

AN ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF MILK UNDER FORMAL AND INFORMAL MILK MARKETS IN PUNJAB

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In

Development Economics

By

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August, 2019

DECLARATION

I declare that the thesis entitled “AN ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF MILK UNDER FORMAL AND INFORMAL MILK MARKETS IN PUNJAB” has been prepared by me under the guidance of Dr. Naresh Singla, Assistant Professor, Department of Economic Studies, School of Social Sciences, Central University of Punjab. No part of this thesis has formed the basis for the award of any degree or fellowship previously.

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ABSTRACT

“AN ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF MILK UNDER FORMAL AND INFORMAL MILK MARKETS IN PUNJAB”

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Dairy farming as an allied activity has been considered an alternative to revive the agrarian economy of Punjab. Further, participation of farmers in formal milk markets may increase the income level of farmers, provide them guaranteed market as well as assured price. Hence, in this context, the study was carried out to analyse the relationship between farmers and formal milk market in terms of procurement operations, role of formal milk markets in augmenting income and employment, cost and returns from milk production, factors influencing farmers' participation in formal milk markets and problems faced by the farmers regarding production and marketing of milk. Based on mainly primary data, three formal milk markets two cooperatives viz. Milkfed and Kaira Milk Union a tier of Gujarat Cooperative Milk Marketing Federation (GCMMF) and a producer company namely, Baani Milk Producer Company Limited (BMPCL) were selected for the present study. Out of total 600 sampled farmers, a sample of 100 farmers supplying milk to each formal milk market was selected through the usage of stratified sampling technique. Further, another sample of 100 farmers supplying milk to informal milk market corresponding to each company was selected. Companies under formal milk market procure milk on the basis of fat as well SNF and make payment to farmers after a fixed period of time. Besides, companies involved in formal market also provide technical input services. It was found that participation in formal milk markets

augments the income as well as employment of the farmers. Further, farmers participating in formal milk markets were having more returns from milk production as compared to farmers participating in informal milk market. Distance was found to be the main determinant of farmers' participation in formal milk markets. Besides, age, education, herd size etc. were also found to be major determinants influencing the farmers' participation in formal milk markets. However, farmers participating in formal milk market were also facing problems regarding production and marketing of milk such as higher cost of feeding inputs, low price, fluctuations in milk production, requirement of much labour time, distance of milk collection centres from farmers' farm gate, incidence of diseases among milch animals etc. In order to address these problems, the study recommends some policy measures such as establishment of more than one milk collection centres in geographically large villages, access to credit facility, provision of subsidy of feeding inputs, veterinary and breeding services, advance payment facility, fixation of reasonable price of milk etc.

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Dr. Naresh Singla

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LIST OF ABBREVIATIONS

Sr. No.	Full Form	Abbreviation
1.	The Punjab State Cooperative Milk Producers Federation Limited	Milkfed
2.	Gujarat Cooperative Milk Marketing Federation	GCMMF
3.	Baani Milk Producer Company Limited	BMPCL
4.	Marketed Surplus	MS
5.	Net Sown Area	NSA
6.	Gross Sown Area	GSA
7.	Cropping Intensity	CI
8.	Total Production	TP
9.	Domestic Consumption	DC
10.	Dairy Gross Receipts	DGR
11.	Dairy Farm (family) Business Income	DFBI
12.	Dairy Family Labour Income	DFLI
13.	Total Variable Cost	TVC
14.	Total Fixed Cost	TFC
15.	Total Costs	TC
16.	Solid Not Fat	SNF
17.	Village Cooperative Society	VCS

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Agriculture and allied sectors still act as a backbone for Indian economy as around 54.6 per cent of the population is engaged in these sectors though their share in Gross Domestic Product (GDP) have declined to 14.6 per cent (Gol, 2015-16; Gol, 2015). In the era of continually growing domestic expenditure as well as decline in net income from crop farming, depending only upon crop cultivation for livelihood is not viable for the rural masses, especially for marginal and small farmers, who constitute about 85 per cent of the operational holdings in India. Therefore, the enterprises of animal husbandry comprising dairy farming, bee keeping, poultry, piggery etc. along with crop production have been widely acknowledged for supporting additional income and also reducing the production risk from crop farming.

Livestock is the second largest economic activity of rural India as about 20.5 million people depend upon livestock for their livelihoods (Sethumadhavan, 2017). Globally, India ranks first in the livestock population constituting around 11.6 per cent of the livestock population in the world (Baby, 2017). In India, out of the total agricultural GDP, livestock sector contributed around 25.7 per cent during 2016-17 at constant prices of 2011-12 (Gol, 2017). Indian agriculture across the major landholding categories is characterized by mixed crop–livestock farming (Sohal, 1980; Kurup, 2001; Singh et al., 2014; Lal and Chandel, 2016; Pawar, 2017). Livestock sector acts as a source of insurance against income shocks in crop farming due to natural calamities. During TE 2009-10, the value of the output of livestock was 18 per cent higher than the value of food-grains (BIRTHAL and NEGI, 2012). It acts as a significant tool for poverty reduction as the incidence of poverty has been found less in the states having higher livestock share in total agricultural output (Ali, 2007; Kumar et al., 2008; Kumar and Singh, 2008; BIRTHAL and NEGI, 2012; BIRTHAL, 2014; BIRTHAL, 2016). Livestock is a labour intensive activity; therefore, it creates gainful employment for marginal and small farmers who, in general, are characterised as having abundant family labour, but tiny pieces of land (George, 1996; Pandit and Dhaka, 2004; Ali, 2007; Bardhan, 2007; Kumar et

al., 2007; Baba et al., 2011; Kumar et al, 2011; Birthal, 2016). Females are the leading employees of animal husbandry as during 2000s, 70 per cent of the labour requirement in livestock sector was fulfilled by female workers as against 33 per cent in case of crop farming alone (Ali, 2007).

Among the various activities under livestock farming, dairy farming has been extensively recognised as it contributes around 69 per cent of the gross receipts from animal farming (NSSO, 2014). It has been emerged as the most important segment and an integral part of farming economy (Kashish et al., 2014). Indian population spends 40 per cent of their daily income on food items and as per National Sample Survey Organisation (NSSO) report, around 70-75 per cent of their food budget is for milk and milk products (Sethumadhavan, 2017). Besides ensuring nutritious food security, it is also the potential source of direct cash flow as well as living assets for Indian farmers (Buragohain and Deka, 2015).

India is largest milk producer of the world and accounts 18.5 per cent of the global milk production (Gol, 2015-16a). As per the 19th livestock census 2012, out of the total livestock population in India, around 37.28 per cent constitutes dairy cattles (both indigenous as well as crossbred) (Chakravarty, 2017). Growth of the milk production over the previous year was recorded 6.26 per cent during 2014-15 as compared to 3.1 per cent of world milk production during the same time period (Gol, 2016). Globally, India also stands first in bovine population. The number of buffaloes, crossbred cattles and indigenous cattles has increased by 7.99 per cent, 34.78 per cent and 0.17 per cent respectively during 2007-12 (Gol, 2012). Besides the largest producer of milk, India is also the largest consumer of milk in the world and the milk consumption is growing at 6 per cent annually (Patel, 2017). Per capita availability of milk has also increased from 222 g/day during 2001-02 to 352 g/day during 2016-17, which is more than the minimum requirement of 250g/day as recommended by Indian Council of Medical Research (ICMR) (Gol, 2017). It has also found to be more than the world average of 294 g/per day (Gol, 2016). In India, milk is the top single product contributing to the value of agricultural output even surpassing the rice during the last few years (Gol, 2013). Milk production in India rose from 80.6 million tonnes during 2000-01 to 163.6 million tonnes during 2016-17 as shown in Figure 1.1. The Indian dairy industry is growing at an annual

growth rate of 7 per cent at current prices (Jaisridhar et al., 2012). The dairy industry in India is the second most important segment of the food-processing sector, accounting for 8 per cent of total value added in 2008-2009 (Ohlan, 2013).

Hence, the enterprise of milk production acts dominantly for the Indian peasantry. It provides livelihood to majority of the rural population, especially the agricultural labourer, small and marginal farmers and women that exist in bulk. Around 70 per cent of total milk is produced by landless, marginal and small farmers in India (Malliga et al., 2012; Kumar et al., 2013) and hence, this enterprise generates additional employment opportunities as well as income for majority of the marginal and small farmers (Padhi, 2014; Bharti et al., 2015). Dairying has also a positive impact on the health of the masses as milk is considered the complete diet and full of nutrients. Along with providing nutritious food, remunerative employment and income, the enterprise of dairy farming is useful in the provision of manure for the cultivation of crops, animal draught power for farming and hence, augments the crop production (Venkatesh and Sangeetha, 2011). In exchange the crop sector provides fodder, feed and crop by-products (which otherwise do not find alternative use would have been disposed of by burning causing more air pollution) (Singh et al., 2007). In this way, there exists a complementarity between the crop and dairy sectors. Besides, it is also helpful in the provision of transport, energy for fire and light, and raw material for different industries.

Dairying in India is more inclusive as compared to crop production in the sense that it involves majority of the vulnerable segments of the society for their livelihoods (Singh and Datta, 2013; Singh and Datta, 2013a). Also, the ownership of in-milk bovine is more equitable than landholdings as around 85 per cent of India's marginal and small holdings just operate 45 per cent of the operated area whereas their share in total female bovine population is around 75 per cent (Gol, 2016a). Further, in dry-lands and mountain ecosystems, the livestock sector contributes anywhere between 50 to 75 per cent of total household incomes of the rural population. Hence, growth of the Indian dairy sector is supposed to be demand-driven, inclusive and pro-poor (Ohlan, 2013).

Due to increase in literacy rate, globalisation, upliftment in standard of living, urbanisation etc., the consumers are shifting their food pattern from food-grains to

a diversified basket of nutritious food items such as milk and milk products, fruits and vegetables etc. (Birthal and Taneja, 2006; Das et al., 2011; Kashish et al., 2014). In the past decade, there has been an increase in the consumption of milk and milk products in rural and urban areas by 29 and 26 percent respectively (Rajamani, 2016). Also, the share of expenditure on milk and milk products to total food expenditure has increased to 15.4 per cent in rural areas and 18.6 per cent in urban areas (Birthal, 2008).

The credit of the historical dairy development in India goes to Dr. Verghese Kurien's programme of 'Operation Flood', the world's largest rural development programme launched in 1970 with the objectives of increase in milk production ("a flood of milk"), supplement rural incomes and reasonable prices to consumers. Due to this, milk production rose by many times and in 1998, India became the largest milk producer in the world even surpassing the U.S. He was then the chairman of National Dairy Development Board and the whole process of 'Operation Flood' was divided into three phases (Phase I from 1970-80, Phase II from 1981-85 and Phase III from 1986-96) within a time span of 26 years viz. 1970-1996. The sharp rise in milk production in India is called as white revolution. The programme was financed by World Food Programme, European Economic Community (EEC) and World Bank. Phase III is regarded as India's dairy cooperative movement and it also focussed on research and development in animal health and animal nutrition (NDDB, n.d). At present, the demand for milk is surpassing its supply and growth in annual milk production is less than the growth of demand for milk (Kishore et al., 2016). Over the next decade, demand for dairy products has been projected to grow at 5 per cent per annum, while milk production has grown at about 3.5 per cent annually in the recent past. Improving productivity of the dairy industry to meet the projected demand is a key developmental challenge facing the Indian dairy sector (Ohlan, 2013).

Before independence, there was no formal milk market in India. However, military dairy farms were set up by the defence department in the British era to provide butter and milk to the army personnel. Aarey milk colony was set up in 1949 by Bombay Government under Greater Bombay Milk Scheme. It benefitted partly both the milk producers as well as consumers. However, the most historic development

in Indian dairy sector came in 1973 when the Kaira Cooperative Union set up a three-tier structure at village, district and state level for procuring, processing and marketing the milk and milk products under the marketing agency named Gujarat Cooperative Milk Marketing Federation (GCMMF). These milk cooperatives of Gujarat today own the GCMMF, the largest food products business as well as the largest exporter of dairy products from India under its brand name *Amul* which is well known in all over the world. The government adopted this successful model and set up the National Dairy Development Board (NDDB) in 1965 which set a proposal for a milk revolution across the country (Goswami, 2007). During 2014-15, *Amul*, which is part of the Gujarat Cooperative Milk Marketing Federation having 17 milk cooperatives, exported ₹ 250 crore (Mukherjee, 2015).

Before the introduction of LPG (Liberalisation, Privatisation and Globalisation) policy in 1991, the Indian dairy sector was regulated by the Indian government under the Industries Development and Regulation Act (IRDA) of 1951 and dairy processing plants were mainly reserved for the public sector or cooperatives (Punjabi, 2015). However, with the launching of economic reforms in 1991 as well as following the agreements in Uruguay round of WTO (World Trade Organisation), the dairy sector was liberalised in a phased manner (Sharma et al., 2009) and private players started to enter in the milk processing sector. However, in 1992 following the Milk and Milk Products Order (MMPO), government again imposed some restrictions on dairy industry. As per this order, any person/dairy plant handling more than 10,000 litres of milk per day or 500 MT of milk solids per annum needs to be registered with the Registering Authority appointed by Central Government. The objective of this order was to maintain and increase the supply of liquid milk of desired quality in the interest of the general public and also for regulating the production, processing and distribution of milk and milk products (DAHS, n.d.). The MMPO was, however, perceived as an entry barrier for private sector investments, and in March 2002, the government made some important amendments so that the MMPO would basically regulate food safety, quality, sanitary and hygiene conditions of all the registered units (Jha, n.d.). Under these amendments, all the restrictions were removed by the government on setting up new processing capacity. Government also allowed foreign investors to invest in

dairy sector in the early 2000s. As a result, number of private milk processing plants rose from 403 in 2002 to 493 in 2006 (Sharma et al., 2009).

In Punjab, under the cooperative sector, Punjab State Cooperative Milk Producers' Federation Limited (MILKFED) came into existence during 1973 to improve dairy farming in the state. The main aim was to provide a sound milk market to the milk producers in the state by value addition and marketing of produce. Besides this, it also emphasised on the provision of technical inputs to milk producers for the enhancement of milk production. At present, it procures milk from milk producers from almost all the districts of Punjab and sells the milk in various forms as well as various milk products under the brand name of *Verka* (Verka, n.d.).

