Chapter 6

Dairy Value Chain

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6.1 Introduction

Livestock sector is the backbone of Indian agriculture and plays a crucial role in the development of the rural economy. More than one-fifth (23%) of agricultural households in India with area less than 0.01 hectare reported livestock as their principal source of income (GoI 2014). Livestock is one of the fastest-growing sectors of Indian agriculture. Livestock sector accounts for 31% of the gross value of output in agriculture and allied sector (GVOA). Within livestock, milk is the biggest component with 20% share in GVOA. In fact, milk is the largest agriculture commodity in terms of value of output, worth INR 772,705 crores, which was more than the value of cereals, pulses, oilseeds and sugarcane combined, worth INR 623,462 crores in 2018–19 (MoSPI 2021). Around 70 million rural households are engaged in milk production, most of them being landless or small and marginal farmers (DAHD 2018). As a source of livelihood for millions of poor households, dairying also supplements their dietary sources of protein and nutrition, thus playing a critical role in the country's food security needs.

Globally, India is the largest milk producer and accounted for 20% of the milk production in 2017. In the 1950s and 1960s, the country's milk production was stagnant, even witnessing negative growth in many years. Imports of dairy commodities were a norm in the first two decades of the post-independence era. Operation Flood (OF) implemented by National Dairy Development Board (NDDB) (1972–1996) created a national milk grid linking rural producers to urban consumers through a network of dairy co-operatives. The dairy revolution or the white revolution in

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India was led by the largest and most successful co-operative, Gujarat Co-operative Milk Marketing Federation (GCMMF) Limited or Amul. The stellar leadership of Sardar Vallabhbhai Patel and Lal Bahadur Shastri and persistent groundwork by local leaders like Tribhuvandas Patel combined with the innovative genius and technological prowess of Dr. Verghese Kurien, shaped the dairy co-operatives. Dr. Kurien championed the launch of Operation Flood, which resulted in creation of three-tier dairy co-operative structure in the states also known as milk-sheds where liquid milk could be produced, procured and transported to nearby cities.

After following a heavy protectionist and licensing regime, dairy industry was liberalized during 1991 economic reforms and the doors were opened for private entrepreneurs to compete with the co-operatives in procurement and marketing of milk. But due to political pressure from the co-operatives, the Milk and Milk Products Order (MMPO), 1992 was announced by the government under the Essential Commodities Act (ECA) in order to regulate production of milk and milk products, thereby, reintroducing licensing of the processing industry. It was only in 2001, when the Atal Bihari Vajpayee led government amended MMPO, thus abolishing the license renewal system. In 2003, all restrictions on processing and manufacturing plants were removed. The amended Order emphasized sanitary, hygiene, quality and safety of milk and milk products. As a result of this delicensing, there was a major fillip in creation of processing capacity by the private sector. In fact, private processing capacity created in two decades since 1990s has been more than the capacity created by the co-operatives over three decades (Dairy India 2017). However, the pasteurized liquid milk market is still dominated by the co-operatives. Following the implementation of Operation Flood (OF) between 1970 and 1996, India's milk production increased at a steady pace, surpassing the United States as the world's largest milk producer in 1998 (Fig. 6.1). Between 2001–02 and 2018–19, milk production in India increased from 84.4 million metric tonnes (MMT) to 187 MMT, at a compound annual growth rate (CAGR) of 4.4%.

Global trade in dairy products amounted to about USD 45 billion in 2017, significantly up from USD 39 billion in 2016 (Global Dairy Industry 2018). It is the European Union (especially countries like France, Ireland, and Germany) popular

Fig. 6.1 India and USA milk production. Source DAHD (2019), USDA

for their cheese and butter that has the largest share of about 39% in the global trade of dairy products. New Zealand and Australia (Oceania region) are also important exporters of milk in skimmed milk powder (SMP) form.

It is against this backdrop that we study the dairy value chain in India with an objective to assess how far it is globally and domestically Competitive, Inclusive, Sustainable and Scalable with adequate access to finance (CISS-F).

6.2 Overview of the Dairy Sector

6.2.1 Global Dairy Sector

The world milk output reached 811 million tonnes in 2017, 1.4% higher than in 2016. Across geographic regions, milk output expanded in Asia, the Americas and Europe while it stagnated in Africa and declined in Oceania. About 150 million households in the world are engaged in milk production.

India accounts for about 20% of global milk production, almost same as the European Union (EU), followed by USA (12%), with China and Pakistan producing roughly 5% each (Fig. 6.2). But India, despite being the leading producer of milk globally, does not figure in the top 5 exporters of SMP. In 2016, SMP exports were highest by USA (27%), very closely followed by EU (26%), New Zealand (20%), Australia (7%), and all others accounting for about 18% (Table 6.1). SMP remains the dominant dairy produce in global markets (51% in value), others being cheese (36%) and butter (13%) (Table 6.2).

Fig. 6.2 Country-wise share of global milk production (TE 2017). *Source* FAO (2017)

Table 6.1 Global trade in SMP 2016

Total global trade/exports	21.87 (lakh tonnes)/USD 4870 million
European Union	5.74 (26%)
The United States	5.93 (27%)
New Zealand	4.44 (20%)
Australia	1.64 (7%)
Others	4.12 (18%)

Source FAOSTAT (2016), FAO (2017)

Table 6.2 Global market in dairy products (2016)

Commodities	Trade volume (lakh tonne)/value (USD/million)	% of total trade (volume/value)
Milk powder ^a	46.52/11,030	57/51
Cheese	24.78/7815	31/36
Butter	9.63/2742	12/13

Source FAO (2017)

Note ^aWhole milk powder/skimmed milk powder

6.2.2 Domestic Dairy Sector

Milk production in India increased from 83.7 million tonnes in TE 2002–03 to 176.5 million in TE 2018–19 (Fig. 6.3). Per capita consumption of milk increased from 221 grams per day to 374.7 grams per day during the same period. India has the world's largest bovine (cattle, buffalo, mithun and yak) population of 302.8 million, which is 56.5% of the total livestock population (535.8 million) (DAHD 2019). Cross-bred/exotic milch cattle population increased by 32.2% between 2012 and 2019. However, indigenous buffaloes account for 48.9% of the milk production, followed by cross-bred cattle at 27.3%.

Notwithstanding steady increase in India's milk production, especially since 1980s, milk production is concentrated in few states. In 2018–19, ten states contributed more than 81% of the country's milk production (Fig. 6.4). India's milk production continued to increase mainly because of rising demand for processed food from increased urbanization. This milk output growth was supported by rising milk collection and processing facilities especially by dairy co-operatives along with rising role of Artificial Insemination (AI) adopted by the organized sector (FAO 2020).

