter (unless exported as branded products in consumer packs not exceeding 5 kg). To ensure that Indian dairy products meet the requirements of importing countries, dairy products are brought under mandatory export certification issued by the Export Inspection Council (EIC) based on food safety management systems such as Hazard Analysis Critical Control Point (HACCP)/Good Manufacturing Practice (GMP)/Good Hygiene Practice (GHP). However, the government has exempted inspection of exports of products notified under the Export Quality Control and Inspection Act 1963, from compulsory reshipment

The WTO enacted the new regime concerning dairy products, effective as of 1 July 1995. Liberalization of world trade in dairy products under this trade regime posed new challenges and has opened up new export opportunities for the dairy industry. There is need to enhance competitive economic advantage in dairy products in terms of both quality, cost and credibility in international markets. The role of government should be to direct, coordinate and regulate the activities of various organizations engaged in dairy development; to establish and maintain a level playing field for all stakeholders; to create and maintain a congenial socio-economic, institutional and political environment for smallholder dairy development through appropriate policies and programmes. The new trade regime is not expected to affect the overall world trade in milk and milk products; however, there will be some redistribution in terms of regions of origin and destination. It is expected that the decreased volume of subsidized exports of dairy products from several developed countries will be off-set to some extent by increased export from countries that do not subsidize their exports of dairy products, such as India.

In order to benefit from the new trade opportunities, India and other south Asian countries will need to set and enforce high-quality standards for various dairy products through an independent non-governmental authority and to improve the basic infrastructure (particularly the ports) and the air transport system. They will also need to improve their competitive

advantage in milk production by increasing milk yields to reduce the per litre cost of production and by enhancing the quality of their products through the adoption of the latest processing and packaging technologies and professional management. Compliance with phytosanitary specifications will also be necessary in order to increase the export of dairy products. A general switch to higher-value dairy products following increased access to high-priced markets in developed countries is also likely to occur.

5. Lessons learnt

India's small-scale dairy industry in the present era is a low energy consumer in milk production compared to developed countries. This has mainly derived from: the use of animal and human power in producing fodder and feed; the feeding of crop by-products that does not require any additional energy; the predominance of grazing over stall-feeding; the use of human power for milking; tending and disposal of animal wastes including dung; keeping animals in low-cost sheds or in the open; relatively low consumption of concentrated feeds. All of this has enabled an effective low energy consumption. In addition to these natural sources, also many innovative practices and management practices, contribute to the success of smallholder dairying.

Dairy cooperatives not only organized milk producers, but also tuned into the process of modernization and commercialization and dealt with issues of development and change. Training and extension education played key roles at every stage in the entire process.

The salient and successful features that have contributed are as follows:

- The development of a grass roots village level integrated dairy system controlled by farmers.
- The basic philosophy of the Anand Pattern; combining the power of its people with professional management in a vertically integrated cooperative structure that establishes a direct linkage, eliminating all middlemen, between those who produce the milk and those who consume it, either in the form of milk or milk products. This structure transfers the largest share of consumers' money to the producers, creating an incentive to improve production. It supports production by exposing farmers to modern technology. Placing the farmers in command as the owners of their cooperative involves them in the process of development.
- A single commodity approach; handles only the milk business.
- Four-tier organizational structure ; an integrated structure owned, managed and controlled by milk producer members themselves, which handles milk production, procurement, processing and marketing, and provides support services for milk production enhancement.
- Each tier of the organizational structure performs a unique function: procurement and services by the village cooperative; processing by the district union; marketing by the state federation; advancing the interests of the cooperative dairy industry by the national federation. The model has therefore evolved into an integrated approach to systematic dairy development
- Democratically elected boards from among their members in all the four tiers, i.e. the village DCS, the district milk union, the state federation and the national federation. The board members are authorized to decide the policies for total democratic governance.