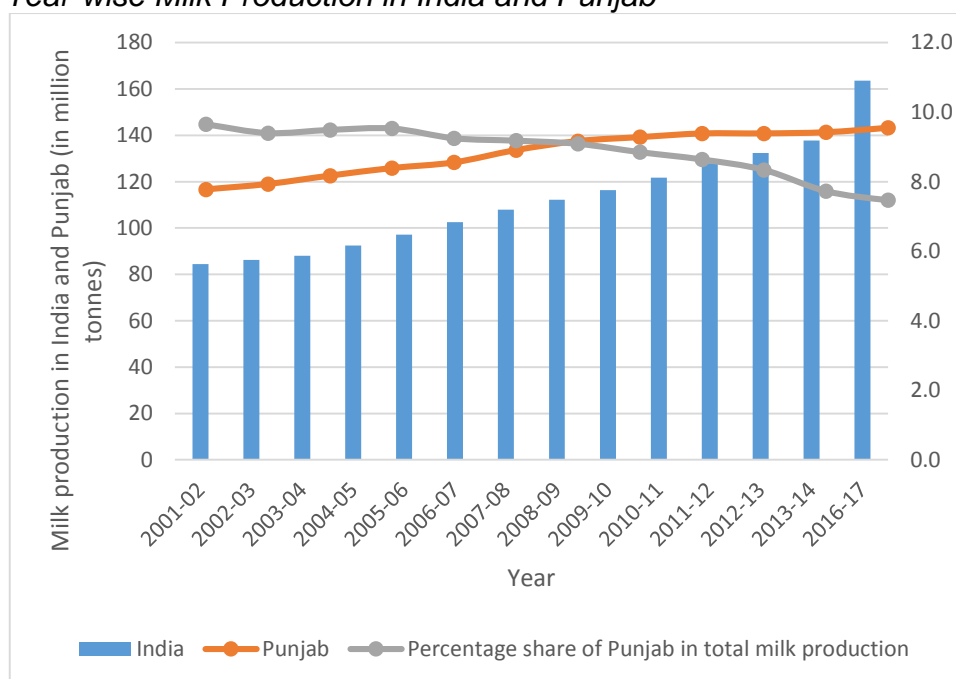
1.2 Statement of the Problem

Punjab is one of the top most agriculturally leading states in India as around 35.6 per cent of the total workers are directly or indirectly involved in agricultural and allied activities (GoP, 2015) and the share of agriculture and allied sectors in Gross State Domestic Product (GSDP) is around 20.67 per cent in 2012-13 (GoP, 2013). In Punjab, around 34.21 per cent of the total operational holdings belong to marginal and small farmers while they operate only about 9.35 per cent of the total area (Gol, 2010-11) and therefore, possess very small pieces of land for the survival of whole family. Livestock sector, therefore, plays an important role in Punjab economy. The Gross State Value Added from livestock sector at 2011-12 prices was ₹ 2286318 lakh contributed around 29 per cent of the Gross Value Added from agriculture and allied sector (GoP, 2015). Punjab ranks sixth in milk production with a share of around 6.89 per cent in total milk production in India during 2016-17 (Figure 1.2). Milk production in Punjab has increased from 9389.03 thousand tonnes during 2009-10 to 11282 thousand tonnes during 2016-17 (Gol, 2017). Besides this, Punjab ranks first in per capita milk availability. It has increased from 892 g/day during 2001-02 to 1075 g/day during 2016-17 as against national average from 225 g/day to 352 g/day during the same time period (Gol, 2017).

Among the two segments of the agricultural sector viz. crops and dairy, no doubt, Punjab is a prosperous state in crop farming. Despite having only 1.5 per cent of the geographical area of India, it contributed 24.2 per cent of rice and 41.5 per cent

of wheat to the central pool during 2014-15 (GoP, 2015-16). Moreover, green revolution not only made the nation food secure, but also turned India from food importing to food exporting country. But at the same time, this also left some unforgotten issues for the state such as ground water depletion, soil erosion, exorbitant use of chemicals, rise in water and air pollution etc. Consequently, the productivity of the crops stagnated and net profits started to decline due to frequent rise in the cost of cultivation. All these issues were the result of shifting the cropping pattern towards the monoculture of wheat and rice in Punjab. Also, during the post green revolution era, the major benefits of new agricultural technology were reaped by the large and political affluent farmers due to the reverse tendency of shifting land from peasants to land owners. Hence, for small and marginal farmers, dairy farming is regarded as an alternative occupation for combatting against the decline in income from crop farming (Rani et al., 2013; Rani et al., 2015).

Fig 1.1
Year-wise Milk Production in India and Punjab



Source: GoI, 2017

Moreover, like India, in Punjab also, the rural land distribution is highly skewed. Around 68.3 per cent of the rural households did not cultivate any land during 2004-05 and out of 11.7 lakh operational holdings in 1990-91, 2.04 lakh holdings (18.3 per cent) were of 1-2 hectares in size and 2.96 lakh (26.5 per cent) were of less than one hectare (Singh and Joshi, 2008). Hence, getting employment in livestock

sector is the next best pathway to reduce the income inequalities among the various categories of farmers. Unlike in crop sector, dairying enterprise is associated with regular flow of income and hence, stable source of income, whereas the crop sector is characterized with risk and uncertainty in income due to vagaries of nature like flood and draught, unseasonal heavy rain, attack of insects and pests etc. Hence, system of dairy farming is considered as an insurance against risks and uncertainties in crop sector. It helps in utilising their surplus family labour, requires less land and water resources and provides cash income to meet their daily consumption needs (Sidhu and Bhullar, 2004). The significance of dairy farming in Punjab can also be gauged from the fact that the share of dairy in farm business income improved from 43.4 per cent during 1987-90 to 54.6 per cent during 2000-03 for marginal farmers and from 31.0 per cent to 37.4 per cent for small farmers during the same time period (Sidhu and Bhullar, 2004; Singh and Joshi, 2008).

Being a smallholders' enterprise, the rapid increase in demand for milk may give an opportunity to increase the milk production. But, the further expansion of milk depends upon the profits to the milk producers (Ghule et al., 2012). Milk being the most perishable commodity requires the immediate process of sale. Marketing of milk still is bounded by numerous obstacles. Inefficient marketing is the major problem ahead farmer as well as national level. In the absence of appropriate marketing system, farmers are not actively adopting the enterprise of dairy at large scale. In India as well as Punjab, a large chunk of marketed surplus of milk is handled through traditional marketing channels generally dominated by the milk vendors, who in order to get maximum profit, purchase milk from the milk producers at a low rate and sell to the consumers and in urban areas at a very high price. Therefore, there exists a large price spread between the producer and consumer. The further expansion of Indian dairy industry is also constrained by some threats. Firstly, the share of organized dairy industry in total milk production is less than 15 per cent and the share of dairy products in global trade is less than 1 per cent (Sharma et al., 2009). The rural consumers are still dependent on the traditional market channels (Samal and Pattanaik, 2014). There are various factors which are responsible for the farmers' non-participation in formal milk markets.

Hence, the development of formal milk markets is the pre-requisite for the expansion of dairy industry.

1.3 Research Gap

Majority of the farmers belongs to the category of marginal and small farmers. In this context, enterprise of dairy farming may generate a significant role in supplementing farm income especially for marginal and small farmers. However, despite the good place in milk production and per capita milk availability of Punjab, the annual growth of milk production has remained only 1.8 per cent as against some other states such as Madhya Pradesh (8.5 per cent), Tripura (6.3 per cent), Haryana (5.7 per cent), Andhra Pradesh (5.6 per cent) and Gujarat (5.1 per cent) (Gol, 2014). If this continues to happen, the position of Punjab may slip down further and it will become difficult to revive the agrarian economy of Punjab from the clutches of declining farm income, indebtedness, farmers' suicides etc. Hence, for boosting the milk production in India, its marketing plays a prominent role.

A large chunk of marketed surplus milk is disposed through traditional marketing channels dominated mainly by milk vendors who purchase from farmers at low price and sell in urban areas to consumers, sweet shops etc. at a very high rate. Thus, these channels are characterised by a large price spread between the farmers and consumers as well as very low producer's share in consumer's rupee and hence, very small profits to milk producers. Besides this, there exists the large price fluctuations seasonally in the informal milk marketing channels. In the winter season, due to excess supply of milk, price generally falls down sharply and hence, the milk producers are penalized. Marketing efficiency is also very less in the informal marketing system. Therefore, informal marketing system is termed as inefficient marketing system due to the involvement of large number of market functionaries. In order to reduce these malpractices, cooperative dairies as well as private dairies in formal sector may play significant role in protecting the interests of the milk producers.

The formal milk markets are, in general, characterised with demand driven, integrated supply chain, less number of intermediaries, direct procurement from milk producers, provision of credit facilities, inputs and extension services etc. Large number of studies are available on marketing efficiency, cost and return

analysis on different channels. However, none of the studies in Punjab have made a comparative analysis of both various formal as well as informal markets simultaneously related to production and market aspects of the farmers selling through formal and informal markets. Further, the present study will explore the comparative analysis of informal markets with recently emerged integrating firms in the formal market. Earlier, none of the studies have studied the procurement operations of the formal milk markets. Further, none of the studies have explored the impact of formal milk markets on gross income and employment generation. The present has also explored role of formal and informal milk markets in augmenting income and employment generation of the farmers which has not been analysed in the earlier studies. Farmers' participation in formal milk markets varies from firm to firm. Hence, the present study has investigated the determinants of farmers' participation in different formal milk markets which has not been conducted yet in Punjab.

1.4 Research Questions

- 1) How does the firms procure milk from the farmers through organised channels?
- 2) Is there any criterion for inclusion or exclusion of dairy farmers in formal milk marketing channel?
- 3) How does the role of dairy farming differ across both the formal and informal channels in augmenting farm income?
- 4) How the enterprise of dairy farming is helpful in providing the employment under both the channels?
- 5) What is the cost of production and returns of milk in both the formal and informal channels?
- 6) What are the major determinants of dairy farmers' participation in formal milk marketing channels?
- 7) What are the various constraints faced by the milk producers under both the formal and informal channels?

1.5 Research Hypotheses

- 1) Milk procurement system under formal milk market is likely to be transparent under formal milk market.

- 2) Farmers under formal milk markets may have more farm and livestock ownership as compared to farmers under informal market.
- 3) Contribution of Income from dairying to total income is more in case of milk producers supplying milk to formal milk markets.
- 4) Annual employment generation from dairy farming is more in case of formal milk market as compared to informal milk market.
- 5) Returns from dairy farming are more under formal milk channel as compared to informal milk marketing channel.
- 6) Smallholder dairy farmers are excluded from the formal markets.
- 7) Farmers under both the channels face various constraints regarding milk production and marketing.

1.6 Objectives of the Study

- 1) To examine the procurement operations of the integrating firms in procuring milk.
- 2) To study the socio-economic profile of both the producers involved in formal and informal milk marketing channels.
- 3) To work out the contribution of income from dairy farming in total income of the milk producers in the formal and informal milk markets.
- 4) To investigate the labour utilisation in dairy farming for both the producers under formal as well as informal milk markets.
- 5) To calculate the cost of milk production and returns of producers marketing under the formal as well as informal markets.
- 6) To identify the factors influencing the participation of the milk producers in formal dairy channels.
- 7) To study the various constraints faced by the milk producers regarding production and marketing in both the channels.
- 8) To suggest the various policy measures to improve the conditions and safeguard the interests of the milk producers in the presence of formal milk markets.

1.7 Significance of the Study

Land is most important factor of production for the generation of farm income. But as per the classical theory of rent by David Ricardo, the supply of land is inelastic

and it is the only factor which fetches rent. Hence, due to fixed supply of land, the size of average land holdings has been remaining skewed due to fragmentation and rise in rural population. Therefore, for sustaining the livelihoods of rural masses, dairying may serve as the best enterprise. As majority of the milk producers belongs to marginal and small farmers, therefore, dairy farming has emerged as a source of self-employment and constitutes a significant source of income. Due to this reason, it is necessary to improve the production as well as marketing strategies adopted by dairy farmers. At present, Punjab state is facing the severe agrarian crisis in crop sector due to failure of crops, high input prices, deterioration of soil and water quality etc. Therefore, it has led to problem of indebtedness and farmer suicides. Hence, development of dairy farming may play an important role as an allied enterprise for the livelihood of farmers. But, this enterprise cannot be uplifted further unless the stimulus efforts are made to improve the marketing system of milk. In the union budget 2016-17, Government of India has set the goal to double the farmers' income by 2022. It cannot be possible by focusing only on crop sector particularly in states like Punjab which is already passing in the crisis. Thus, dairy farming may play an important role in enhancing the income levels of farmers. Therefore, it is necessary to study the production and marketing strategies of milk in Punjab. In the present era, marketing of milk has become major issue which must be given due priority as bulk share of marketed surplus of milk is sold through informal marketing system which is characterized with low price, delay in payment, seasonal fluctuations in price etc. In this context, formal milk markets may play a pivotal role to correct these problems.

1.8 Chapterisation

The thesis consists of nine chapters. Chapter 1 is the introductory chapter that deals with background of the study and also covers statement of the problem, research gap, key research question, objectives, hypothesis and chapterisation of the study. Chapter 2 presents the review of related literature. Chapter 3 brings out the methodology used for the present study such as sampling design, database and analytical tools used in the present study. Chapter 4 sketches the procurement operations of companies procuring milk through formal market. Chapter 5 provides the socio-economic profile of the milk producers under formal as well as informal

milk markets. Chapter 6 highlights the contribution of dairy farming in income and employment under formal as well as well as informal milk market. Chapter 7 describes cost, returns and determinants analysis of milk production under formal and informal milk markets. Chapter 8 deals with the farmers' perceptions towards formal and informal milk markets in India. Lastly, chapter 9 furnishes the major finding, conclusions and suggestions.

CHAPTER 2

REVIEW OF LITERATURE

Dairy farming is seen as one of the most important source of livelihoods especially for landless, marginal and small farmers as well as for most of the rural community. India is the world's largest milk producing country. The present chapter archives the main outcomes of the previous studies related to dairy production, marketing, labour utilisation etc. both at the national as well as international level.

2.1 Production and Marketing of Milk at Global Level

2.1.1 Farmers' Profile

In Zambia, almost all the dairy farms were found to be capital intensive (zero grazing) and were having purebred dairy cows at large scale (Neven et al., 2017). However, in some of Eastern European countries, small dairy farmers dominate (Neven et al., 2017). In Zambia, farmers selling milk through modern dairy marketing channel were operating land three times more than land operated by the farmers selling milk through traditional milk marketing channel. In case of herd size too, modern dairy farmers had cows twice as many as traditional dairy farmers had. Further, in case of breed of herd size too, modern dairy farmers were having improved breeds of cows as more than half the cows kept by modern dairy farmers were of improved breeds while the cows kept by traditional dairy farmers were of traditional breeds. In case of physical capital also, modern dairy farmers had more access on the same as compared to traditional dairy farmers (Neven et al., 2017). In Ethiopia, about 9 per cent of the households participating in market were female headed and the smallholder dairy farmers were dominating the milk marketing system having few milch animals located in rural areas (Willy and Gemechu, 2016). Moreover, female headed households were more likely to sell milk and butter as compared to male headed households (Negassa, 2009). Similarly, in Western Province, around 13 per cent of the livestock especially dairy farmers were females and overall age of the dairy farmers was varied from 35 to 64 years. Hence, in Western Province, the need of involvement of youth and female in dairy enterprise was felt because the involvement of youth in dairy farming was less than 30 per cent of the farmers (Sichilima and Hadunka, 2017). Around 60 per cent of the farmers were passed up to higher secondary level in Western Province (Sichilima and

Hadunka, 2017). In Western Province, farmers owned approximately 10 milking animals and the average ownership of milking animals was 0-19 (Sichilima and Hadunka, 2017).