Fig. 6.3 Milk production in India. *Source* DAHD (2019)

Fig. 6.4 Share of milk production in top 10 milk producing states (TE 2018–19). *Source* DAHD (2020)

6.2.3 Milk Procurement and Processing

It is estimated that 48% of milk is retained for self and local consumption and the remaining 52% is marketed to urban consumers through organized sector (31%) and unorganized sector (21%) comprising of *dudhwalas* (milk vendors) and *halwais* (sweet shop owners), who collect milk from producers and supply unprocessed

milk to the customers at their doorstep. Co-operatives and private players account for an equal share of the organized dairy sector. GCMMF or Amul is the leading player in the dairy sector with average milk procurement of 229 lakh litre per day (LLPD) reported in 2018–19, which is 45% of the total procurement by co-operatives. Amul is followed by Karnataka dairy co-operative, (Nandini) at 74 LLPD (15%), Maharashtra (Mahananda and others) cooperatives at 39 LLPD (8%), Tamil Nadu (Aavin) at 33 LLPD (7%) and Rajasthan (Saras) at 27 LLPD (5%) (NDDB 2020). The top five state co-operative federations contribute close to 80% of the total milk procurement by mainly 15 states dairy federations (Fig. 6.5).

As of 2015–16, Uttar Pradesh based VRS Foods Ltd and Tamil Nadu based Hatsun Agro Product Ltd are the top two private dairy players with an average milk procurement of 25 LLPD and 18 LLPD, respectively. Maharashtra based Parag Milk Food procures 12 LLPD of milk. Besides, there are 8–9 private dairy companies across the country with an average milk procurement of 7–15 LLPD each (Dairy India 2017). However, official data on volume of milk procurement as well as processing capacity of organized private sector is not known. While Food and Safety Standard Authority of India (FSSAI) collects data on registration and licensing of dairy plant capacity, the data is not disaggregated into co-operatives and private organized players (Lok Sabha 2019a).

Unlike in the European Union, Australia and New Zealand, SMP is a residual commodity and not a value-added product in the Indian domestic dairy market. Due to seasonality in India's milk production, where winters are generally flush with milk and summers witness dip in production, SMP is produced mostly out of compulsion to help farmers with assured income and smoothen inter-year milk supply fluctuations. This seasonal variability results in SMP production being restricted to only about 4–5 months in a year. No official estimates of SMP production and prices are available in India. However, industry experts suggest that about 3% of total milk production gets converted into SMP, annually.

Fig. 6.5 Percentage of milk procured by co-operatives: 2018–19. *Source* NDDB (2020)

As a policy, co-operatives procure the entire quantity of liquid milk that is offered by their members. In winter or flush season that extends from October to January, co-operatives procure a large surplus of milk and in summer, lower milk production results in lower milk procurement. In the case of private sector, a few of them produce SMP for the domestic food industry. Some private processors manufacture SMP when market (both domestic and export) conditions are good. Generally, SMP is not available at the retail level and is traded between dairy and dairy/food companies depending on the seasonal fluctuations in milk demand.

6.3 Competitiveness

This section examines the competitiveness of the Indian dairy value chain both at the international as well as the domestic levels. While international competitiveness is examined by estimating Nominal Protection Coefficients (NPCs) of SMP, i.e. whether the Indian SMP prices are lower (efficient) or higher (inefficient) than global prices. Domestic competitiveness is assessed by estimating farmer's share in consumer rupee. If the farmer's share in consumer's rupee is high, it indicates that the intermediation costs are low and therefore milk value chain is efficient.

6.3.1 International Competitiveness

Dairy Trade Policy

India's dairy trade policies are formulated mostly in response to local demand and supply conditions, thereby, subject to periodic changes. Between 2000–01 and 2006–07, SMP imports attracted import duty of 60%. Imports routed through National Dairy Development Board (NDDB) had an import quota of 10,000 tonnes in a financial year, attracting a duty of 15%. In 2016–17 and 2017–18, SMP attracted an import duty of 64% (basic duty of 60% and special countervailing duty of 4%). This duty structure continued in 2020–21.

In February 2011, the government banned SMP exports in an attempt to contain rising domestic prices of milk. On June 11, 2012, the government removed any restriction or ban on exports of SMP and provided export subsidy (5% of FOB value of exports) for SMP through *Vishesh Krishi and Gram Udyog Yojana* (VKGUY), also known as Special Agriculture and Village Industry Scheme. The scheme was aimed at compensating any exporter from the village to the port. For clearing huge inventory of SMP (estimated at more than 200,000 tonnes as per industry sources), especially with GCMF/Amul and other co-operatives, the government of Maharashtra and Gujarat announced an export subsidy of INR 50,000 per tonne (July 2018). The central government announced an additional export subsidy of 10% on export price (Lok Sabha (2019b)).

Fig. 6.6 SMP export from India. *Source* APEDA (2019)

SMP Exports from India

India's SMP exports are mostly confined to countries such as United Arab Emirates (UAE), Bangladesh, Nepal, Pakistan, Bhutan and Sri Lanka. In 2016–17, India exported 14,698 tonnes of SMP worth USD 40 million accounting for 30% of total dairy exports. In 2013–14, global SMP prices rose sharply in contrast to domestic price that resulted in a spurt in exports (Fig. 6.6).

New Zealand in Comparison to India

New Zealand exports around 85% of its milk production, mostly in processed form and has been the price setter in the global SMP market. The country's dairy business model is aligned to international prices and the prices given to farmers vary accordingly. Farm gate prices offered to New Zealand farmers by Fonterra varies as per international market conditions. Fonterra has around 10,500 farmers and shareholders. Between 2014 and 2015 (February), the farm gate milk prices for the New Zealand farmers were reduced by about 43% because of fall in global prices. Similarly, prices given to farmers rose by 66% between 2006 and 2008.

However, in the case of Indian dairy co-operatives, the prices given to farmer members are never rolled back. In such a downward sticky-price situation, Indian co-operatives are unable to compete in a highly volatile market by adjusting milk prices to SMP prices. Differences in farm gate prices offered by Fonterra and Amul are illustrated in Fig. 6.7.

Fig. 6.7 Historical overview of farm gate milk prices: Fonterra (NZ) and GCMMF (Amul)

Estimation of NPC of SMP for Three States

The nominal protection coefficient (NPC) of SMP is estimated for three states—Gujarat, Maharashtra and Uttar Pradesh for 17 years (2000–01 to 2016–17). For the domestic farm gate prices of milk, data from co-operatives and a major private player in Maharashtra and co-operatives in Gujarat and Uttar Pradesh have been used. These three states provide a unique diversity in the Indian dairy sector. In Maharashtra, both private and co-operatives have an almost equal share in milk procurement while in Gujarat; the co-operatives have a monopoly in milk purchase. Uttar Pradesh, despite being the largest milk producing state in India, does not have any significant presence of the co-operatives and private sector (mostly unorganized) has ample operating space in the state.

Out of the total 17 years (2000–01 to 2016–17), with two years of exceptionally low prices, the Gujarat co-operatives have been globally competitive only in 5 years (Figs. 6.8 and 6.9). In Maharashtra, the co-operatives and private sector have been globally competitive in SMP in 9 and 15 years, respectively. Uttar Pradesh's co-operative and private sector have been globally competitive in SMP in 11 and 15 years, respectively (Figs. 6.10 and 6.11).