- Employment of professionals by the cooperatives and professional managers answerable to the cooperative boards.
- A focus in improved dairy product quality and increase in livestock yield. Transparency maintained in business: bylaws providing continuous and concurrent audit.
- Cash and regular payment to producers for the milk supplied by them.
- Awareness raised on clean milk production and animal husbandry practices, which results in better quality of milk production and breed improvement.
- Active member participation caused by the year-round, assured market and quality-based daily produce and regular payment
- The cooperatives are not dependent on any outside agency since milk collection, processing and marketing are integrated
- Complete package of inputs and support services necessary for enhancing milk production for their members at their door step and at a very nominal price. The package includes animal health care through both regular and emergency visits by veterinary doctors, artificial insemination (AI), balanced cattle feed, improved fodder seeds, extension education and training
- Continuous education and training among its members, elected leaders and employees at every stage of organization, management, procurement, processing, quality control, monitoring, accounting/bookkeeping and overall supervision have created significant awareness of their duties and responsibilities and enhanced their sense of belonging. Whenever any gap between existing and desired skills are observed, immediate remedial measures are taken by organizing a need-based training programme.
- A national public programme, under the NDDB, OF, that replicated the Anand model at a national level. The three phase programme provided for a good development framework, where in each phase valuations of the previous phase could be made and iterative process, were required enacted. It was started in ten states in phase one and then expanded to a national level.
- Positively improved the life of those engaged in this business, directly or indirectly, bringing significant socio-economic changes. Impacts have been found in the social, economic, infrastructure and improved food aid and nutrition realms for rural people.

Note that although the cooperatives together collect about 20 million litres of milk per day, this is only about 16 percent of the total marketable surplus milk available in the country. Another approximately 4-5 percent must be collected by the privately organized sector. Thus, unorganized traders handle most of the milk, but the presence of the cooperatives acts as a psychological barrier in stopping traders from exploiting farmers.

All in all the dairy sector in India can be said to have the following strengths, weakness, opportunities and threats;

Strengths: Sizeable population of high-yielding cows and buffalo; huge domestic market for milk and milk products; good infrastructural and institutional support for dairying; high producer's share (89 percent) in the consumer's price of milk; availability of all kinds of machinery and equipment for dairy plants at the most competitive rates in the world; a well-developed and professionally managed system of dairy cooperatives set up under OF; the largest network of AI centres in the world.

Weaknesses: Small and scattered animal holdings; low milk yields; a large population of unproductive cattle; socio-cultural constraints on culling less productive/unproductive animals; shortages of feed and fodder in many milk sheds; competition between man and animals for scarce land and water resources; undue interference by the government in the affairs of dairy cooperatives; lack of strict regulations by the government on the unethical practices of unscrupulous private operators; lack of access for smallholders to institutional credit; lack of professional management; lack of a well-defined national policy for dairy development.

Opportunities: Potential for increasing the productivity of milch animals and export of high quality dairy products since the new world trade regime came into effect; scope for dairy sector reforms by restructuring the departments of animal husbandry in Indian states and reorienting their mandates; good scope for problem-solving and action-oriented research funded by private agencies; good scope for privatization of animal health care services in selected areas.

Threats: Unregulated competition from national and multinational private companies; dumping of cheap dairy products on Indian markets by developed countries; unethical practices by unscrupulous private dairy operators; inadequate public and private investment in modernizing the sector.

In the past, management has been the key factor in the success of smallholder dairying. This is evidenced by the experiences of AMUL, OF and many other successful dairy development projects. The future of smallholder dairying will also rely on the continued adaptation of management techniques to suit markets, environments and socio-economic conditions. Managing dairy plants and cattle feed factories is not the business of the government; it is better left to professional managers who are employees of the dairy cooperatives and hence accountable to their member milk producers. The role of government should be to regulate, coordinate and direct the various dairy development organizations. The government needs to create, via policies and programmes a congenial macro-environment that stimulates small holder dairying development. There is need for the central government/union government to formulate and announce a comprehensive dairy development policy for the country. This policy should be an integral part of national development policy and due consideration should be given to its direct and indirect effects on other subsectors of the economy and vice-versa.

Other than the government, there is the dairy cooperative system, which provides high quality livestock services, veterinary and AI, to its members. These services are limited to the cooperatives' areas of operation and account for less than 10 percent of total services in terms of areas covered. In the case of AI, the cooperatives also have a large network of over 12 000 village-based institutions. However, apart from cooperatives, the dairy sector is still characterized by small-scale, scattered and unorganized milch animal holders; low productivity; inadequate and inappropriate animal feeding and health care; lack of assured year-round remunerative producer prices for milk; inadequate basic infrastructure for provision of production inputs and services; inadequate basic infrastructure for procurement, transportation, processing and marketing of milk and lack of professional management. Other important characteristics of the dairy sector are the predominance of mixed crop-livestock farms and the fact that most of the milch animals are fed on crop by-products and residues, which have very low opportunity costs. Additionally, dairy development policies and programmes followed in the country,

including those relating to foreign trade, are not congenial to the promotion of sustainable and equitable dairy development.