2.1.2 Cost and Returns from Milk Production

The enterprise of dairy farming was found to be viable in Pakistan as the benefit-cost ratio was found to be 1:1.82 and net income from dairy production was worked out to be Rs. 9987.84 per month (Shah et al., 2009). Among all the cost components, feeding costs were found to play an important role (Khan et al., 2008; Shah et al., 2009; Hussain et al., 2014; Aujla and Hussain, 2015; Andaleeb and Khan, 2017) and these costs along with labour and veterinary charges were responsible for variations in profitability in milk production (Mehmood et al., 2015). However, the dominance of small dairy farmers was observed to be inhibiting the profitability and economies of scale from milk production in Pakistan (Jalil et al., 2009). In Kenya also, feeding concentrate was also found to be the significant component in farm performance (Schaik et al., 1996; Mburu et al., 2007) and due to higher feed and labour cost, profitability was found to reduce and thereby, gross margin as well as net margin were significantly influenced by intensification pathway adopted (Kibiego et al., 2015). In Pakistan, net income per litre from buffalo and cow milk was worked out to be Rs. 29 and Rs. 5 respectively and buffaloes were found to be more profitable as compared to cows (Andaleeb and Khan, 2017) and in Pakistan, dairying enterprise was found to be exhibit increasing returns to scale (Shah et al., 2009). Out of total cost of milk production in Pakistan, total fixed cost was worked out to be 16.44 per cent, 16.95 per cent and 18.71 per cent in rural subsistence, semi-commercial and commercial farms respectively and therefore, total variable cost was found to be 83.56 per cent, 83.05 per cent and 81.27 per cent respectively (Anwar and Younas, 2000).

2.1.3 Impact of Dairying on Income and Employment

In Zambia, farmers selling milk through modern dairy channel had a positive impact on income as around 61 per cent share of milk sale in annual income in modern channel was mainly the outcome of a greater focus on dairy within the overall farm operation. However, the little difference was found in case of income from off-farm income between both the channels (Neven et al., 2017). In Western Province, as

compared to 2015, farmers experienced an increase in revenue from milk sales and thereby, 69 per cent of the farmers had indicated an increase in their income (Sichilima and Hadunka, 2017). In Southern Ethiopia, the major source of income of the farmers was from crop-livestock which jointly accounts for 99.2 per cent (Beyene et al., 2017). In Pakistan, around 35-40 per cent of the income was from livestock particularly from dairy farming (Shah et al., 2009).

2.1.4 Marketing of Milk

Milk market due to some constraints exhibited less marketed surplus. In Pakistan, around 97 per cent of the milk was consumed (Tariq et al., 2008). In Zambia, marketing of milk products was more than the marketing of raw milk and around 50-60 per cent of the milk was marketed through informal milk market. In formal milk market, processors were found to be the dominant players and were supplied mainly by commercial dairy farms. Apart from this, the top four dairy processors contributed around 80 per cent of total volume processed in the formal dairy processing sector and in this way, the market showed the concentrated industry. However, the small processors were processing mainly cheese and yoghurt production because of economies of scale in processing milk products rather than raw milk. Milk from domestic processors was marketed through different channels (Neven et al., 2017). The marketed surplus of milk was calculated to be 61 per cent in Western Province and on an average, around 273 litres of milk was sold (Sichilima and Hadunka, 2017). In South-Western Uganda, around 70 per cent of the milk was marketed and 30 per cent was retained for domestic consumption (Sikawa and Mugisha, n.d.). In South-Western Uganda, around 80-90 per cent of the milk was marketed through informal sector as compared to 10-20 per cent was sold through formal sector (Sikawa and Mugisha, n.d.) as against only 3-4 per cent in Pakistan (Tariq et al., 2008). In Indonesia, farmers were shifting towards formal milk marketing channel i.e. Makmur Agro Satwa (MAS) in cooperative sector (Permani et al., 2015). In Uganda, the most significant determinants of formal marketing choice were household size, total volume of milk produced, payment period, source of market information, milk selling price and distance to the milk collection centres. The factors were also found to be the major determinants of marketed surplus of milk in Uganda (Nkwasiabwe et al., 2015).

2.1.5 Farmers' Perceptions towards Formal Milk Markets

In Kenya, selling price of milk to hawkers, milk bars was negatively associated with farmers' choice towards cooperatives. However, the seasonal effects were also influencing the farmers' choice of milk marketing. As in summer season, milk production of milch animals reduced due to their dry spell and in this season, milk vendors were playing an important role as they were the centre point of milk procurement and were collecting milk from their farm gates without imposing any kind of transaction cost to farmers. Moreover, experience in dairy farming positively influenced the farmers' choice towards selling milk to milk hawkers as well as cooperatives (Berem et al., 2015). Moreover, in lower central Kenya, the choice of household dairy market outlet was significantly affected by land size, total milk production, access to market information, educational level of head of the household, access to training and herd size. Farmers having access to information were found to prefer selling milk through cooperatives while farmers who had access to training were selling milk at their farm gates rather than dairy cooperatives and farmers with more educational qualification were selling milk through dairy cooperatives (Mutura et al., 2015). In Ethiopia, herd size had a significant impact on farmers' choice towards milk marketing channels. Thereby, the small dairy farmers were less likely to sell milk to cooperatives rather they preferred to sell milk directly to individual consumers (Bernard et al., 2007). This was also found true in case of lower central Kenya (Mutura et al., 2015). In Kenya, farmers were found to sell milk to milk bars with increase in scale of milk production (Omiti et al., 2009) whereas in lower central Kenya, milk price, land size and number of cows negatively influenced the farmers' involvement in dairy cooperatives (Mburu et al., 2007). In Southern Ethiopia, it was found that farmers' participation decision in milk value addition is significantly affected by gender, quantity of milk produced per day, family size, access to extension service, type of dairy cows' breed and access to credit whereas farmers' participation decision on volume of milk value addition is affected by gender, family size, education level of the household, access to extension service, access to credit, quality preferences on value added dairy products, quantity of milk produced per day etc. (Beyene et al., 2017).

2.1.6 Constraints in Milk Production and Marketing

Farmers involved in dairy enterprise were also facing problems related with production and marketing of milk. In Ethiopia, farmers were facing the problems of low marketable surplus, remoteness from markets as well as urban centres and lack of tradition in dairy marketing etc. Similarly, low milk production problem was perceived by around 20 per cent of the farmers. Farmers also faced the problem of lack of marketing in cheese and butter (Willy and Gemechu, 2016). Low milk yield, long calving interval, long age at first calving and short lactation length were also found to be the other major problems in Ethiopia (Negassa, 2009). In South-Western Uganda, low consumption of milk was reported by the dairy farmers due to low income levels and thereby, farmers had to involve in distress sale (Sikawa and Mugisha, n.d.). In Malawi, the fractured supply chain of milk was found to be the main barrier for dairy development. Moreover, lack of infrastructural development, low milk quality standards and low price of milk were found to be other major problems in Malawi (Revoreda-Giha et al., 2015). In Vietnam, low farm-gate price of milk, improved competition from imported milk, low availability of feeding inputs, capital investment inadequacy, lack of technical support from dairy manufacturer, incidence of cow diseases and regular rise of input prices were found to be the major problems regarding production and marketing of milk (Anh et al., 2013). Due to the lack of limited milk collection centres and milk cooling facilities, most of the milk was marketed through informal milk markets in Kenya (Hambloch et al., 2014). Seasonal fluctuations in milk production was also found to be main constraint faced by the farmers in Ethiopia as around 43 per cent of the farmers in wet season and 47 per cent of the farmers in dry season were not selling any quantity of milk. Besides the constraints faced by the farmers, cooperative sector was also not free from major obstacles such as no cooling facilities, limited storage and processing facilities (Nagassa, 2009). In Netherlands, difficulty in meeting the quality standards of raw milk was found one of the major problems for small scale producers to participate in modern dairy chains. Besides this, poor feeding practices, low milk yield, unavailability of good quality of feeding inputs problems were also present (Wouters and Lee, 2010). In Newzealand, the current major issues found in dairy industry were lack of cheap as well as highly nutritive value feed for cows of high genetic merit for milk yield, the poorer reproductive capacity of high merit cows and inefficient quantity and skills of farm labour (Clark et al., 2007). The major obstacles

in dairy cattle production in Sri Lanka were the shortages of quality feeds and fodder, limited access to veterinary care, poor management practices, disorganised marketing systems and lack of institutional support, research and training (Saadullah, 2001).

2.2 Production and Marketing of Milk at Indian Experience

2.2.1 Farmers' Profile

The probability of a farmer being a milk producer depends upon his/her various socio-economic characteristics such as age, education, land size, herd size etc. In Andhra Pradesh, higher the land size was found to be more associated with farmers' involvement in dairy farming (Squicciarini et al., 2017). In Amritsar district, the marginal, small and others farmers constituted around 0.65 ha, 1.75 ha and 3.08 ha respectively (Kashish et. al, 2014). In Uttarakhand, cooperatives were playing more important role in procuring milk in hilly areas as compared to plains (Bardhan et al., 2012). In case of contract dairy farming, the number of small dairy farmers (those who were having up to 5 milch animals) was more than medium (having milch animals from 6-10) and large dairy farmers (having milch animals more than 10) (Birthal et al., 2005). In Uttarakhand also, younger farmers were more inclined towards participation in milk marketing than the older ones (Bardhan et al., 2012). Besides this, it was also noted that with increase in land size, farmers' dependence on dairying enterprise as an additional source of income declines and it also reduced the farmers' decision to sell milk (Bardhan et al., 2012). However, in Gujarat, with increase in land size, farmers' participation in dairy cooperatives also tended to increase and thereby, land size had a positive impact on farmers' participation in dairy cooperatives (Basu and Chakraborty, 2008).

2.2.2 Cost and Returns from Milk Production

Dairy farming had a positive impact on producers' net returns in case of local, H.F. and Jersey milch animals in Rajasthan (Kumawat et al., 2016), while in Sirsa district of Haryana, the net returns from milk production for small farmers as well as overall farmers in case of local cows were turned out to be negative and for crossbred cows and buffaloes, it was positive among all the categories of the farmers (Lal and Chandel, 2016). In Maharashtra also, the net returns were also positive in case of crossbred cattle and buffaloes (Ghule et al., 2012). Per litre cost of milk production

was highest in crossbred cows, followed by buffaloes and local cows in Bihar (Singh et al., 2012). In Gujarat also, buffalo and cow milk production was found to be remunerative among all the categories of the farmers (Jadav et al., 2016). In cold desert of Ladakh, although, both crossbred cows as well as local cows were both found to be profitable, but, the extent of profitability was higher in case of crossbred cows due to higher yield (Singh, 2014). However, in Rajasthan, buffalo milk production was found to be more profitable than cow milk production (Narayan et al., 2015). In Karnal district of Haryana, per litre cost of milk production was higher in buffaloes (₹ 10.68) as compared to local cows (₹ 7.90) (Sirohi et al., 2007). In Rajasthan, per litre cost of buffalo and cow milk production was ₹ 11.43 and ₹ 11.76 respectively (Meena, 2008). In Akola, dairy farms with higher herd strength were more beneficial as compared to lower herd strength for maintenance and managing dairy farms (Badukale et al., 2008). Similarly, in Rajasthan, per litre cost of milk production was decreased with increase in herd size in case of buffalo but this was not observed in case of cow milk production (Meena and Jain, 2012). By making a comparison of costs and returns of milk production between farmers supplied milk to cooperative network and private dairy in Tamil Nadu, it was found that, gross returns were higher among farmers supply milk to private dairy due to better care of animals (Umamageswari et al., 2017).

2.2.3 Impact of Dairying on Income and Employment

Dairying plays an important role in enhancing the income level of the farmers. Income from dairying to total income was found to be inversely related to the size of land ownership and in this way, it is considered a significant tool for reducing poverty especially for marginal and small farmers (Singh and Datta, 2013) and supplementing the income of marginal and small farmers (Singh and Joshi, 2008). In Andhra Pradesh, dairy production was strongly and positively associated with improvements in rural livelihoods (Squicciarini et al., 2017). In Gujarat, Telangana and Andhra Pradesh, the contribution of dairying was more than 15 per cent of the per capita income of the households (Meena et al., 2017a). Similarly, the share of dairying in total family income was about 33 per cent for landless farmers and about 39 per cent in case of marginal and small farmers each in Punjab (Kashish et al., 2017). Dairy cooperatives had also played an important role in uplifting the rural economy of North Bihar (Choudhary, 2017). By making a comparison between the

member and non-member farmers of dairy cooperative societies, the monthly income from both crossbred cows as well as buffaloes was more in member farmers of women dairy cooperative societies than non-members in Bihar (Kumar and Sharma, 1999; Kumari and Malhotra, 2016) and Rajasthan (Singh and Sharma, 2006; Meena et al., 2010). In Rajasthan too, the impact of dairy cooperatives as well as women dairy cooperatives was positive on income and employment (Meena et al., 2009; Seema et al., 2013). In Punjab, due to better quality animals, adoption of better management practices and high milk price to the dairy cooperatives, the annual net income as well as annual milk production was found to be significantly higher among member farmers as compared to non-member farmers (Tanwar et al., 2015).

The enterprise of dairy farming also plays an important role in generating additional employment. In Punjab, dairying provided an employment of 252.23 person days per annum per household comprising 105.85 person days for male, 27.21 person days for female and 10.04 person days for children for family labour (Kashish et al., 2017). The labour utilisation in dairy farming per household and per standard animal unit was worked out to be 134.67 and 39.52 man days/annum respectively in Rajasthan (Tailor and Meena, 2013). Women also play a significant role in performing dairy activities. The involvement of women in some activities such as new born calf and cleaning of utensils as well as shed was 100 per cent (Lahoti et al., 2012). In Andhra Pradesh, around 90 per cent of the indoor activities such as milking, feeding and cleaning were performed by women (Kumar and Kondeti, 2014). In Karnataka, majority of the women were performing the various dairy activities such as cattle shed cleaning, selection of breeds, washing the animals etc. (Nataraju, 2012) whereas in case of selection of breeds, taking animals for grazing and chaffing the fodder, women were not too much involved in this activity in Assam (Sarma and Payeng, 2012). Employment of rural women in dairy farming was affected by caste, adoption behaviour, risk orientation and management orientation, education etc. (Tripathi and Kunzru, 1994). Between member and non-member farmers of dairy cooperative societies, the average annual employment in dairy farming was more in case on women dairy cooperative members as compared to non-members in Bihar (Kumari and Malhotra, 2016). In Meghalaya also, an average annual employment in dairying farming was 171.22 person days in case of member

farmers as compared to 142.59 person days in case of non-member farmers (Singh and Chauhan, 2015). In semi-arid areas of Punjab, the overall labour utilisation per annum per household was also higher among member farmers (142.49 man days) as compared to non-members (93.74 man days) of dairy cooperative societies (Tanwar et al., 2015). Dairying has also the potential of reducing income inequalities among farmers as in Punjab, gini ratio among farmers by including income from dairy farming in total income was calculated to be 0.23 as against 0.33 by excluding income from dairy farming in total income (Kashish et al., 2017). Further, among member and non-member farmers of dairy cooperative societies, income from dairying was more equitably distributed among member farmers of dairy cooperative societies than non-members in Rajasthan (Meena et al., 2010). In Madhya Pradesh, women dairy cooperatives have also started the partnership with Mahila Chetna Manch (MCM) and has also improved the livelihood of rural women (Buch, 2010). Hence, dairy cooperative societies were found to be emerge as significant tool for enhancing income and employment as well as reducing income inequalities among dairy farmers.