While Gujarat, because of co-operatives' inclusive approach towards small dairy farmers, can be competitive only in high-value dairy products exports and not in SMP exports, unless they price SMP as a part of overall strategic pricing. Uttar Pradesh with a small presence of co-operatives but a large and diversified presence of the private sector, should explore investment, consolidation and export opportunities for SMP, globally. Gujarat could continue to work on its strength of inclusiveness, high procurement and sale of liquid milk, and value-added products. Even Maharashtra could look for supplying value added products and SMP to global market.

Fig. 6.8 SMP price comparison—co-operatives and global (Oceania) prices. *Source* Authors’ calculation using data from co-operatives

Fig. 6.9 Comparing NPCs (co-operative) and export volume. *Source* Authors’ calculation using data from co-operatives

Fig. 6.10 SMP price comparison—private and global (Oceania) prices. *Source* Authors' calculation using data from organized private players

Fig. 6.11 Comparing NPCs (Private) and Export Volumes. *Source* Authors' calculation using data from organized private players

6.3.2 Domestic Competitiveness

The domestic efficiency of the dairy value chain is studied by estimating the share of farmer's price in consumer rupee for a leading dairy co-operative, an organized private player and a multinational company (MNC). In the co-operative sector, it is estimated that about (75–85)% of what the consumer spends goes back to the farmers. This often includes value of services rendered and subsidized inputs. The organized

private dairies follow a different approach in milk procurement compared to co-operatives. While the co-operatives procure all the milk brought in by their members to collection centers, the private organized players are not obliged to purchase entire quantity of milk from the farmers. The organized private players also hire aggregators at the village level to procure milk and transport it to the processing units. Figure 6.12 indicates the mark-ups on consumer rupee spend on milk marketed by co-operatives and private organized players.

Maharashtra's biggest dairy co-operative—*Kolhapur Zila Sahakari Dudh Upadak Sangh* or popularly known as Gokul, passed on INR 1656 crores (about 81% of its turnover of INR 2034 in 2016–17) to its farmer members as price of the milk procured. This also includes the cost of veterinary and cattle feed supplies provided by the co-operatives. In case of a leading MNC operating in Moga (Punjab), milk procured from the farmers is used for manufacturing value added products like dairy whitener, baby products and other dairy products. Unlike co-operatives or private organized players, the MNC is not into liquid milk business.

As more than 70% of consumer's rupee reaches the dairy farmers, dairy value chains are much more efficient than other high-value commodities like fruits and vegetables in India. This comes with the caveat that the majority of marketable surplus of milk is still handled by the unorganized sector. The major difference between the co-operative dairy value chain and fruits and vegetables value chain is the number of intermediaries involved between the farmers and the end consumer. While co-operatives deal directly with the farmers, fruit and vegetable value chains have long chain of intermediation.

Fig. 6.12 Mark-ups of consumer rupee spend on milk of co-operatives and private (organized). *Source* Bihar State Milk Co-operative Federation/Sudha (derived from 2016–17 financial results) & Private Dairy, Pune

Fig. 6.13 Distribution of Milch Animal Owning (MAH) households. *Source* Development and Research Services Pvt. Ltd. (2013)

6.4 Inclusiveness

Dairying in India is an inclusive livelihood option, as a major share of milk production is contributed by animals reared by small and marginal farmers and landless labourers. Following the implementation of Operation Flood (1970–1996), Indian dairy sector witnessed a sharp increase in milk output and per capita availability, which enabled India to achieve self-sufficiency in milk production. An evaluation study conducted by an external agency (Development and Research Services Pvt. Ltd. 2013) for monitoring and evaluation of National Dairy Plan Phase I (2011–12 to 2018–19) stated that 66% of the milch animal owning households (MAH) are landless or have small land holdings (Fig. 6.13). The study also found that 55% of the dairy households have a single bovine animal, on an average. The report also stated that each milch animal owning household in the NDP project area on an average had 1.8 adult female animals, which clearly indicates the inclusiveness of the sector.

6.4.1 Inclusiveness in Dairy Co-operatives

In 2018–19, average milk procurement by co-operative milk unions in India was 507.7 lakh litres of milk per day against 475.3 lakh litres per day in 2017–18, registering a growth of about 7%. Liquid milk sales went up to 354.5 lakh litres per day, marginally higher than the sales recorded in 2017–18. Women accounted for 30% (5.06 million) of the co-operative membership (as on March 2019) (NDDB 2020).

From a modest beginning of procuring 250 litres of milk daily in 1948, Kaira District Co-operative Milk Producers' Union (Amul) procured around 25 lakh litres per day (LLPD). In 2018, close to 700,000 farmers were members of Kaira union and 17% of the members were women. Over 80% of the dairy farmers associated with Kaira co-operative have on an average less than five animals. *Kolhapur Zila Sahakari Duddh Upadak Sangh* (Gokul) procured 14 LLPD milk from close to 400,000 farmers across 5600 villages located mostly in Kolhapur and adjoining districts of

Table 6.3 Member farmers with Bihar State Milk Co-operative Federation—Sudha (in lakhs)

Year	Cumulative numbers			New members		
	Total Members	Women Members	% of Women	Total	Women	% increase of women
2013–14	8.72	1.30	15.0	1.13	0.17	15.6
2014–15	9.42	1.46	15.6	0.69	0.16	23.2
2015–16	10.04	1.67	16.7	0.62	0.20	33.1
2016–17	10.86	2.01	18.5	0.81	0.33	41.5
2017–18	11.39	2.25	19.8	0.53	0.24	45.8

Source Bihar State Milk Cooperative Federation (Sudha)

Maharashtra in 2017–18. Gokul also supports its members through Milk Producers Provident Fund Scheme and Farmers' Insurance Package Scheme.

Bihar State Milk Co-operative Federation or Sudha, with a daily milk procurement of 16 LLPD is the largest dairy co-operative in eastern India. It focusses on including more women as members of the co-operative. In 2017–18, out of the 1.14 million dairy farmers supplying milk to Sudha, nearly 20% of them were women. In 2016–17 and 2017–18, new women members associated with the co-operatives increased by 42% and 46%, respectively (Table 6.3).

The Karnataka Co-operative Milk Producers' Federation, the second biggest state dairy federation after Gujarat has been inclusive. Number of dairy co-operative societies (DCS) at the village level have increased from 416 in 1976–77 to 15,772 DCS in 2018–19. As per Census 2011, Karnataka has 27,586 villages, which implies that more than half of the villages have their own DCS. Similarly, farmer membership of the state dairy federation has seen a sharp increase from 37,000 in 1976–77 to 2.45 million in 2018–19.

Box 6.1: Dairy Sector lifts Socio-Economic Indicators of a Water Stressed Region: Banas Dairy, Gujarat

In July 2017, Banaskantha District Co-operative Milk Producers' Union or popularly known as Banas dairy, procured a record 60 lakh litre of milk in a day from the farmers, thus setting a new benchmark for the Indian dairy sector. Banas dairy's average milk procurement for 2016–17 was 39.2 lakh litre per day (LLPD), which was 25% of the total procurement of 153.1 LLPD by Gujarat Cooperative Milk Marketing Federation (GCMMF) or Amul in the state.