Low productivity of milch animals is a serious constraint to dairy development in India. Crossbreeding the low-yielding non-descript cows with high-yielding selected indigenous pure breeds or suitable exotic breeds in a phased manner could increase the productivity of dairy animals in the country. The cattle breeding policy should not only focus on milk yield, but should also provide for the production of good-quality bullocks to meet the draught power requirement. Upgrading non-descript buffalo through selective breeding with high-yielding purebreds such as Murrah, Mehsani or Surti should be given high priority in all areas where buffalo are well adapted to the agroclimatic conditions.

While fixing the procurement price, producers' interests should receive the utmost attention. The producer price should at least cover the long-run average cost of milk production and provide a reasonable mark-up. The departments of animal husbandry or the dairy development boards/milk unions should initiate studies on cost of milk production and its financial viability. Such research needs to be carried out in all the major agroclimatic zones and should be repeated at regular intervals of approximately 3 years in order to determine whether milk production is profitable and to furnish an objective basis for fixing producer prices of milk.

Despite all the problems it faces, the dairy sector holds high promises as a dependable source of livelihood for the vast majority of the rural poor in India. The AMUL model of small-scale dairy production and marketing, as it has evolved and been refined over the last 50 years, also holds high promises for smallholder dairy development in India.

Liberalization of world trade in dairy products under the new trade regime of the WTO poses new challenges and has opened up new export opportunities for the dairy industry in India. It needs to enhance competitive economic advantage in dairy products in terms of both quality, cost and its credibility in international markets. Milk yield needs to increase so as to decrease the per litre cost of production, quality needs to be enhanced with the adoption of the latest processing and packaging technology and compliance with phytosanitary specifications will increase export of dairy products.

While exploring possibilities for the future of smallholder dairying in India, it is essential to acknowledge the variations among individuals and groups of milk producers and the impact of factors as diverse as dietary preferences, alternative occupations, trade regulations and subsidies. In the various production systems and less favourable climates of various parts of the country, low production is related to the poverty of the individual producer and to the producer's ability to utilize by-products in an intensive manner.

Annex 1

Profile – Dairy cooperatives in India (2001-2002)

	2001-2002	1999-2000
No. of dairy cooperatives:	103 305	101 427
of these, no. of APDC	96 206	84 289
Membership total (in million)	11 536 700	12 908 500
Membership of Anand Pattern	10 738	10 608
Women's membership (in million)	2 334	n.a.
Share capital (Rs)	2 795.3	2421.3
Government participation in share capital	13.8%	15.6%
Working capital (Rs)	14 667.8	10 912.3
Assets (Rs)	10 071.3	7 285.8
Reserves (Rs)	n.a.	1 623.9
Turnover (total) (Rs)	5 957.9	58 922.3
Average milk procured per day ('000 L)	16 504	15 877
No. of milk sheds (unions)	176	176
Total milk procured by coops. ('000 L)	6 023 960	5 795 105
Liquid milk marketed per day ('000 L)	13 363	12 964
Skim milk powder (SMP) production (MT)	120 786	52 613
Whole milk powder (WMP) production (MT)	n.a.	11 728
Baby food production (MT)	n.a.	27 067
Table butter production (MT)	89 517	29 927
White butter production (MT)	n.a.	35 281
Whole milk powder (WMP) sold (MT)	120 786	9 624
Skim milk power (SMP) sold (MT)	n.a.	42 728
Ghee production (MT)	85 384	51 058
Balanced cattle feed production	1 089 673	n.a.
Processing capacities ('000 LPD)	29 000	26 500
(a) Rural dairies	n.a.	20 450
(b) Metro dairies	n.a.	725
Milk and milk products sold (Rs)	37 852.9	30 962.6

Note: Value of Rs. expressed in million

Source: National Cooperative Union of India

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