2.2.4 Marketing of Milk

In India, farmers were found to be following different channels for the marketing of milk. The milk marketing system in India is mainly dominated by traditional market. In India, milk is disposed off through various channels (Rajendran and Mohanty, 2004; Banafar, 2007; Choudhary, 2007; Deokate et al., 2007; Pant et al., 2007; Sadeesh et al., 2007; Singh and Joshi, 2007; Verma, 2007; Kumar, 2010; Wani and Wani, 2010; Kashish et al., 2014; Singh et al., 2014a; Singh and Datta, 2016; Brar et al., 2017; Brar et al., 2017a;). However, in Nagaland, there were two channels through which milk was disposed off i.e. through cooperatives and direct to consumers (Khoveio et al., 2016). In the traditional milk marketing system, the marketing channel directly from producer to consumer was found to be the most efficient channel as it eliminates the intermediaries involved in milk marketing system and therefore, producer's share in consumer's rupee was also highest (Deokate et al., 2007; Sirohi and Bhowmik, 2009; Arora and Agnihotri, 2011; Arora and Bhogal, 2013; Singh and Kaur, 2013; Jha et al., 2014;) while in U.P., this channel was found to be more common among landless and marginal farmers (Jha et al., 2014). In Jammu and Kashmir, farmers channelized milk through cooperative

societies were also found efficient as along with direct producer to consumer, producer's share in consumer's rupee was also highest in this channel (Wani and Wani, 2010). On the other hand, in Punjab, milk vendors were found to be the most preferred mode for selling milk followed by cooperatives, private dairy plants and direct to consumers was the least preferred channel (Singh et al., 2013a). Hence, despite the significant emergence of modern market especially cooperatives, still traditional market was found to play an important role (Kumar, 2010; Kumar and Staal, 2010; Kumar et al., 2010; Kumar et al., 2011; Sharma, 2015). In Rajasthan, around 76 per cent of the marketed surplus of milk was sold through unorganized market and the share of organized channel was calculated only 24 per cent (Meena and Tiwari, 2015) while in Uttarakhand, Dairy Cooperative Societies (DCS) were observed to play a dominant role both in plain as well as hilly areas (Bardhan and Sharma, 2012; Bardhan and Sharma, 2012a). However, in Andhra Pradesh, due to the delay in payments made by cooperatives to milk producers, it was found the tendency of shifting the farmers from cooperatives to private dairies (Sujatha et al., 2015). In Uttarakhand also, the unit price offered by cooperatives was found to be lowest and was highest in case of selling milk in market (Bardhan et al., 2012). At the same time, private players both in the organized as well as unorganized market adopted various kinds of strategies such as timely payment and offering them higher prices than cooperatives (Singh, 2007). Apart from this, large farmers were also found to shift from cooperative to modern private dairies or traditional market as these give price incentive on selling large quantity of milk (Bardhan et al., 2012; Sharma, 2015) whereas in Punjab, modern milk supply chain has emerged as inclusive and the resource-poor farmers are not excluded from this chain (Kumar et al., 2011a). In Punjab, farmers supplying milk to formal channel particularly, multinationals and cooperatives were found to be more efficient than farmers supplying milk to informal markets and selling through formal markets was found to be more beneficial (Vandeplas et al., 2012; Vandeplas et al., 2013). However, the small dairy farmers were more dependent on informal market for selling milk (Birthal et al., 2016; Birthal et al., 2017; Birthal et al., 2017a) but, they were not excluded from formal dairy market (Birthal et al., 2016). Moreover, contract dairy farming was also found to be profitable for farmers due to the reduction in marketing as well as transaction costs in Punjab (Birthal et al., 2008; Birthal and Joshi, 2009, Birthal et al., 2009) as well as Rajasthan (Birthal et al., 2008). But, these contracts made by

the private companies with the large dairy farmers owning more than 25 milch animals in Punjab (Birthal et al., 2017a). In Rajasthan, the overall impact of contract farming in dairying was found to be insignificant as the output price was found to be higher in open market and this price difference between the two markets was compensated by reduction in marketing as well as transaction cost in contract farming in dairying (Birthal et al., 2008).

2.2.5 Farmers' Perceptions towards Formal Milk Markets

Farmers' participation in dairying and especially in formal milk market depends upon significant number of socio-economic characteristics of farmers such as age, family size, education, distance, herd size, household size etc. (Basu and Chakraborty, 2008; Kumar et al., 2011a; Bardhan et al., 2012; Sharma, 2015). Moreover, it was also influenced by the various factors such as location of the village, number of milk collection centres in the villages, agro-climatic conditions etc. (Stall et al., 2006). However, for participating in modern milk market, no relation between herd size as well as farm size and farmers' participation in modern milk market was depicted (Kumar et al., 2011a). Hence, smallholder dairy farmers were not found to be excluded from formal/modern milk market (Birthal et al., 2016; Birthal et al., 2017). However, they were found not to be excluded only from cooperative channel but were excluded from modern private sector (Sharma, 2015; Sharma et al., 2015) as well as multinationals (Vandeplas et al., 2012; Vandeplas et al., 2013). Therefore, herd size in case of modern private sector as well as multinationals was turned out to be the one of the significant determinants of farmers' perception towards participation in modern milk market. However, a study conducted in Bihar and Punjab revealed that small and resource-poor farmers are not excluded from modern milk supply chain and thereby, a modern milk supply channel indicates the more inclusive structure for the participation of farmers (Kumar et al., 2011). Besides this, young and more educated farmers were having greater tendency to involve in modern dairy channel (Sharma, 2015). Moreover, membership of a farmers' group/association/cooperatives, distance from road, distance to milk collection centre, price risk, income from non-farm sources, provision of veterinary facilities etc. were found to be significant determinants that influence positively as well as negatively of farmers' participation in modern milk markets (Birthal et al., 2009; Sharma et al., 2009; Sharma, 2015). In case of contract dairy farming in Rajasthan,

the effect of land on decisions regarding the producers' participation in modern milk market was observed to be positive (Birthal et al., 2008). Distance to market influences positively as well as significantly producers' participation in cooperative market (Bardhan et al., 2012). Further, income from non-farm sources and experience in dairy farming were positively influencing the producers' participation in contract farming (Birthal et al., 2005). Further, in Gujarat also, the probability of a farmer for participation in dairy cooperative member increased with increase in household size and proportion of females as well. Along with proportion of females, the proportion of family labour had also a positive impact on farmers' participation in cooperative membership (Basu and Chakraborty, 2008). However, irrespective of asset value, socio-economic conditions and sales volume etc., farmers were preferred to sell through cooperative channel and government agencies. Further, institutional credit was regarded major determinant of farmers' participation in formal milk markets (Kumar et al., 2018).

2.2.6 Constraints in Milk Production and Marketing

Milk producers face a large number of constraints regarding the production and marketing of milk such as breeding, health care, management, marketing, institutional, higher cost of feeding, difficulty in maintaining the quality of milk etc (Marimuthu and Subbarayalu, 1987; Mathur, 2000; Rajendran and Mohanty, 2004; Manhas and Sharma, 2008; Sarkar and Ghosh, 2010; Kolekar et al., 2013; Kaware and Yadav, 2014; Kumar et al., 2014; Narayan et al., 2014; Amalanathan and Jaffer, 2015).

Among the various production constraints faced by the farmers, low availability and higher cost of concentrate was found to be the foremost problem in Nagaland followed by lack of availability of green fodder for both the farmers under cooperative and non-cooperative farmers (Khoveio et al., 2012). Farmers of Hisar also perceived feeding constraint as the most serious constraint (Kumar et al., 2014). In Pondicherry, the higher feeding cost was reported as the primary constraint in rearing crossbred cows as the requirement of green fodder, dry fodder and concentrate was very high in rearing the same and the problems like lower price of milk and requirement of higher investment etc. were the other following problems next to higher feeding cost (Manoharan et al., 2003). In Ranchi and Jharkhand, due

to less area under fodder production and shrinking area under permanent pastures, the shortage of fodder as well as clean drinking water for animals was the most prevalent constraints perceived by the farmers (Singh et al., 2015). In rainfed area too, the problems like scarcity of fodder resources, low production potential of animals, lack of timely credit facilities, inefficient marketing etc presented the complex phenomenon of dairy production (Misra et al., 2010). In Nagpur district of Vidarbha region of Maharashtra state, high cost of quality concentrate as well as inadequacy of green fodder round the year were creating the disturbances in dairying enterprise (Tiwari et al., 2007; Patil et al., 2009; Kale et al., 2013; Nagrale et al., 2015). The similar problem was also widely spread in North Gujarat (Patel et al., 2015), Rajasthan (Kumawat et al., 2014; Meena et al., 2017), Andhra Pradesh (Misra et al., 2010), Karnataka (Misra et al., 2010; Rathod et al., 2011), Punjab (Bhattu et al., 2013; Sharma et al., 2013; Kumar and Parappurathu, 2014; Dhawan and Kashish, 2016), Uttar Pradesh (Singh et al., 2013; Kumar and Parappurathu, 2014), Assam (Saha, 2014), Madhya Pradesh (Verma, 2007), Bihar (Kumar and Parappurathu, 2014) and Haryana (Singh et al., 2015b). The healthcare constraint was observed as one of the most serious constraints in the expansion of dairy sector for the farmers in Karnal district of Haryana state (Kumar et al., 2014) as well as Thrissur district of Kerala state (Rani and Subhadra, 2007-2008). Besides these problems, low level of knowledge regarding appropriate feeding practices among farmers (Kumar et al., 2011b; Akila and Senthilvel, 2012; Khoveio et al., 2012; Baby, 2014; Nagrale et al., 2015; Shrey et al., 2015; Kumar et al., 2016; Dhami et al., 2017; Rajkumar et al., 2017), lack of knowledge about proper healthcare practices (Murthy, 2001; Debas et al., 2004; Rani and Subhadra, 2007-2008; Rathod et al., 2011; Surkar et al., 2014; Singh et al., 2015), low productivity of milch animals (Hemalatha and Reddy, 2001; Manoharam et al., 2003; Saha et al., 2004; Patil et al., 2009; Rathod et al., 2011; Nagrale et al., 2015; Shrey et al., 2015) were found to be the other major production problems in various parts of India.

Apart from production constraints, marketing constraints were observed to be equally dominant among farmers. Low price of milk was the most dominant problem Pondicherry (Manoharan et al., 2003), Maharashtra (Patil, 2010; Patil, 2010a; Kale et al., 2013; Nagrale et al., 2015; Shrey et al., 2015;), Karnataka (Rathod et al., 2011), Kerala (Rani and Subhadra, 2007-2008), Tamil Nadu (Rajkumar et al., 2017),

Odisha (Prusty and Tripathi, 2016); Punjab (Singh and Kaur, 2013); Mizoram (Lalrinsangpuii et al., 2016) and Madhya Pradesh (Khare et al., 2003). The farmers marketing milk through cooperative channel in Nagaland also experienced the low price of milk as the main marketing constraint as the price of milk was determined on the basis of fat and SNF whereas the farmers following non-cooperative channel were not receiving the payments on time (Khoveio et al., 2012). Besides low price of milk, delay in payment (Khare et al., 2003; Kale et al., 2013; Nagrale et al., 2015), large number of intermediaries in unorganised channel (Rajkumar et al., 2017) were found to be the other problems in Indian dairy industry. Apart from these, in Varanasi district of Uttar Pradesh, the other issues such as education and information issues, infrastructural issues, investment and compensation, inadequate government policies and social awareness were also identified that affect the growth of dairy sector adversely (Poonia et al., 2014).

Moreover, complex system of institutional credit facilities had made the smallholder dairy production more problematic (Kurup, 2001; Kaware and Yadav; 2014; Nagrale et al., 2015; Vedamurthy et al., 2015; Vedamurthy and Sirohi, 2016). Financing by commercial banks and other formal institutions was restricted only to 9 per cent of the borrowers particularly the large farmers (BIRTHAL et al., 2016). Hence, the constraints such as low price of milk, higher cost of feed and fodder inputs, shortage of quality breed animals, low milk productivity, expensive animals and exploitation by animal traders and milk vendors were also found to be the major reasons in the failure of repayment of dairy loans (Gupta et al., 1983; Rani et al., 2013; Rani et al., 2015).

In a comparison between constraints faced by cooperative and non-cooperative farms, the non-cooperative farms were found to be faced major constraints and high severity as compared to cooperative farms (Sarkar and Ghosh, 2010) as the market intermediaries in the non-cooperative channels were receiving much higher abnormal profits as well as profit efficiency as compared to cooperative channel (Sarkar and Ghosh, 2010a). In case of contract dairy farming, difficulty in meeting quality requirements, pressure for maintaining quality of milk, delayed payments, faulty grading of milk, delay in arranging inputs, lack of credit facilities, poor service delivery by firm, lack of quality inputs, cheating by an agency, scarcity of labour and

lower price of milk produce were observed to be the major constraints faced by the farmers in Satara district of Maharashtra (Kolekar et al., 2012; Kolekar et al., 2013a). However, the integrating firms, in case of contract dairy farming, also highlighted the problems faced by themselves regarding procurement and management that act as threat for the further expansion of industry such as frequent milk price fluctuations in the market, input diversion, farmers' negligence in maintaining quality, difficulty in maintaining communication with farmers, difficulty in arranging quality inputs, violation in terms and conditions by farmers, selling of milk to other firms by farmers, extra contractual marketing, poor service delivery by health specialists and non-availability of extension staff (Kolekar et al., 2013a). The lack of organised market for the sale of milk was found responsible for malpractices adopted in the marketing of milk (Kashish et al., 2014; Birthal et al., 2016). The problem of lack of ICT tools adoption and transfer of technologies in dairying was also found to be emerge as a major threat in modern dairy practices (Bardhan et al., 2014; Singh et al., 2015; Patel et al., 2016). Above all these limitations, preparation of synthetic milk has recently emerged as a threat to Indian dairy industry as well as human health (Mudgil and Barak, 2013).