This dairy union which is India's largest district dairy co-operative, paid INR 5381 crore (71% of the total turnover of INR 7555 crore in 2016–17) directly to farmers for milk procurement in 2016–17. This implies that each dairy farmer received on an average INR 1.28 lakh by selling milk to Banas Dairy (2015–16) which is higher than the average annual income of agricultural

households (from four sources—agriculture, livestock, non-farm sector and wages and salaries) in the country at INR 8931 per month (INR 1.07 lakh annually) (NABARD 2018).

Dairying is the best livelihood option for the farmers in Banaskantha district, which is a water-stressed region. Average annual rainfall received in the district is around 600 mm. Out of the total geographical area of district, about 47% of area is irrigated. The value of output of livestock products is considerably higher in arid and semi-arid areas like Banaskantha. The large number of rural women find good opportunities to work in several operations of animal husbandry (Government of Gujarat 2016).

The Banas dairy also provides cattle feed and round the clock veterinary services at subsidized rates to their farmer members. This implies that about 80% of their sales income goes back to farmers as price for milk procurement and cost of additional services provided by the dairy. In 2018–19, around 4.2 lakh dairy farmers poured milk into Banas dairy procurement system. Out of 3.5 lakh registered farmers with village level societies or DCS of Banas dairy, 1.2 lakh farmers are women. In most households, though men are registered as members, women look after most of the work related to dairying. With 1200 Bulk Milk Chilling Units (BMCs) located across 1400 village-level dairy co-operative societies (DCS) in Banaskantha district, women engaged in dairy do not need to travel far to pour milk.

Majority of the farmers affiliated to Banas dairy own 2–5 animals on an average, thus providing vital supplementary income, especially when rainfall is deficient. Given the inclusive nature of Banas Dairy, it procures the entire quantity of milk brought to it by its member farmers or non member farmers.

6.4.2 *Inclusiveness in Private and MNC Dairies*

In case of organized private dairy companies, milk is procured either directly from the farmers or through contractors, collection agents, service providers, or aggregators and transported to the nearest processing plants. A leading private dairy company in Maharashtra procures about 13 LLPD milk from farmers mostly in and around Pune district. The company undertakes direct milk procurement through its own infrastructure network—*Dudh Sankalan Kendras*. The company procures around half of its milk requirement through bulk suppliers or contractors. A leading MNC in Punjab procures around 8 LLPD milk from 80,000 small farmers (those who supply 150 L or less milk daily) including 60,000 women farmers and around 2000 large farmers mostly from one district in Punjab. The company also provides veterinary

services and feed at reasonable prices. More than 47% of the milk procured is sourced from large farmers. The company provides incentives of about 8% over the milk price to small farmers, who supply more than 500 L of milk, daily. For ensuring quality milk procurement, the company has been focusing on large farmers and is non-inclusive in its approach. For large farmers, the company has installed bulk milk cooler at their doorsteps. The volume of milk procurement is based on demand and the company has not expanded its procurement operations extensively.

6.5 Sustainability

Dairy value chain has been studied with respect to its financial as well as environmental sustainability. While financial sustainability focuses on financial viability of the co-operative sector, environmental sustainability focuses on issues such as water footprint in dairy sector, availability of fodder and challenges of dealing with large livestock population.

6.5.1 Financial Sustainability

Financial viability of dairy co-operatives is one of the key challenges.

As per annual accounts and financial information from 175 co-operative milk unions (out of 210) for the year 2013–14, 95 co-operative milk unions had accumulated net losses, of which 55 and 14 loss making unions were from Uttar Pradesh and Tamil Nadu, respectively. The remaining 80 milk unions had reported net profits. If we take into account the support received from state and central governments by these co-operatives, (the data is not available), the number of co-operatives making profits may be much less (Lok Sabha 2015).

There has been no visible attempt to restructure these co-operatives to make them efficient and accountable farmers' organizations as envisaged during Operation Flood. This has led to the collapse of the dairy co-operative sector in states like Uttar Pradesh. Successful co-operatives like GCMMF (Amul) forayed into other states, but not in the Anand pattern. Since farmers outside Gujarat cannot be members of GCMMF, they do not get any bonus and they cannot be elected to the Board. These co-operatives become benevolent private sector entities in other states, unless they are declared multi-state co-operatives.

6.5.2 Environmental Sustainability

The availability of adequate quality and quantity of feed and fodder is crucial for sustaining and improving the productivity of livestock. One of the major reasons

for low livestock productivity in India is non-availability of quality feed as it alone contributes to nearly 60% of the cost of milk production (Halli et al. 2018). The National Institute of Animal Nutrition and Physiology (NIANP) estimated the deficit in the requirement and availability of dry fodder, green fodder and concentrates. In 2015, the three types of fodder had a deficit of 21%, 26% and 34%, respectively. This deficit is likely to increase to 23%, 40% and 38%, respectively by 2025 (Table 6.4). The fodder demand is expected to reach 1207 MMT of green fodder and 671 million MT of dry forage. At the current level of growth in forage resources, there could be 66% deficit in green fodder and 25% deficit in dry fodder by 2030 (IGFRI 2011).

As the Ministry of Agriculture & Farmers' Welfare (MoA&FW) does not collect data on fodder crops, reliable data on fodder production does not exist. According to India Grassland and Fodder Research Institute (IGFRI), Indian Council for Agricultural Research (ICAR), precise data on production of fodder crops, yield, adoption of improved varieties and technology are not available and there is no agency to monitor these aspects. This seriously dampens effective policy formulation and research planning for fodder development and cultivation.

According to NDDB, chronic shortage of green fodder may make dairying an uneconomical and unattractive livelihood option for farmers. However, dairy farmers can increase their income by making available good quality green fodder in adequate quantity from their own fields. Cultivation of newly developed varieties and hybrids of fodder crops in farmers' field should be promoted on a mission mode (NDDB 2017). Fodder shortage could be overcome by increasing the cultivation of forage crops, which are major feed resources for livestock across states. The increase in the availability of crop residues over the years has been largely due to increase in

Table 6.4 Fodder scarcity (units in MMT)

Types		2012	2015	2020	2025
Dry	Requirement	480	491	530	550
	Availability	375	387	408	433
	Deficit (%)	– 22	– 21	– 23	– 23
Green	Requirement	820	840	880	1000
	Availability	614	619	596	600
	Deficit (%)	– 25	– 26	– 32	– 40
Concentrates	Requirement	82	87	96	105
	Availability	55	58	61	65
	Deficit (%)	– 33	– 34	– 36	– 38

Source NIANP (2013), data on requirement and availability

production of paddy, wheat and other crops. There is a need to strengthen location-specific technologies for forage production, forage cropping systems and other land-use strategies to achieve higher production of fodder. There is also a need to identify suitable varieties or cropping system to match the changing climate scenario.

Ecological Sustainability

Like other ruminants, buffaloes, sheep, goats and cows excrete substantial quantities of methane, a greenhouse gas (GHG). India's livestock farming is a significant anthropogenic source of methane (CH₄) in the world. According to a study by National Institute of Animal Nutrition and Physiology (NIANP), ICAR, while India accounts for around 15% of global livestock population, its contribution to global methane emissions is around 10.6%. The major chunk of Indian livestock rearing is based on open grazing and straying on forestlands, community land, among others. The GHG namely, methane (CH₄) and nitrous oxide (N₂O) are emitted by livestock through enteric fermentation and manure (animal wastes) management. All livestock and poultry contribute to GHG emissions, through N₂O and CH₄ from manure, nitrogen from urine and feces (IPCC 2007). In 2016, agriculture contributed 14% of total GHG emissions. Within agriculture, livestock sector (enteric fermentation) accounted for 54.6% of GHG emissions of which buffalo and indigenous cattle accounting for 40.2% and 36.4% respectively, followed by cross-bred cattle at 15.8% and rest at 7.6% respectively (MoEFCC 2021).

India does not have legally binding emission reduction commitments with regard to reducing GHG. However, in its Intended Nationally Determined Contributions (INDC) submitted to UNFCCC in October 2015, India has volunteered to reduce emission intensity by (33–35)% by 2030 from 2005 level. India in its submission to the UNFCCC, 2018 stated that there exists a potential for increasing production levels by addressing the problem of imbalanced nutrition with existing feed and animal resources. In its submission, India also stated that optimum feeding of animals through Ration Balancing Program (RBP) helps to enhance milk production commensurate with the genetic potential of the animals (UNFCC 2018). The RBP implemented during 2012–2019, resulted in reduction of average cost of feeding per kg of milk by more than 10% and a reduction in enteric methane emission by 13.7% per kg of milk in lactating cows and buffaloes (World Bank 2020). RBP covered 2.86 million milch animals in 33,374 villages across 18 states. If the program is extended to all milch animals, there could be a substantive reduction in costs, GHG emissions and fodder requirements.

Despite the huge increase in milk production, about 37% of the growth has been due to increase in productivity of animals implying that the increase in the number of livestock is the dominant source of growth in milk output. Such growth rate in milk production driven by increase in number of livestock is not sustainable (Chand 2017). India, with large cattle population along with low productivity faces challenges in terms of curbing GHG emissions and rendering dairying environmentally sustainable.

Water Use Intensity

Dairy farming is a water-intensive activity as large amount of water is required for cultivation of forage crops, concentrate feed ingredients as well as to cater to the drinking and cleaning requirements of animals. With the demand as well as supply for milk rising steadily, the water intensity of the sector remains an area of concern from the sustainability aspect of dairy value chain.

NDDB study on water foot prints of milk production states that the average water foot print of milk from indigenous cows, cross-bred cows and buffaloes in Gujarat was 1970 and 1820 cubic meter¹ (m³) per tonne, respectively. The study revealed that feeding animals in the traditional pattern led to a higher water footprint. In contrast, animals fed on a balanced ration, comprising a judicious mix of green fodder, dry fodder and concentrate feed ingredients, led to 14% lower² water foot print from 1236 to 1062 litre/Kg (NDDB 2020). NDDB and other government agencies have to map water foot print of dairy sector extensively for formulating future strategy which would ensure sustainable use of water.

6.6 Scalability

The Operation Flood helped quality milk reach consumers across 700 towns and cities through a National Milk Grid. The program also helped remove the need for middlemen thereby reducing the seasonal price variations. Because of the co-operative structure, production and distribution of milk and milk products became economically viable for farmers to undertake themselves. However, OF did not impact dairy development evenly across the country. Especially in eastern and north-eastern regions, dairy co-operatives could not expand their procurement operations with the exception of Bihar State Milk Co-operative Federation or Sudha, which achieved limited success. Also, the per capita availability of milk remains far below the national average in the eastern and north-eastern states. Despite substantial support by the government, scaling up the co-operatives post OF in many states seem unsustainable. The scaling up in these regions have to come from the private sector.

Private sector organized dairies have expanded their base across states like Uttar Pradesh, Maharashtra, Tamil Nadu and Gujarat. Highest concentration of private dairy units is in Uttar Pradesh and Maharashtra, accounting for half of the total dairy plants in the country (Dairy India 2017). The future scaling of dairy processing would be driven by the private sector. Keeping in mind the increasing role of private sector in milk processing, the government had announced INR 15,000 crores Animal Husbandry Infrastructure Development Fund (AHIDF) in June 2020 which could play a critical role in coming years.

¹One cubic meter is equal to 1000 L. Water foot print of milk is defined as the sum of the volume of fresh water consumed in different steps of milk production chain, measured in units of water consumed (Litre per Kg of milk).

²<https://www.nddb.coop/services/animalnutrition/climate-smart-dairying/water-footprint-of-milk>.

Indian dairy sector has undergone several technological innovations and breakthroughs, which have boosted production and processing of milk. Some of the key aspects of the technological innovations during OF period included imported semen from the high yielding Holstein–Friesian and Jersey cross breeds, introduction of technology for drying milk, machinery for pasteurization, installation of automatic milk vending machines, bulk milk coolers, transportation of milk through refrigerated trucks, large milk trains, etc.

Genetic Improvement of Cattle Population

Majority of India's milk production in 1950s and 1960s were contributed by cattle and buffalo. The indigenous varieties of cows (desi) are known to have less milking potential than exotic cows like Jersey or Holstein Friesian. However, the critical challenge was that the exotic breeds were unable to cope with the Indian climate. Recognizing this, the government aggressively promoted a systematic cross breeding program using imported semen. The strategy was to increase milk yield by cross-breeding with exotic cows like Jersey, and Holstein Friesian. The cross-breeds have substantially more milk yield than the desi varieties. Also, they are much more resilient than the exotic pure breeds. The Artificial Insemination (AI) technique was first introduced way back in 1940s. However, the real boost to spread of AI came in the third stage OF which commenced in 1985.

The Artificial Insemination (AI) coverage, which helps in improving productivity of bovines by upgrading their genetic potential needs to be expanded. Cross-breeding of high-productivity animals of foreign selected high genetic merit bulls and selected indigenous breeds; and sexed semen technologies assuring female progenies, are some of the methods which need to be adopted to increase animal productivity.

MoA&FW stated that although AI coverage is expanding, its acceptability amongst the farmers is still poor and 100% breeding by AI is not practically possible. The average success rate of AI has been in the range of (35–40)%, implying higher cost for the farmers and adverse impact on expansion of AI. For increasing productivity, more research and development has to be carried out to reduce inter-calving interval (for buffalo, average 400–500 days) and age at first lactation.

Table 6.5 indicates that productivity of milch animals is far below the global standards of more than 20 kg per day. Cattle productivity increased by a CAGR of 3.8% for non-descript/indigenous cow, 1.25% for exotic/crossbred cows and 1.76% for buffalo between 2011–12 and 2016–17.