2.3 Summary

The detailed literature on production and marketing of milk at national and international level has reviewed the socio-economic profile of farmers and the difference in various characters between farmers selling milk to formal and informal milk market. Dairy farming was found to be income supporting and employment generating enterprise at national as well as international level. The emerging formal milk market have ensured better returns as well as assured market in all the seasons to dairy farmers. However, some of the private firms were found to exclude the small dairy farmers but it was not seen in cooperative sector. Therefore, as herd size of farmers increases, farmers were found to shift from traditional to emerging modern private sector. Although, several studies have been conducted on production and marketing of milk, but a few studies are there on the comparative study of newly emerged formal and informal milk markets in Punjab.

CHAPTER 3

DATABASE AND METHODOLOGY

This chapter deals with the methodology used for the study viz. selection of districts, villages and farmers, methods of data collection and techniques used for analysis of primary data collection collected through survey schedule. The chapter is further divided into three sub-sections: 3.1) Data collection 3.2) Sampling design 3.3) Analysis of data.

3.1 Data Collection

The entire study is mainly based on primary data collected through survey schedules. However, some part of study pertaining to milk production in Punjab and India also deals with the secondary data as well.

3.1.1 Primary Data Collection

In order to collect primary data, field survey was conducted during October 2017 to March 2018. The primary data was conducted on the basis on pre-tested survey schedule from the selected member and non-member farmers of formal milk markets. Apart from farmers' survey schedule, a separate schedule was also prepared to interview the company officials of formal milk markets for studying the procurement operations of the formal milk markets in Punjab.

3.1.2 Secondary Data Collection

Along with primary data collection, the study also carried out some of the secondary data sources especially the Basic Animal Husbandry and Fisheries Statistics (BAH&FS).

3.2 Sampling Design

Data was collected from the farmers through survey schedule. The selection of the villages was based on the list provided by the company's officials and list of farmers was obtained from the officials of villages' milk collection centres. Three companies two cooperatives namely Ludhiana Milk Union, a tier of The Punjab State Cooperative Milk Producers Federation Limited (Milkfed) and Kaira Milk Union, a tier of Gujarat Cooperative Milk Marketing Federation (GCMMF) and a producer company namely, Baani Milk Producer Company Limited (BMPCL) were selected for the present study. In this regard, area under companies for procurement of milk,

selection criteria of farmers, determination of milk price, mode of payment, frequency of payment to farmers etc. was undertaken from companies' officials. Further, three districts were selected (one district for each company) on the basis of highest milk procurement. Thus, Ludhiana district was selected for Milkfed, Gurdaspur district was selected for GCMMF and Bathinda district was selected for BMPCL. Thus, for the three companies involved in formal milk market, three districts were selected (Table 3.1). Further, from each district four villages were selected and from each village 50 farmers i.e. 25 farmers supplying milk to formal and 25 farmers selling milk to informal milk market were selected. Thus, from each district 200 farmers were selected and a total of 600 farmers from three districts i.e. 300 farmers selling milk to formal markets (100 farmers selling milk to each formal milk market) and 300 farmers selling milk to informal milk market were selected as is explained in Table 3.1.

Table 3.1:
Sampling design for each formal milk market

Company	Districts	Villages	Farmers		Total
			Formal	Informal	
Ludhiana Milk Union (under Milkfed)	Ludhiana	Mullanpur	25	25	200
		Dakha	25	25	
		Swaddi Kalan	25	25	
		Humbran	25	25	
Kaira Milk Union (under GCMMF)	Gurdaspur	Ghuman Kalan	25	25	200
		Bangowani	25	25	
		Chak Bhangwan	25	25	
		Chur Chak	25	25	
Bani Milk Producer Company Limited (BMPCL)	Bathinda	Kot Shamir	25	25	200
		Mahinangal	25	25	
		Lalleana	25	25	
		Kamalu	25	25	
Total			300	300	600

3.3 Brief Profile of Selected Districts

3.3.1 Ludhiana: Ludhiana is located in the centre of plain Punjab region. Total cropped area and net sown area of this district is 301 thousand ha and 599 thousand ha respectively. In this district, around 13 per cent and 16 per cent of belongs to marginal and small operational holdings. Total number of cows and buffaloes in this district is 154.48 thousand and 505.10 thousand respectively. The district is divided into seven tehsils, viz. Ludhiana East, Ludhiana West, Samrala, Jagraon, Khanna, Payel, Raikot and seven Sub-tehsils Kum Kalan, Dehlon, Mullanpur Dakha, Sahnewal, Sidhwan Bet and Machhiwara. Literacy rate of Ludhiana district is 82.2 per cent.

3.3.2 Gurdaspur: Net sown area and total cropped area of this district is 286 thousand ha and 503 thousand ha respectively. In this district, around 24 per cent and 25 per cent of belongs to marginal and small operational holdings. Total number of cows and buffaloes in this district is 143.05 thousand and 281.40 thousand respectively. This district has been divided into 3 tehsils namely Gurdaspur, Batala and Dera Baba Nanak and 8 sub-tehsils namely Kahuwan, Kalanaur, Dinanagar, Naushehra Majja Singh, Dhariwal, Shiri Hargobindpur, Quadian and Fatehgarh Churrian. Literacy rate of this district is 81.1 per cent.

3.3.3 Bathinda: Bathinda district is situated in the southern part of Punjab state and region-wise, it is also situated in the heart of Malwa. The district is situated within the Satluj-Ganga plain. Net sown area and total cropped area of this district is 296 thousand ha and 556 thousand ha respectively. In this district, around 12 per cent and 13 per cent of belongs to marginal and small operational holdings. Total number of cows and buffaloes in this district is 105.49 thousand and 274.04 thousand respectively. The district is divided into three sub-division namely Bathinda, Talwandi Sabo and Phul, which are further sub-divided into eight development blocks namely Bathinda, Sangat, Talwandi Sabo, Nathana, Rampura, Phul, Bhagta Bhai Ka and Maur. Literacy rate of Bathinda district is 69.6 per cent.

3.4 Analysis of Data

The data collected through survey schedule was tabulated and analysed. The analysis was done by categorising the farmers on the basis of land size. As there is no standard categorisation of farmers on the basis of herd size, therefore, the

farmers were categorised only on the basis of land size under both the formal as well as informal market.

3.4.1 Socio-Economic Profile of Farmers

A) *Categorisation of Farmers*: Farmers were categorized on the basis of land size. Hence, farmers were categorized into six categories on the basis of operated area. These are as follows;

Table 3.2
Categorisation of farmers on the basis of operated area

Categories	Operated area (in ha)
Landless	-
Marginal	Up to 1
Small	1-2
Semi-medium	2-4
Medium	4-10
Large	Above 10

B) *Operational Landholding*: The area under operational landholding is calculated by:

$$\text{Operational Landholding} = \text{Land owned} + \text{Leased in land} - \text{Leased out land}$$

C) *Net Sown Area (NSA)*: It represents the area under various crops including perennial counting only once in a year.

D) *Gross Sown Area (GSA)*: It represents the total area sown once and/or more than once in a year i.e. area is counted as many times as crops are sown in a year.

E) *Cropping Intensity (CI)*: It is taken as percentage ratio of GSA to NSA. The formula of cropping intensity is;

$$CI = \frac{GSA}{NSA} \times 100$$

F) *Marketed Surplus*: It refers to the amount of produce for commercial sale retained after domestic consumption. Amount of domestic consumption depends upon size of the family, total milk production, milk price, herd size etc (Acharya and Agarwal, 1999). The formula of marketed surplus is;

$$MS = TP - DC$$

Where;

MS= Marketable Surplus

TP= Total Production

DC= Amount kept for domestic consumption

3.4.2 Cost and Returns Analysis

The cost and returns analysis was carried out on the basis of different cost concepts as given below:-

A). Dairy Farming Costs–

1. Cost A = Cost of feed, fodder, concentrates, value of hired labour, medicines and veterinary expenses and depreciation on fixed assets.
2. Cost B = Cost A + interest on fixed investment on dairy animals, shed, equipments etc.
3. Cost C = Cost B + imputed value of family labour.

Costs were divided into variable costs (cost of feed, fodder, concentrates, value of hired labour, medicines and veterinary expenses) and fixed costs (interest on fixed investment on dairy animals, shed, equipments and depreciation on fixed assets). The interest on fixed capital was worked out at 9 per cent. The depreciation on buffalo and local cows was taken as 10 per cent by assuming the productive life of 10 years whereas the depreciation on crossbred cow was taken as 8 per cent by assuming its productive life of 12.5 years. Depreciation on cattle shed, stores and dairy equipments were calculated by using straight line method (Vishnoi, 2014). As per straight line method, depreciation is calculated as;

$$\text{Depreciation} = \frac{\text{Purchase Price} - \text{Junk Value}}{\text{Expected years of life}}$$

B). Dairy Incomes-

1. Dairy Gross Receipts (DGR) = Value of milk + Value of dung.
2. Dairy Net Income= Dairy Gross Receipts/Income- Dairy Gross Cost (Cost C)

3. Dairy Farm (family) Business Income (DFBI) = D.G.R. –Cost A (or) Interest on owned fixed capital+ family labour income.

4. Dairy Family Labour Income (DFLI) = D.G.R. –Cost B (or) Dairy Net Income+ Imputed value of family labour.

5. Gross Margin of milk producers= D.G.R. –Total variable cost (TVC)

6. Input-output Ratio= Gross Returns/Gross Cost

3.4.3 Labour Utilisation in Dairy Farming

To study the labour participation extent of male, female and children for both family and hired labour, actual labour time spent in various activities under milk production such as cutting and bringing of fodder and grasses, feeding of animals, cleaning of sheds, watering and bathing of animals, milking the animals and then the marketing of milk under the formal and informal milk marketing channels was calculated. The total time spent on various activities per day was converted into man equivalent days by assuming eight working hours. However, one day work of female was taken as equivalent to 0.67 man days (i.e. 2 male= 3 female) and one day work of children (both boy and girl) was considered equivalent to 0.5 man days (1 male= 2 children) (Ganga and Jain, 2012). In this way, for calculating the gender-wise labour participation in different activities of both the milk producers under formal and informal, the number of per days in various activities was considered.

3.4.4 Treatment Effect Model

For finding the various determinants of farmers' participation in formal milk market as well as for finding that whether their participation has any impact on gross income or not, treatment effect model was used. Farmers participating in formal milk market would have higher gross income if they are more efficient than farmers participating in informal milk market. In this context, coefficient on the participation i.e. dummy variable includes the effect of these unobservable characteristics in addition to measuring the effect of participation in formal milk markets. This indicates that there is a correlation between independent and dependent variables. The correlation leads to results having inconsistent and biased estimates of the coefficient of variables between participants and non-participants of farmers involved in formal milk market in the income model. By using participating Probit model, an inverse mills ratio, i.e. the ratio of the probability density function over the cumulative

distribution function, was computed for each observation and included this as an independent variable in the income model. This term corrects for possible selection bias and yield unbiased and consistent estimates in the income model. This analysis is implemented as maximum likelihood estimation as all the parameters in both models are estimated simultaneously, rather than as a two- step procedure (Warning and Key, 2002; Miyata et al., 2009; Kaur and Singla, 2018).

The equation for the study is:

$$Y_i = \alpha + \beta X_i + \mu C_i + \mu_i \quad (1)$$

$$C_i^* = \gamma_1 + \gamma_2 Z_i + e_i \quad (2)$$

$$C_i = 1 \text{ if } C_i^* > 0, \text{ otherwise } C_i = 0$$

Where Y_i is the gross revenue of the i th farmer, C_i is a dummy variable taking the value 1 if one participates in a formal milk market, and 0 if one does not participate in formal milk market. X_i is a vector of the variables believed to affect the gross revenue and μ_i is a zero mean random variable; while β measures the impact of participation in formal milk market on gross income. An OLS estimate of equation (1), is likely to be biased, because of the effects of unobservable factors. Thus, e_i (which contains within it the random unobservable factors) will be correlated with C_i . To correct for selectivity bias, equation (2) (Probit) is estimated with a formal/informal producer as a binary dependent variable (C_i) and a set of explanatory variables Z_i . As variables in Z_i will overlap with variables in X_i , therefore identification requires that there should be at least one variable in Z_i that is absent in X_i . Then, predicted values (also known as the inverse Mills ratio) from equation (2) can be used as an instrument (of C_i) in equation (1) (Greene, 2003).

3.4.5 Garrett's Ranking Technique

Garrett's ranking technique was used to rank the problems indicated by respondents regarding the production and marketing of milk under both the markets. Following this method, respondents are asked to rank all the constraints and the result of such ranking is converted into score value by using the following formula (Garrett and Woodworth, 1979):

$$\text{Per cent position} = 100 (R_{ij} - 0.5)/N_j$$

Where; R_{ij} = Rank given for the i th constraint by j th respondent

N_j = Number of constraints ranked by j th respondent

Then for each constraint, the scores of each individual are added and then total value of scores and mean values of score is calculated. The constraint having highest mean value is considered to be the most prevalent constraint.

CHAPTER 4

PROCUREMENT PROFILE OF COMPANIES UNDER FORMAL MILK MARKET

This chapter analyses the operations of three companies involved in formal milk market in Punjab viz. two cooperative companies i.e. The Punjab State Cooperative Milk Producers Federation Limited (Milkfed) and Gujarat Cooperative Milk Market Federation (GCMMF) and one producer company i.e. Baani Milk Producer Company Limited (BMPCL). The operations are studied in terms of procurement system, mode of payment, provision of credit, technical input services, determination of milk price etc.

4.1 The Punjab State Cooperative Milk Producers Federation Limited (Milkfed)

4.1.1 History of The Punjab State Cooperative Milk Producers Federation Limited (Milkfed)

The Punjab State Cooperative Milk Producers Federation Limited (Milkfed) came into existence in 1973 to boost the enterprise of dairy farming in the state. The main aim of establishment of Milkfed was to provide a lucrative milk market to milk producers by offering them remunerative prices as well as providing them technical inputs in order to intensify milk production. Besides ensuring profitable milk market to milk producers and enhancing milk production in the state, it also emphasised on the provision of quality milk and milk products to consumers at reasonable prices. Despite registration of the federation much earlier, it came into real sense in 1983 when all the milk plants of the former Punjab Dairy Development Corporation Limited were handed over to cooperative sector under operation flood programme for providing the benefits to milk producers and ensuring reasonable prices to consumers.

4.1.2 Network of Milkfed in Punjab

Presently, Milkfed has 11 milk unions (Amritsar, Bathinda, Ferozpur, Faridkot, Gurdaspur, Hoshiarpur, Jalandhar, Ludhiana, Patiala, Ropar and Sangrur) in the state but 9 milk plants as in Ferozpur and Faridkot districts, milk is procured but there are no milk plants in these districts. Its main office is in Chandigarh. Besides this, Milkfed has also established two cattle feed manufacturing plants at Khanna and Ghania Ke Banger (Batala) to meet the demand for cattle feed by milk

producers. For the provision of good quality of green fodder seed (rabi and kharif), Milkfed has established the seed farm at Bassi Pathana. Milkfed has also established the one of the most modern Frozen Semen Station at Bhattian (Khanna). Milkfed sells milk and milk products under the brand name of *Verka*.