As seen in Fig. 6.14, the productivity of milch animal is targeted to increase at a faster rate (more than double) by 2022 compared to previous years. The NAPDD

Table 6.5 Cattle productivity—average yield per in-milk animals (kg/day)

Year	Non-descript/indigenous cows	Exotic/CROSSBRED cows	Buffaloes
2011–12	2.27	6.97	4.71
2016–17	2.84	7.51	5.23

Source DAHD (2016, 2017)

Fig. 6.14 In-Milk Animal Yield (anticipated). *Source* DAHD (vision-2018)

vision document—2022 stated that, with the present constraint of feed and water resources, it would not be feasible to increase absolute number of bovine population.

Creating Demand for Anticipated Increase in Milk Production

As per the DADH&F projections, per capita availability of milk was likely to go up to 417 g per capita by 2021–22. Dairy co-operatives along with private sector need to revamp their operations to procure and process more quantity of milk. Despite lack of any official data on private dairying capacity, it is noteworthy that the private sector is nearly at par with co-operatives in handling liquid milk. It is expected that the former will overtake the co-operative sector in the times to come (Dairy India 2017). However, co-operatives are likely to dominate the Indian dairy market, especially liquid milk over the next decade.

The dairy sector, be it co-operatives or private sector, would need to invest in rural milk procurement network and reduce its dependence on intermediary milk collectors and transporters. Currently, co-operatives procure about 77% of total volume of milk from Gujarat, Karnataka, Maharashtra, Rajasthan, Tamil Nadu and Andhra Pradesh. States like Uttar Pradesh, Madhya Pradesh, Odisha, West Bengal, Chhattisgarh and Jharkhand could be potential candidates for meeting the procurement target as milk production increases in the next five years or so. Due to weakness of the co-operative model in many of these states, alternative forms of institutions like producer companies, and self-help groups could be formed for milk procurement, which can be linked to a co-operative like GCMMF or the private sector.

If the entire projected growth depends on increased demand, the state governments should provide milk as part of Mid-Day Meal (MDM) program, which in turn would address malnutrition amongst children. As per the National Family Health Survey (2015–16), about 36% of the children in the country were undernourished. Some of the states which provide milk for addressing malnutrition include Karnataka and Gujarat.

- Under the Karnataka's *Ksheera Bhagya* scheme launched in 2013, more than 10 million children get 150 ml of flavoured milk, five days a week, across all the *anganwadis* and government schools. The milk powder (SMP) for the scheme

is provided by Karnataka Milk Federation (KMF), the country's second-biggest milk co-operative after GCMMF (Amul). *Ksheera Bhagya* was launched mainly to fight malnutrition amongst children and also allow KMF to dispose their surplus milk.

- The *Doodh Sanjeevani Yojana* launched by Gujarat government in 2006–07 provides 200 ml fortified milk to primary school children in the tribal talukas as part of their Mid-Day Meal (MDM) program. The focus of the program was to prevent dropouts from schools and ensure nutrition of the students. At present, the program covers more than 7.5 lakh students in 4700 primary schools. Pre-packed milk to children and women through programs such as Integrated Child Development Services (ICDS) or MDM scheme would meet twin goals of tackling malnutrition as well as creating demand for surplus milk.

Through the Corporate Social Responsibility (CSR) initiatives like NDDDB Foundation for Nutrition (NFN)'s *Giftmilk* program, demand for milk could be generated. *Giftmilk*, jointly promoted by NDDDB and its subsidiaries (Indian Immunological Limited, IDMC Limited, and Mother Dairy Fruit & Vegetables Private Limited) and GCMMF supplies and distributes flavoured milk to about 3500 underprivileged children (200/150 ml servings per day) in selected schools in Gujarat, Telangana and Delhi.

6.7 Access to Finance

The financing pattern of dairy value chain was analyzed taking into account the main stakeholders in the process—farmers or producers, entrepreneurs, dairy companies, co-operatives and retailers operating in the production, procurement, processing and marketing of milk and milk products. Primary field study shows that at dairy farmer level, there are no specific schemes for buying new cattle. However, there are programs for financing small dairy units and both public and private banks provide loans to purchase milch animals.

6.7.1 Existing Financial Channels

Across the country, financing initiatives for dairy value chain being implemented include Dairy Processing and Infrastructure Development Fund (DIDF), Dairy Entrepreneurship Development Scheme (DEDS), Animal Husbandry Infrastructure Development Fund (AHIDF), NDDDB Term Loans, Working Capital Finance Scheme for Dairy Co-operatives and the Ministry of Food Processing Industries sponsored Cold Chain scheme. The National Co-operative Development Corporation (NCDC)

under MoA&FW also provides financing to dairy co-operatives. At the farmer level, programs such as Pradhan Mantri Mudra Yojana (PMMY), Kisan Credit Cards (KCC) for dairy farmers and financing by banks for setting up small dairy units are some of the existing channels of finance.

Dairy Processing and Infrastructure Development Fund (DIDF)

In the Union budget 2017–18, the central government announced setting up of the Dairy Processing and Infrastructure Development Fund (DIDF) to upgrade and modernize existing infrastructure for milk production and processing for dairy co-operatives—milk unions, state dairy federations, multi-state milk co-operatives, milk producer companies and NDDB subsidiaries. Since the dairy co-operatives generally pass on the maximum share of sales realization (usually between (75–80)% of the consumer rupee) to the milk producers as well as ensure supply of milk at affordable prices to the consumers, they have lower financial resources to invest in setting up infrastructure for increasing milk processing (NDDB no.date.).

The fund which was initially operational from 2017–18 to 2019–20 with an outlay of INR 10,881 crore (NABARD loan of INR 8004 crore and borrowers' contribution of INR 2001 crore) has been extended until 2022–23. As on July 31, 2020, 37 projects across 11 states including Karnataka, Maharashtra, Punjab, and Haryana, worth INR 1073 crore have been sanctioned under DIDF. NABARD also raises fund from market and provides the same to NDDB or NCDC, which further provide loans at an annual interest rate of 6.5% to borrowers with a repayment period spanning 10 years with initial two years moratorium (Lok Sabha 2020). The concerned state governments are required to guarantee loan repayment.

The fund is being used by co-operatives for modernization and creation of milk processing facilities, creation of village-level chilling infrastructure and installation of bulk milk coolers (BMCs). DIDF aims to help more than 9.5 million farmers by creating additional milk processing capacity of 12.6 million litres per day. It also aims at installation of 28,000 bulk milk cooling (BMCs) along with electronic milk adulteration testing equipment and value-added products manufacturing capacity of 5.9 million litres per day.

Dairy Entrepreneurship Development Scheme (DEDS)

DAHD has been implementing Dairy Entrepreneurship Development Scheme (DEDS) through NABARD since September 2010. The scheme provides capital subsidy of 25% (on loan amount) for general category beneficiaries and 33.33% for SC/ST beneficiaries for purchase of cattle apart from other dairy activities. Under the scheme, the cost of a maximum 10 animals is fixed at INR 6 Lakh. Loans are provided under DEDS for purchase of milking machines, other dairy processing equipment,

cold storage facilities, dairy marketing outlets, etc. Rate of interest charged for the loan extended is as per RBI guideline (base rate) and the policy of the concerned banks. Until May 2019, INR 1310 crore had been disbursed to around 3.2 lakh beneficiaries.³ However, DEDS had been discontinued since August, 2020 (DAHD 2020).

Inclusion of Dairy Farmers under Kisan Credit Cards Scheme

For meeting the working capital requirement of dairy farmers, central government in the Union Budget 2018–19 announced the extension of Kisan Credit Cards (KCCs) to fisheries and animal husbandry farmers. A special drive had been undertaken by DAHD to provide KCCs to all dairy farmers associated with co-operatives and milk producer companies. DAHD has been aiming to provide KCC to around 1.5 crore dairy farmers associated with 230 milk unions in the country. As on 22nd December 2020, milk unions collected 5.1 million applications of dairy farmers and forwarded 4.14 million applications to the banks (PIB 2020).

Those who have KCCs, get agriculture credit at a reduced interest rate of 7% per annum while MoA&FW implements an interest subvention scheme for short term crop loans up to INR 300,000. Under the subvention scheme, additional subvention of 3% is given to those farmers who repay their short-term crop loan on time, thus reducing the effective rate of interest to only 4% per annum. All farmers who own cultivable land, tenant farmers, share croppers and SHGs of farmers are eligible to avail credit under KCCs.

Animal Husbandry Infrastructure Development Fund (AHIDF)

In June 2020, while announcing *Atma Nirbhar Bharat Abhiyan* stimulus package for dealing with the adverse impact of Covid 19 on the economy, the Cabinet Committee on Economic Affairs approved Animal Husbandry Infrastructure Development Fund (AHIDF) worth INR 15,000 crores. The aim of this fund was to incentivize investment in infrastructure development for the private sector engaged in dairy and meat processing. The eligible beneficiaries under AHIDF include farmer producer organizations, medium and small enterprises, private companies and entrepreneurs, who would contribute a minimum 10% margin money while balance 90% would be loan component from the scheduled banks. The government will provide 3% interest subvention for loans under AHIDF, two years moratorium period for principal loan amount and six-year repayment period thereafter. As on 22nd December 2020, project loans worth INR 150 crores under AHIDF has been sanctioned by the banks (PIB 2020).

³Data provided by NABARD official, in May, 2019.

Ministry of Food Processing Industries' Cold Chain Scheme

The Ministry of Food Processing Industries (MoFPI) also provides loans for integrated cold chain and preservation infrastructure facilities, from the farm gate to the consumer end. Out of 238 projects approved, so far, 54 pertains to the dairy sector. Subsidy in the range of (25–35)% with a cap of INR 10 crore is available as well.

Mudra Loans

Under the Pradhan Mantri Mudra Yojana (PMMY), loans in the range of INR 50,000–INR 10 lakh are provided to dairy farmers. Kwaliti, a big private dairy farm based in Uttar Pradesh and Haryana, tied up with Bank of Baroda to provide loans under MUDRA to around 100,000 farmers in its key milk procurement areas of western Uttar Pradesh. Mudra Loans are provided at 8% interest per annum and are available to traders, shopkeepers (or retailers) and micro business owners. In Punjab, the leading MNC facilitates loans for dairy farmers (for buying calf or equipment) from banks (at base rate/Mudra scheme). In case of organized private dairies and MNC, the BMCs and other equipment required for procurement, are provided by the respective companies. The farmers associated with private organized players and MNC need working capital for buying calf and/or equipment.

Bank Finance for Setting up Small Dairy Units

Public sector banks extend loans for setting up small dairy units (less than 10 milch animals) based on financial viability of the project. The loan component is 90% if quantum of loan exceeds INR 1 lakh with maximum ceiling of INR 5 lakh. The loans are provided to those dairy farmers who are members of the milk procuring societies or located on the milk route. The eligibility criterion for availing loans for a dairy unit with less than 10 animals is minimum 0.25 acre of land for every five animals for growing fodder and balance requirement procured locally. Dairy unit with 10 animals and above requires minimum one acre land for cultivation of fodder. The loans to dairy units are provided as per the interest rate decided by the bank (base rate) with a tenure of 4–5 years. RBI has details of loans given to dairy units by banks during 2013–2016 (Table 6.6).

Table 6.6 Bank loans to dairy units: 2013–14 to 2016–17

Year	No of accounts (in lakhs)	Amount of loan (INR crore)
2013–14	1.17	1375
2014–15	1.4	1150
2015–16	2.39	2010
2016–17	10.83	3952

Source LokSabha (2016)

Financing Opportunities at Retail Level

With the growth and expansion of the dairy sector, there would be increasing opportunities of financing at the retail levels. The biggest dairy co-operative—GCMMF or Amul has 10 lakh retailers and 10,000 dealers across the country. Therefore, combined financing opportunities at the retail level for dairy industry would be large for financial institutions.

6.7.2 Key Financing Sources for Dairy Co-operatives

In this section, financing aspect of key dairy co-operatives—Banaskantha or Banas dairy (Gujarat), Sudha (Bihar State Milk Cooperative Federation) and Gokul (Kolhapur Zilla Sahakari Dudh Utpadak Sangh, Maharashtra) have been studied.

Banas Dairy: In 2018–19, leveraging its volume and financial capabilities, Banas Dairy accessed loans from leading private sector banks at competitive rates for enhancing its processing capacity (INR 150 crores for a processing plant at a rate of interest of 6.5% per annum). It availed loan from NCDC at an interest rate of 8%, while loans availed with support from NDDB via State Bank of India (INR 318 crores) at an interest rate of 8.3%. Access to finance for meeting working capital requirements like cattle or equipment is not adequate. Farmers have been accessing finances from informal sources at interest rates up to (25–30)% per annum or availing personal loan (at 10% interest per annum) from public sector banks. About 1200 out of 1400 DCSs have BMCs which cool the milk to 4 degree Celsius before it is transported to processing units. Banas dairy provides loans to DCSs for setting up BMCs at an annual interest rate of 9%. There is a subsidy under the World Bank aided National Dairy Plan for setting up BMCs.

Sudha Dairy: In case of Bihar State Milk Cooperative Federation or Sudha, finance for expansion of processing capacity has been carried out through NCDC loans worth INR 573 crores which were sanctioned in 2014 at the prevailing annual interest rate of 12.75%. This was brought down to 10.9% in 2018. The Bihar dairy federation has availed INR 225 crores loans so far for the six projects out of which 25% of the loan amount is subsidized, thus effectively bringing down the cost of financing further.

Gokul Dairy: The financing of the Maharashtra's biggest dairy co-operative union's (Kolhapur Zilla Sahakari Dudh Utpadak Sangh) operations are met through loan from NDDB and other government supported schemes. However, at the ground level, dairy farmers access loans from both public and private sector banks with the interest rate ranging from (12–13)% annum for the purchase of cattle.⁴

⁴Based on personal interactions with officials of Gokul as well as farmers.