4.1.3 Organisational Set-Up

Working on the lines of Anand pattern, there is the three tier organisational set-up; Milk Producers Cooperative Societies at the village level, Milk Unions at District Level and Milk Federation as an Apex Body at State level. At present (2016-17), Milkfed has 6777 milk producers cooperative societies at village level and 11 milk unions at district level. After procuring milk twice in a day from milk collection centres set in villages by village level cooperative societies, it is transported to chilling centres established at various locations by each district level milk union and is kept at 5⁰ centigrade. It has also set bulk milk coolers (BMCs) in various milk collection centres. Within 12 hours, milk reaches to various milk plants where the lab tests are conducted and after passing, milk is processed into various milk and milk products. After converting the milk into milk products, the products are ready for marketing (Fig: 4.2).

Figure 4.1
Organisational Structure of Milkfed in Punjab

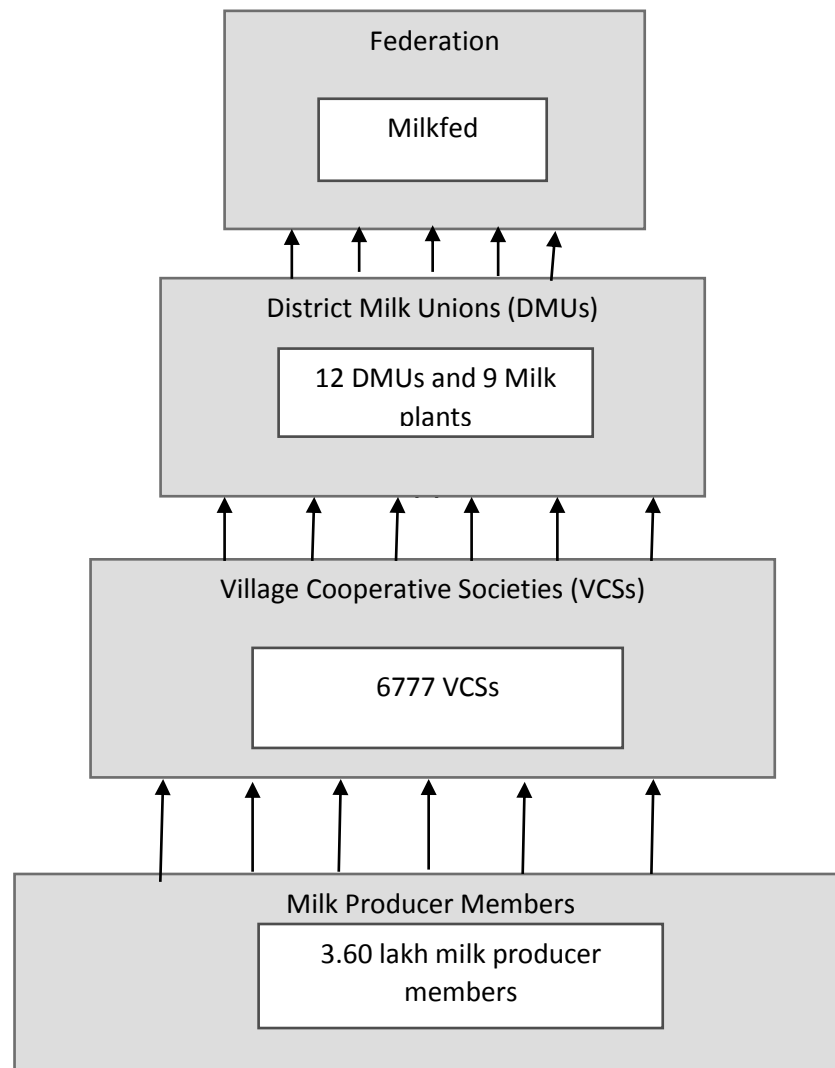
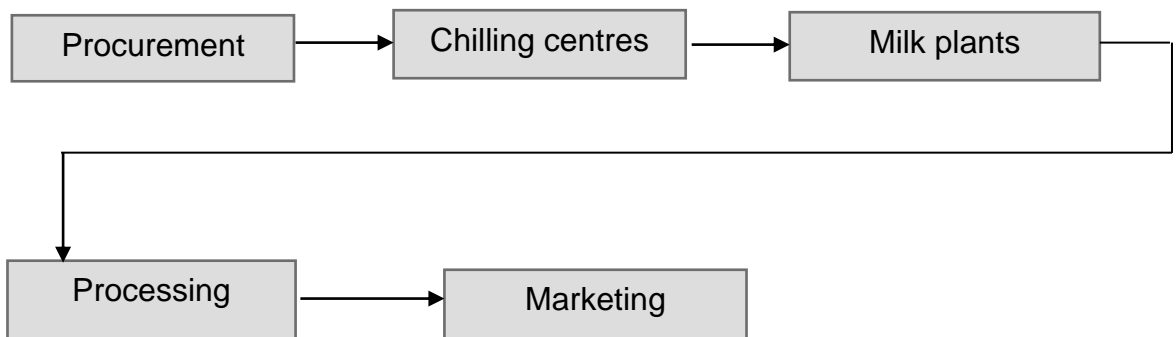


Figure 4.2
Post-procurement milk route



4.1.4 Categorization of Farmers

There are two types of dairy farmers under Milkfed; a) Commercial dairy farmers b) Small milk producers supplying milk through societies. Commercial dairy farmers are those dairy farmers who supply milk above 50 kg of milk per day. They are also known as progressive dairy farmers. On the other hand, farmers supplying less than 50 kg of milk supply through societies are known as small milk producers. For supplying milk, commercial dairy farmers have to become members of district milk unions with a membership fee of ₹ 1000. This is the nominal fee and this is for life long and after the death of a milk supplier farmer, this membership is shifted to any of his/her family member. They are given commission of 2.5 per cent of the value of milk supplied to Milkfed after every year. However, for becoming societies' member, a small milk producers have to pay ₹ 105. They are distributed the bonus from 2.5-3.0 per cent under the bonus distribution scheme. However, in general, there is no hard and fast rule for supplying milk to Milkfed. Milk producers can supply milk to Milkfed whenever they want and can discontinue to supply anytime. Further, there is no maximum or minimum limit on the amount of milk to be supplied to Milkfed.

4.1.5 Provision of Technical Input and Veterinary Services

Milkfed provides various technical input services such as better quality of green fodder seed (both rabi and kharif), cattle feed and mineral mixture. The provision of these input services is area-oriented or these are distributed zone-wise. Besides this, Milkfed also provides veterinary services, medicines, artificial insemination (AI) services, semen services etc. To progressive or commercial dairy farmers, it provides milking machines at 25-50 per cent subsidised rates.

4.1.6 Minimum Quality Standards, Determination of Milk Price, Mode of Payment

While procuring, Milkfed also sets some quality parameters of milk in terms of fat and SNF (Table 4.1). Besides this, adulteration in milk is also checked at society's level.

Table 4.1
Minimum quality standards of milk in terms of fat and SNF

Parameters	Cow milk	Buffalo milk
Fat	3.3	3.5
SNF	8.0	8.6

Photo 4.1
Fat and SNF measuring machine installed at VCS



Under Milkfed, price of milk is determined on the basis of both fat and SNF (Table 4.2). Producers are given the passbooks on which day to day fat and SNF percentage is recorded. Besides this, a small receipt is also given to milk producers. Payment to farmers is made after every 10 days on cash basis. Price of milk was found to different for buffalo milk and cow milk.

Table 4.2

Determination of milk price on the basis of fat and SNF

Fat	SNF	Price (in ₹)
Buffalo milk		
6.5	9.0	42.56
6.5	9.5	43.51
7.0	8.8	44.12
7.4	9.0	46.07
Cow milk		
3.5	8.5	28.52
3.8	8.5	29.64
3.8	8.7	30.00

Milkfed also give some incentives out of its profits. It fetches profit from two ways;

a) Commission from commission agents and b) Milk conversion.

a) Commission from Commission Agents: Milkfed distributes 2.5 per cent of commission to its commercial dairy farmers and commission agents out of total milk marketed by them.

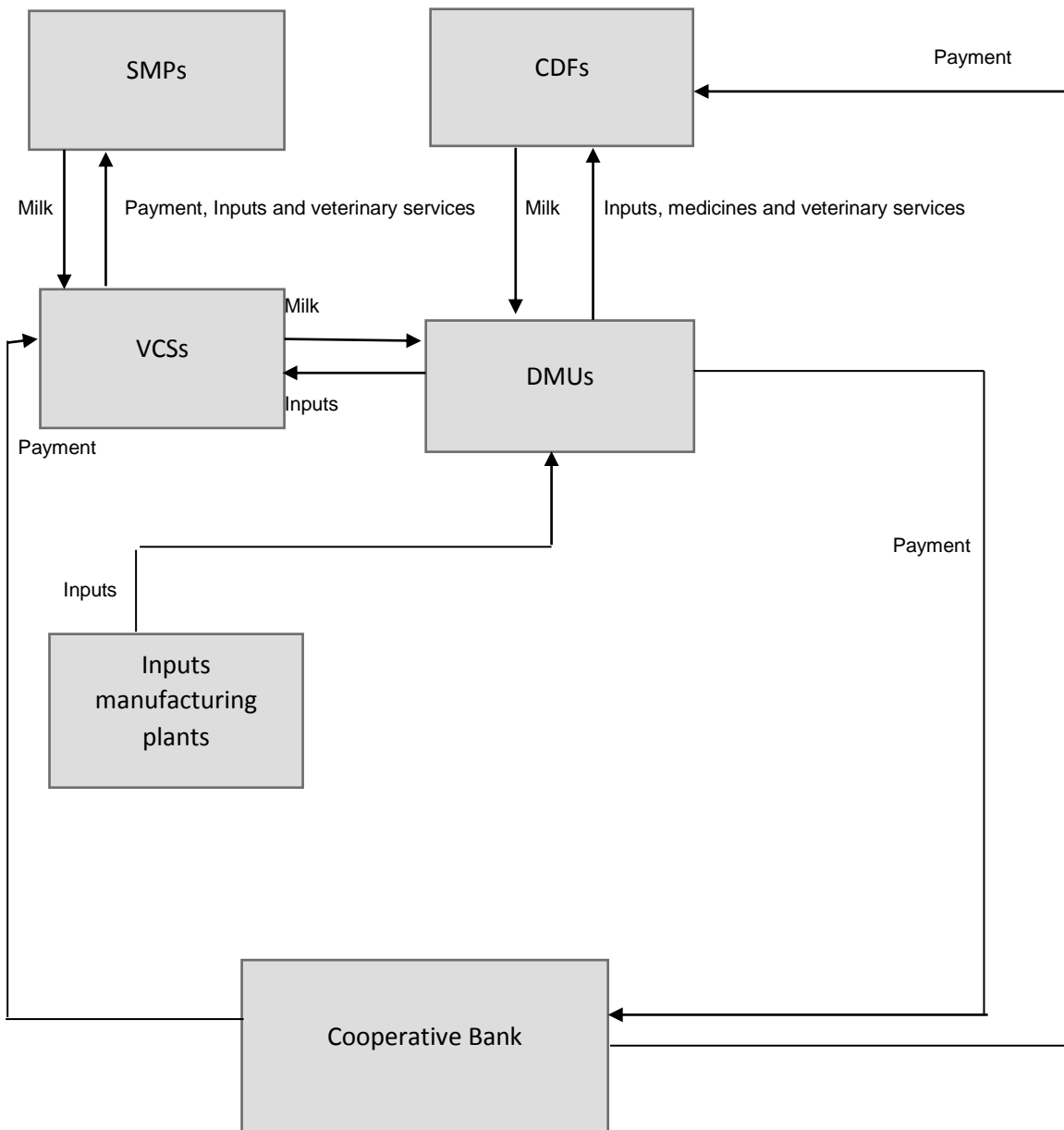
b) Milk Conversion: Milkfed creates difference in milk volume while purchasing and selling. It purchases milk from farmers in kilograms and sells the same in litres. Since a kilogram is more than a litre by 25 grams, hence on procuring 100 kg of milk, Milkfed sell it in 102.5 litres or in other words, after every 100 kg of milk, it makes profit of 2.5 litres of milk.

Out of total profit, 25 per cent is retained as reserve fund. Out of remaining 75 per cent, 65 per cent is leased out in a phased manner under bonus distribution scheme. Under bonus distribution scheme, District Milk Unions distribute 2.5-3 per cent of total bonus to progressive dairy farmers and commission agents. Remaining 10 per cent of 75 per cent is kept for education fund, cattle development fund, cooperative development fund etc. In general, out of total profit 45 per cent is distributed to farmers.

Photo 4.2
Bulk Milk Cooler (BMC) installed at VCS



Fig 4.3
Flow chart of Milkfed's procurement of milk



4.2 Gujarat Cooperative Milk Marketing Federation (GCMMF)

4.2.1 History of Gujarat Cooperative Milk Marketing Federation (GCMMF)

History of GCMMF is linked with Kaira District Cooperative Milk Producers' Union Limited (KDCMPUL). KDCMPUL started from cooperative movement in 1946. History of KDMPCUL is somehow linked with India's freedom struggle and was also inspired from freedom fight of India. During 40s, the income of most of the farmers in Kheda District was derived almost entirely from seasonal crops. The income from sale of milk was erratic. Besides this, farmers had to travel long distance for selling milk to only dairy at that time i.e. Polson dairy. Polson Dairy was locally owned dairy in Anand village of Gujarat and popularly known for butter. During First World War, the demand for milk rose quickly. As a result, there was huge exploitation of the consumers by the milk producers. Therefore in 1929, Pestanji (a Parsi) came to Anand from Bombay and established a dairy called Polson from which the milk was transported to Bombay for the British i.e. around 427 kilometres away from Anand. The government had given rights to Polson dairy in Anand to collect milk from Kaira district and sent it to Bombay. Moreover, in Kaira district, Polson dairy had the monopoly in procuring milk and transported it to Bombay under Bombay Milk Scheme in 1945.