6.7.3 Anticipated Investments in Dairy Sector

If we achieve 5% annual growth rate in milk production between 2016–17 and 2023–24, output is expected to touch 236 million tonnes. The additional capacity creation for processing is likely to be 2242 LLPD by 2023–24 by both co-operative and private sector. Total investment required would be more than INR 84,000 crores. There are other additional investments required like setting up drying and chilling capacity, cattle feed plant, manufacturing value-added products, Visi coolers, etc. which would be about INR (12–15) crores for a one LLPD plant. We have considered INR 37.5 crores as estimated investment required for creating one LLPD capacity for the dairy sector (Table 6.7).⁵

In case of 6% annual growth rate in milk output by 2023–24, the total investment required would be more than INR 90,000 crores. The additional processing capacity required would be 2402 LLPD. As per the industry norm, for setting up milk processing capacity, INR 25 crores per LLPD is required.

Taking into account INR 37.5 crores investment required for creating a LLPD of milk processing, the projected investment for creating additional milk processing capacity would be in the range of INR 78,000 crores (in case of 5% annual increase in milk output between 2016–17 and 2023–24) and INR 84,000 crores (in case of 6% annual increase in milk output by 2023–24). Out of these, co-operatives would require INR 32,000 crores and INR 35,000 crores, respectively. Private sector would require INR 45,000 crores and INR 49,000 crores, respectively based on the NAPDD assumption that 30% of total milk production would be processed by private sector and 20% by the dairy co-operatives by 2023–24.

Table 6.7 Projected investment required for increasing dairy processing capacity

	Milk output in MMT	Output in (LLPD)	Processing (LLPD) by Coop	Processing (LLPD) by private sector	Total processing (LLPD)	% coverage of milk output by Coop & organized pvt sector
2015–16	155.5	4136	440	430	870	21
2016–17	165	4520	497	497	994	21
2023–24*	236	6473	1295	1942	3236	50
2023–24**	248	6795	1358	2038	3396	50

Source Authors' calculations based on anticipated growth in milk production

Note *On the basis of 5% annual growth from 2016–17, **on the basis of 6% annual growth from 2016–17, by 2023–24, organized private sector is anticipated to handle 30% and cooperative 20% of the total milk production. Lakh Litre per Day (LLDP), Million Metric Tonne (MMT)

⁵Although the official data about dairy processing capacity created by private sector is still not available, the paper has relied on available data from various sources to arrive at the possibility of quantum of investment required in the next five to six years.

The DIDF and financing schemes of NDDB and NCDC would meet around half of the amount required. Under DIDF, INR 10,800 crores is available to co-operatives for creating additional processing capacity of 126 LLPD by 2019–20. Significant opportunity for the financial institution exists in the dairy sector as domestic demand for processed products increase in the next few years. Animal Husbandry Infrastructure Development Fund (AHIDF) worth INR 15,000 crores launched in June, 2020 is being used by private sector. If NAPDD's target of achieving 300 million tonnes of milk production by 2023–24 is to be achieved, the requirement for funds would be much more.

Significant financing opportunity by the financial institutions exists in the dairy sector as domestic demand for processed products increase in the next few years. While a portion of financing would come from DIDF, the rest of the finance or credit would have to be met by various channels such as banks loans, bonds, etc.

6.7.4 Need for Finance at Reasonable Rate for Dairy Farmers

During the field visits, we found that in Maharashtra, village-level dairy co-operative societies (multiple societies at village level) are providing loans (INR 30,000) to farmers to buy new calf at 9% rate of interest. Banks (public, private and co-operative) in Maharashtra are providing loans to dairy farmers at an interest rate ranging from (12–13)% per annum for a tenure of 3–5 years. Through interaction with farmers, we found that there are additional charges or cost of processing of the loans availed by the dairy farmers. On a loan of INR 10 lakh from a public sector bank for a tenure of 3–5 years, the additional charges (about 5% of loan amount) include—mortgage fee (INR 15,000), application processing charges (INR 2500), registration fee (INR 8000) and premium towards the term insurance (INR 30,000). This is where the cost of finance for the dairy farmers can be reduced by providing soft loans and handholding support provided by co-operatives and private sector on timely procurement of milk from the farmers.

6.8 Conclusion and Policy Recommendations

Following are the key recommendations to make the dairy value chain in India more competitive, inclusive, sustainable, and scalable with adequate access to finance.

1. Limited export opportunities for SMP exist for the private sector in South Asian countries, which needs to be encouraged. Particularly states like Uttar Pradesh should explore such opportunities. However, growth of the Indian dairy sector cannot be achieved from export competitiveness in SMP alone as

it is only a residual product. The dairy sector would need to focus on high-value dairy products for exports to specific markets of South Asia and Gulf countries.

2. The key challenge is to include more women in actual functioning of co-operatives through greater representation in the board of dairy co-operatives. At present, less than 3% of the members of the board of the dairy co-operatives are women, although they constitute 18% of the membership.
3. There is a need for strengthening technologies for forage production, cropping systems and other land-use strategies for ensuring sustainable growth of the dairy sector.
4. Another critical challenge the dairy sector is likely to face over the next few years pertains to impact of climate change which may pull down growth in milk output in the country. Milk production may get hit following an average rise in temperature which would create scarcity of water and dry fodder for the cattle. A strategy needs to be developed to deal with the situation arising out of climate variability.
5. Advanced herd management needs to be promoted for maintaining and improving the genetic potential of the cattle.
6. The government agencies need to conduct extensive study on the water foot print of dairy sector for formulating future strategy keeping in mind water use efficiency of the sector.
7. Dairy co-operatives need to be treated as private enterprises of farmers and freed from any government imposed controls. For ensuring transparency and accountability, the government should ensure that co-operatives' financial results are disclosed in public.
8. The future growth in milk production should be driven by increasing yield per cattle. There has to be an acceptable solution for disposal of male cattle not wanted by farmers. Use of frontier technologies like sex-sorted semen, genomic selection of high merit animals, embryo transfer, data collection and analytics need to be promoted on priority.
9. The co-operatives need to expand their base in states including Uttar Pradesh, Madhya Pradesh, Odisha, West Bengal, Chhattisgarh and Jharkhand for meeting the procurement target, as milk production increases.
10. The central government could consider providing vitamin-enriched milk to the 100 million children currently covered under Mid-Day Meal (MDM) for boosting demand for milk. Compared to huge annual food subsidy budget, the cost of providing milk under MDM would be much smaller.
11. The financial institutions must provide working capital assistance to dairy farmers at reasonable rates. In the absence of institutional financing structure at the ground level, dairy farmers are forced to seek credit from the informal sources at much higher interest rates. Provision of specific windows for accessing credit for purchase of animals need to be made. Kisan Credit Cards to dairy farmers would help farmers in meeting their working capital requirements.

12. Expansion and modernization of milk processing facilities would need substantial investments. Since a major portion of this has to be carried out by the private sector, a financing mechanism at par with co-operatives will have to be set up to ensure that dairy farmers in areas not covered by the co-operatives have the opportunity to enhance their incomes, significantly.

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