However, During Second World War Polson dairy started exploiting milk producers in terms of providing very low price to milk producers, involvement of large number of market intermediaries and agents, delay in payments, zero profits to farmers. Apart from this, by passing a long distance, the milk used to get sour, especially in summer season. As a result, during 1945, where the fight for freedom against British rule was at its top level, the farmers from Kaira district started against these unfair trade practices of Polson Dairy. In response to this, farmers from Anand village under the leadership of Tribhuvan Das Patel met to India's freedom fighter Sardar Vallabh Bhai Patel in Mumbai who had advocated farmers' cooperatives since 1942 and took their plea. He suggested them to start revolt against Polson dairy and sell milk directly to Bombay Milk Scheme instead of Polson dairy under the cooperative society of their own. He also assigned this duty to Morarji Desai to organise the farmers and start the movement against Polson dairy. Therefore, the farmers started the revolt against Polson dairy under the headship of Tribhuvan Das Patel and started collect as well as process milk and selling directly to

Bombay. The farmers called a milk strike and not a single drop of milk was sold to Polson dairy. This strike continued for 15 days and after 15 days, the milk commissioner of Bombay (an Englishman) and his deputy visited Anand, gauged the circumstance and accepted the farmers' demand.

Consequently, this led to the formation of cooperative namely, Kaira District Cooperative Milk Producers' Union Limited (KDCMPUL) in Anand and this cooperative was registered on December 1, 1946. Tribhuvan Patel became the founder chairman of this union. This co-operative, the Kaira District Co-operative Milk Producers Union Ltd. began with just two village dairy co-operative societies and around 250 litres of milk. This cooperative was further developed by Dr. Verghese Kurien and H.M. Dalaya. The union started pasteurising milk produced by a handful of farmers for the Bombay Milk Scheme and grew to 432 farmers and around 5000 litres of milk per day by the end of 1948. This rapid growth led to problems including excess production that the Bombay Milk Scheme couldn't accommodate. To solve this issue, a plant was set up to process all that extra milk into products such as milk powder and butter. This new dairy with the milk processing plant started in October 1955, when there was a revolution in dairy technology and buffalo milk was processed to make products for the first time in the world.

During 1955, the brand '*Amul*', was also introduced for the marketing of its products range by Kaira union. *Amul* was derived from Sanskrit word '*Amulya*', which means 'precious' or 'priceless'. It is also an abbreviation for Anand Milk Union Ltd. The garage at which the milk was collected and processed is now named as *Amul Dairy 1*. *Amul's* famous slogan, *The Taste of India*, which is now a part of its logo, was created in 1994 by Shri Kanon Krishna of a Mumbai-based advertising agency called Advertising and Sales Promotion (ASP). In the successive years, *Amul* also made cheese and baby food on a large commercial scale by processing buffalo milk and hence, created a history in the world. The then Prime Minister of India, Lal Bahadur Shastri felt that the same approach should be the basis of a National Dairy Development policy. As a result, in 1965, National Dairy Development Board (NDDB) was set up on the lines of replicating the *Amul* model and Dr. Kurien was chosen to head the institution as its Chairman for replicating this model throughout the country.

This cooperative dairy soon started to spread in other neighbourhood areas of Gujarat and within a short span of five years, five other district level unions (Mehsana, Banskantha, Baroda, Sabarkantha and Surat) were established. Hence, in order to expand the market in systematic way, an apex body of these district level unions namely; Gujarat Cooperative Milk Marketing Federation was set up in 1973 and the brand name *Amul* was transferred to GCMMF. Dr. Kurien was elected as the president of Gujarat Cooperative Milk Marketing Federation (GCMMF).

4.2.2 Network of GCMMF and KDCMPUL

At present, GCMMF has 18 district milk unions;

1. Kaira District Cooperative Milk Producers' Union Ltd., Anand
2. Mehsana District Cooperative Milk Producers' Union Ltd, Mehsana
3. Sabarkantha District Cooperative Milk Producers' Union Ltd., Himatnagar
4. Banaskantha District Cooperative Milk Producers' Union Ltd., Palanpur
5. Surat District Cooperative Milk Producers' Union Ltd., Surat
6. Baroda District Cooperative Milk Producers' Union Ltd., Vadodara
7. Panchmahal District Cooperative Milk Producers' Union Ltd., Godhra
8. Valsad District Cooperative Milk Producers' Union Ltd., Valsad
9. Bharuch District Cooperative Milk Producers' Union Ltd., Bharuch
10. Ahmedabad District Cooperative Milk Producers' Union Ltd., Ahmedabad
11. Rajkot District Cooperative Milk Producers' Union Ltd., Rajkot
12. Gandhinagar District Cooperative Milk Producers' Union Ltd., Gandhinagar
13. Surendranagar District Cooperative Milk Producers' Union Ltd., Surendranagar
14. Amreli District Cooperative Milk Producers' Union Ltd., Amreli
15. Bhavnagar District Cooperative Milk Producers' Union Ltd., Bhavnagar
16. Kutch District Cooperative Milk Producers' Union Ltd., Anjar
17. Junagadh District Cooperative Milk Producers' Union Ltd., Junagadh
18. Porbandar District Cooperative Milk Producers' Union Ltd, Porbandar

Network of Kaira District Milk Producers Cooperative Union Ltd.

1. Amul Kheda Dairy, Kheda, Gujarat
2. Amul Dairy, Anand, Gujarat
3. Amul Food Complex, Mogar, Anand, Gujarat
4. Amul Food Plant, Thane, Maharashtra

5. Amul Food Plant, Vadodara, Gujarat
6. Amul Pune Dairy, Rajgurunagar, Pune, Maharashtra
7. Amul Virar Dairy, Virar, Thane, Maharashtra
8. Amul Batala Dairy, Gurdaspur, Punjab
9. Amul Khamanon Dairy, Fatehgarh Sahib, Punjab
10. Amul Sikkim Dairy, Gangtok, Sikkim
11. Amul Waterloo Dairy, New York, U.S.A.
12. Amul Dollon Dairy, West Bengal
13. Amul Jayrambati Dairy, Bankura, West Bengal
14. Amul Kolkata Dairy, Hooghly, West Bengal
15. Amul Siliguri Dairy, West Bengal

It has 4 cattle feed plants also namely;

1. Amul Feed Plant, Erode, Tamil Nadu
2. Amul Feed Plant, Jayrambati, Bankura, West Bengal
3. Amul Cattle Feed Plant, Kanjari, Anand, Gujarat
4. Amul Cattle Feed Plant, Kapadvanj, Kheda, Gujarat

4.2.3 Organisational Set-Up

The Amul model or Anand pattern is three-tier structure. It consists of Dairy Cooperative Societies (DCSs) at village level affiliated from milk unions at district level and these unions are further federated into a milk federation at a state level (GCMMF). Firstly, milk is collected at the VCSs level and after that Milk processing is conducted at the DMU and marketing of milk and milk products at the state federation. This model was first introduced at Amul in Gujarat and subsequently, replicated all over the country under the Operation Flood Programme. Hence, it is known as the *Amul Model* or *Anand Pattern* of Dairy Cooperatives.

- a. Village Cooperative Societies:** The main task of cooperative societies is to collect milk twice a day from milk collection centers in villages. For the establishment of VCS in a village, firstly, an eleven member management committee is made as the VCS is governed by elected milk producers themselves. Any person from the village can be the member of this committee who has at least one milch animal and is also be able to supply at least one kg of milk per day to VCS. Out of 11 member committee, one person is elected as

chairperson of the committee and this is elected with the agreement of all the members. He performs various duties such as collection of milk from milk producers, generation of payment of milk on the basis of quantity as well as quality, selling of raw milk to local consumers, transportation of collected milk to district milk unions etc. After procuring milk from milk producers, it is chilled in Bulk Milk Coolers (BMC) installed in every VCS at 4⁰ C. In case, if any of the VCSs is not installed BMC, then milk is transported to chilling centers.

- b. District Milk Unions:** These come under the second tier of Amul model. These are governed by the Board of Directors consisting of some representative of village societies. These have the membership of VCSs. These also perform various tasks such as procurement of milk from VCSs, processing of milk into various milk products, fixation of price on the basis of fat and SNF, making payment for milk to milk producers, provision of technical input and veterinary services to milk producers, organization of training for milk producers regarding feeding practices, health care and clean milk production, arrangement of transportation facility for procuring milk from VCSs to milk unions etc.
- c. State Cooperative Milk Federation:** This is the apex body and comes under third tier of Anand Pattern. This has the membership of all district milk unions and is governed by a Board of Directors consisting of one elected representative of each milk union. The main task of this federation is the marketing of processed milk and milk products, maintaining brand for milk and milk products, arranging transportation for the marketing of milk products, maintaining a balance of milk among all the milk unions by lease out the milk from milk surplus unions to supply milk deficit unions etc.

4.2.4 Operation of GCMMF in Punjab

KDCMPUL started its operation in November, 2015 in Batala, Gurdaspur. Firstly, it started procuring milk from Gurdaspur district. Within 2 years, it also expanded the procurement from Amritsar and Tarn Taran districts. In Punjab, packed milk, butter milk and dahi are processed. During October 2015, another new plant in Khamanon, Fatehgarh Sahib was also established and therefore, milk is also procured from Fatehgarh Sahib district. Here, along with packed milk, butter milk

and dahi, paneer is also processed. In Batala milk plant, there are total 14865 milk suppliers and around 10600 supply milk regularly irrespective of seasons.

4.2.5 Minimum Quality Standards, Determination of Milk Price, Mode of Payment

Price is determined on the basis of both fat and SNF. Milko Screen machine is used for determining the content of fat and SNF from milk. A small sample of milk is taken and is tested for quality in terms of fat, SNF and adulteration. Indifoss brand of Milk Screen is equipped at every VCS and it is imported from Denmark.

Photo 4.3

Secretary of VCS taking the sample of milk for measuring fat and SNF



The present price of buffalo and cow milk is as follows;

Table 4.3

Minimum quality parameters and price of milk on the basis of fat and SNF

Particulars	Fat (%)	SNF (%)	Price (₹)
Cow milk			
Minimum	3.0	8.0	24.67
Maximum	5.0	8.8	31.97
Buffalo milk			
Minimum	5.1	8.6	30.88
Maximum	10.0	9.0	62.50

Apart from this, Automatic Milk Collection Unit (AMCU) is also equipped at each VCS for bringing transparency in the weight of milk. On the basis of both Milko Screen (for measurement of quality) as well as Automatic Milk Collection Unit (for measurement of quantity), receipt of payment is made and given to milk producers. The operations regarding the amount payable to milk producers are carried out by Bank Coordinate. Price of milk does not fluctuate seasonally.

Photo 4.4

Farmer pouring the milk in big utensils of VCS for weighting



Photo 4.5

Pouring milk into Bulk Milk Coolers (BMC) for chilling after collection



Payment to milk producers is made after every three days. It is transferred into their bank accounts of either HDFC Bank or Corporation Bank. Therefore, every milk producer has to open their accounts in one of these two banks. Except bank holiday, there is no delay in payment. In case, if a milk producer is not able to open his/her account in one of these two banks for some period, then, cash payment is made to those milk producer by VCSs after every 10 days. At the end of the each year, a particular share of the VCS's profits is distributed among all the members based on the quantity of milk sold. Above 95 per cent of the bank accounts are opened in the name of women as women are considered the leading employees of dairy farming.

4.2.6 Provision of Technical Input and Veterinary Services

GCMMF also provides various types of cattle feed. The various types of these cattle feeds and their respective price at which these are sold to milk producers are as follows;

Photo 4.6
Feeding inputs provided by GCMMF to farmers



Table 4.4
Price of various types of cattle feeds (in ₹)

Type	Price/50kg
Buffalo special	1300
Nutri hi five powder	1340
Nutri gold	1000
Nutri rich	1200

All these feeds are purchased by milk unions at ₹ 34/50kg lesser than the price at which these are sold to milk producers. As a consequence, milk union earns a margin of ₹ 34/50kg.

Veterinary services are provided under Amul Research and Development Association (ARDA). At present, ARDA is considered the Center for Excellence for Research and Development in breed development and health care.

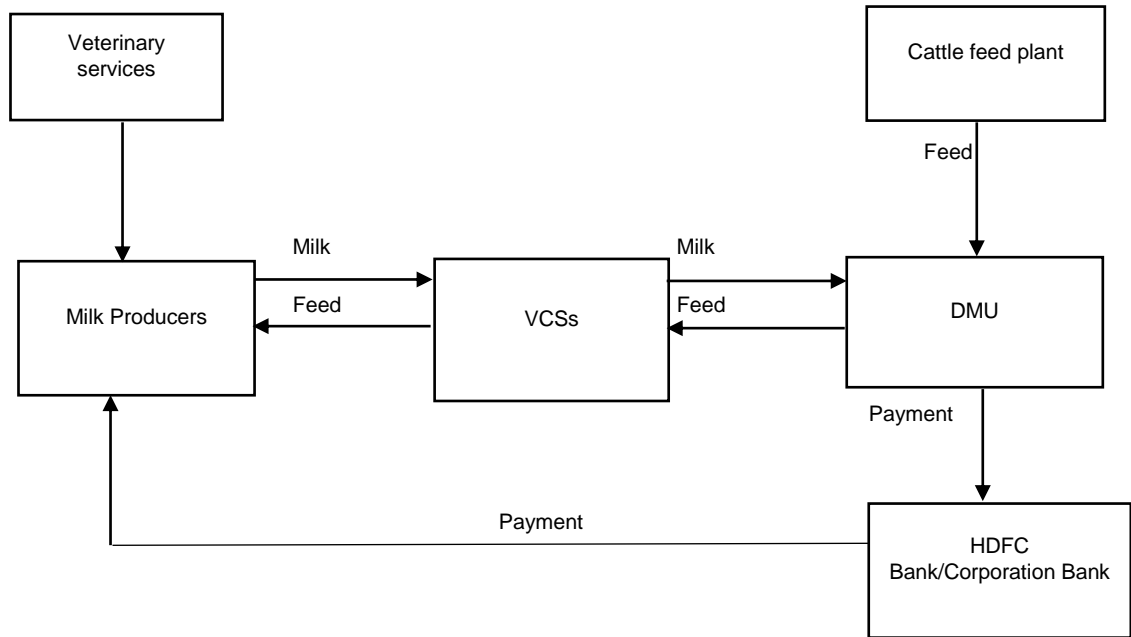
Presently, KDCMPUL, Batala has one veterinary doctor and one assistant. Now, they are giving training to 30 village cooperative societies. Hence, they go to one village once in a month. Mainly, two types of veterinary services are provided by this union;

- a) **Regular Camps:** This camp is organized once in a month and is conducted in 30 villages. The coupon is given to trainees and the fee of this coupon is ₹ 100. The coupon is made by the doctor and assistant themselves. In these camps, the major emphasis is laid on health care, feeding practices etc.
- b) **Special Visits at Home:** In case, if the milk producer feels the need for treatment of his/her animal, then special visits are made by the doctor and assistant. The fee of this treatment is ₹ 400. In this case, a milk producer has to generate a slip of ₹ 400 from Village Cooperative Society (VCS). Milk producers hand over it to veterinary specialist while availing treatment facilities. For availing Artificial Insemination (AI) services, a coupon of ₹ 150 is generated through VCSs. It also provides vaccination services against Foot and Mouth Disease (FMD), Haemorrhagic Septicemia (HS) and Black Quarter (BQ).

At present, this section has decided to give training to total 30 boys from 30 different village at ARDA so that the boys can provide their services to all milk producers at their villages. At present, veterinary is running through losses as it

has to bear the charges of costly medicines and transportation. AI section is running in no profit, no loss. Besides this, the union also launches training and extension programmes in villages regarding feeding practices, clean milk production and health care. The duration of these programmes is around 15-20 days.

Fig 4.4
Flow chart of milk procurement system of GCMMF



4.3 Baani Milk Producer Company Limited (BMPCL)

4.3.1 History of Baani Milk Producer Company Limited

Baani Milk Producer Company was incorporated in 11 August, 2014 with its head office in Patiala, Punjab under the sub-section 2 of section 7 of companies act, 2013. The main objective of the BMPCL was to increase the milk production of its member producers, decreasing the cost of milk production and providing them better services and competitive price of milk. It came into operation w.e.f. November 6, 2014 as an independent organization to develop dairy industry in India for improving the livelihoods of marginal farmers and empowering women milk producers in Punjab. Currently, it is procuring milk from eight districts of Punjab viz. Bathinda, Mansa, Barnala, Faridkot, Faridkot, Moga, Sri Muktsar Sahib and Sangrur. During establishment, the company had 5000 member producers and at present (10 January, 2018), it has increased to 20000 with a coverage area of about 1181 villages. There are 13 milk chilling centres of company.

4.3.2 Membership Procedure

For selling milk to BMPCL, a farmer has to become its member firstly by applying its membership form. For taking membership, a candidate must be above 18 years and he/she must possess at least one or above milch animals. Further, after accepting the terms and conditions of company, a milk producer has to fill the registration form. The fee of this form is ₹ 200 for males and ₹ 150 for females. The language of this form is in Punjabi. Hence, in this way, only member producers can sell milk to BMPCL. For membership, a producer must have unique identification card and a bank account so that payment can be transfer in their bank accounts. After the due approval of the members of board of company, a 16 digit unique code is issued to member producer and the date of approval is considered as the beginning date of membership.

For continuing membership, it is required for the member producers to sell milk at least 200 days with a minimum quantity of 500 litres per annum. Besides this, the lean to flush ratio of milk supplied to company must be 1:3 where the lean months are June to September in which the lactation period of milch animals ends and dry period starts and flush months are December to March. The remaining four months i.e. April-May and October-November are identified as normal

months. If in case, a producer fails to follow this condition in a year, then in the next financial year, a letter is sent to him/her in which he/she is asked the reasons for not fulfilling this conditions. If a producer wants to continue the membership with company then, by mentioning the genuine reasons, he can continue the membership for the next year as well. For becoming the member producer, a producer has to take at least 5 shares of company and each share is of ₹ 100 and thereby, a producer has to pay ₹ 500 in term of shares. The company also gives 8 per cent return on the value of share capital to its member producers.

4.3.3 Categorisation of Farmers

The company has identified its member producers in three categories on the basis of quantity of milk supplied to company, number of days in which milk is supplied to company and number of shares in company. The categorisation is as follows;

Table 4.5

Categorisation of dairy farmers on the basis of number of days milk supplied and quantity of milk supplied in a year

Category	Minimum no. of days in a year in which milk is supplied to company	Minimum quantity of milk supplied to company in a year	Lean to flush ratio	Minimum value of shares in company
A	300 and above days	7000 ltr. And above	1:3	70 shares (₹ 7000)
B	Min. 269 days to max. 299 days	Min. 2500 ltr. and max. 6999 ltr.	1:3	25 shares (₹ 2500)
C	Min. 200 days to max. 268 days	Min. 500 ltr. To max. 2499 ltr.	1:3	5 shares (₹ 500)

The membership of producers with company is growing at 31 per cent per annum.

4.3.4 Minimum Quality Standards, Determination of Price of Milk and Mode of Payment

There are some quality parameters on the basis of fat and SNF of milk also below which milk is not accepted (Table 4.6).

Table 4.6
Minimum quality standards of milk on the basis of fat and SNF

Particular	Fat	SNF
Cow Milk	3.0	8.0
Buffalo Milk	4.0	8.6

The price of milk is determined on the basis of fat and Solid Not Fat (SNF). BMPCL always follows market price of fat and SNF (Table 4.7). It considers its price as competitive price with Milkfed and Gujarat Cooperative Milk Marketing Federation (GCMMF). The payment of milk is transferred into the accounts of member producers and is made after every 10 days. Milk is procured twice a day and it is collected from a particular location in a village.

Table 4.7
Determination of price on the basis of fat and SNF (in ₹)

Particular	Fat	SNF	Price
Cow milk	3.7	8.0	23.67
Buffalo milk	7.4	8.9	39.03

4.3.5 Provision of Technical Input, Veterinary and Training as well as Extension Services

BMPCL also provides two types of cattle feed and one type of mineral mixture to the farmers. Prices of these various kinds of feeds provided by company to its member producers are as follows;

Table 4.8
Price of various input services provided by BMPCL (in ₹)

Type	Price
Baani Feed	895/50 kg
Baani Feed Gold	1095/50 kg
Baani Mineral Mixture	100/kg

It involves third party namely, Kansal Feed Industries Pvt. Ltd., Khanna for the manufacturing of all types of feeds. However, it is not compulsory for the member producers to purchase these inputs from company. They can purchase any other kind of the same from the market also. The payment for these inputs is not paid in cash by the farmers rather, it is deducted while making him/her payment of milk. The company also launches three types of training and extension programmes to aware the member producers regarding better milk production approaches through the involvement of Non-Governmental Organisations (NGOs). Each programme is organised once in a year in each village. These three types of programmes are Clean Milk Production Programme (CMPP), Women Awareness Programme (WAP) and Producer Awareness Programme (PAP). The company has not started providing any kind of veterinary and credit facilities yet.

Photo 4.7

Training and extension programmes launched by Bani Milk Producer Company Limited (BMPCL)

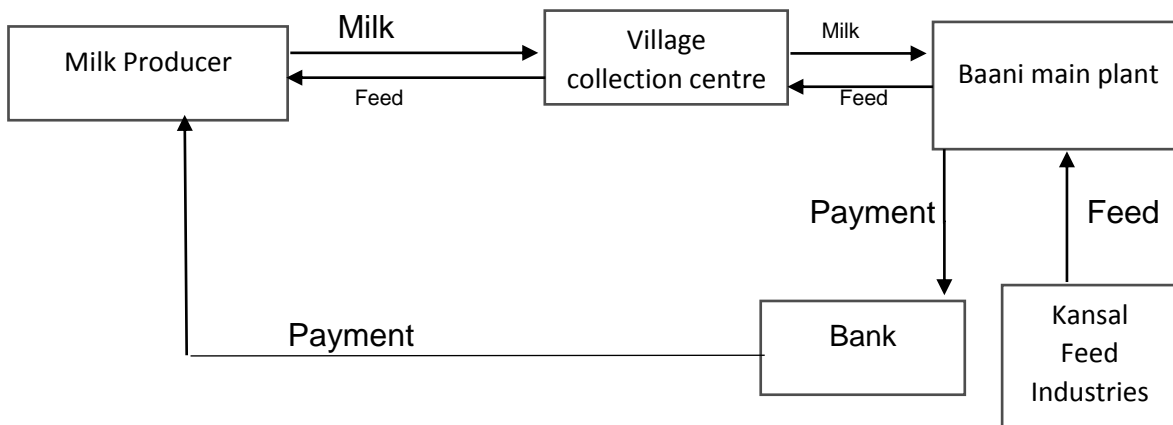


4.3.6 Marketing of Milk and Milk Products

After procuring milk, it is kept and chilled below 4°C. The milk products processed by the company are packaged milk, desi ghee, dahi and lassi. The remaining raw milk is sold to Mother Dairy, New Delhi.

Fig 4.5

Flow diagram of BMPCL milk procurement system



4.3 Summary

In the end, it may be concluded that in case of all the three firms, price is determined on the basis of fat and SNF. All the three firms procure milk from a particular milk collection points set in villages and milk is procured twice a day. Besides procuring milk, all the three firms also provide technical input services to farmers and amount payable for these services is deducted from the payment made to farmers for milk sale. Milked categorizes farmers in commercial dairy farmers (selling milk above 50 kg per day) and small milk producers (selling milk less than 50 kg per day). GCMMF does not categorize farmers on the basis of milk supplied. However, BMPCL, categorize farmers into three categories viz. category A, category B and category C on the basis of number of days and quantity of milk supplied in a year.

CHAPTER 5

SOCIO-ECONOMIC CHARACTERISTICS OF FARMERS PARTICIPATING IN FORMAL AND INFORMAL MILK MARKETS IN PUNJAB

This chapter aims at finding whether there is any difference between the farmers participating in formal as well as informal milk markets.

5.1 The Punjab State Cooperative Milk Producers Federation Limited (Milkfed)

5.1.1 Category-Wise Distribution of Farmers and Land Size

Among the various categories of member farmers, the largest proportion was of landless and semi-medium farmers (24 per cent each), followed by marginal farmers (17 per cent) and lowest proportion was of large farmers (9 per cent) as is explained in Figure 5.1. However, in case of non-member farmers, the landless farmers were found to be 31 per cent. Since, some channels in informal market provides the facility of advance payment or loan, and most of the landless farmers as well as marginal farmers were found to be resource-poor farmers. Therefore, for availing the facility of loan or advance payment, the number of landless farmers was found to be more in case of informal market as against formal milk market. The same reason was also found in case of small farmers. However, the number of large farmers was found to be equal in case of formal as well as informal milk market (9 per cent). Since, most of the large farmers were mainly dependent upon crop cultivation and very less farmers were actively participating in this allied enterprise. Therefore, the number of large farmers was found to be very less in case of member as well as non-member farmers. The number of medium farmers in case of member and non-member farmers was found to be 14 per cent and 12 per cent respectively. In case of marginal and semi-medium farmers, the number of member farmers was relatively high as compared to non-member farmers.

The member farmers had an average land ownership of 10.88 acre as against 9.22 acre in case of non-member farmers. Land ownership of small and semi-medium farmers was found to be higher in case of non-member farmers while in case of medium and large farmers, land ownership was found to be more in case of member farmers as compared to non-member farmers (Table 5.1).

Fig 5.1

Category-wise distribution of member and non-member farmers associated with Milkfed

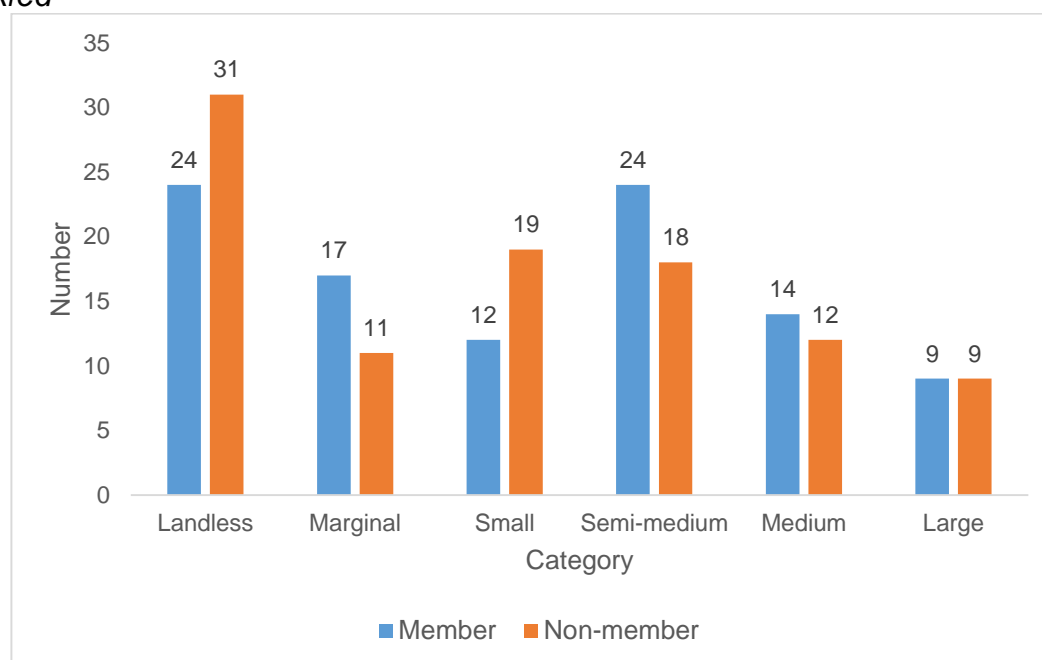


Table 5.1

Category-wise landholding details of member and non-member farmers of Milkfed (in acres)

Category	Owned land	Leased-in land	Leased-out land	Operational landholding
Member				
Marginal	6.01	-	4.47	1.54
Small	3.9	0.17	-	4.1
Semi-medium	6.52	1.34	-	7.85
Medium	10.07	6.21	0.57	15.71
Large	18.34	23.67	3.89	38.11
Overall	8.05	4.4	1.57	10.88
Non-member				
Marginal	3.46	0.18	2.09	1.55
Small	4.92	0.11	0.21	4.82
Semi-medium	8	0.33	0.44	7.89
Medium	10.92	4.17	0.34	14.75
Large	22.33	8.11	0.89	29.55
Overall	8.67	1.93	0.68	9.92

Table 5.2 represents the cropping pattern of member farmers of Milkfed. In overall, GCA and NSA were calculated to be 23.79 acres and 10.88 acres respectively. Cropping intensity was worked out to be 218.65. The highest percentage of GCA was found under rice, followed by wheat, fodder and potato. However, among marginal farmers, the percentage area under fodder was worked out to highest (65.52 per cent) and with the increase in GCA, the area under fodder tended to decline and that of rice tended to rise. The reason behind this is that the most of the area under fodder is grown for domestic purposes and the other crops are grown for commercial purposes. Hence, the area under fodder depends upon the herd size. It was found that although, herd size tends to increase with increase in land size but not in the same proportion. This is due to the reason that category-wise wide fluctuations were found in case of area under fodder to GCA

Table 5.2
Category-wise cropping pattern of member farmers of Milkfed (in acres)

Crop	Marginal	Small	Semi-medium	Medium	Large	Overall
Wheat	0.34 (10.66)	2.83 (33.34)	6.19 (37.09)	11 (33.83)	27.72 (35.77)	8.7 (36.57)
Barley	-	-	0.04 (0.24)	0.21 (0.65)	1.44 (1.86)	0.22 (0.92)
Potato	0.12 (3.76)	0.17 (1.99)	0.35 (2.10)	3.08 (9.47)	7.28 (9.39)	1.55 (6.52)
Fodder	2.09 (65.52)	1.94 (22.72)	2.52 (15.10)	2.55 (7.84)	4 (5.16)	2.42 (10.17)
Vegetables	0.1 (3.13)	0.5 (5.85)	0.5 (3.00)	0.43 (1.32)	-	1.16 (4.88)
Rice	0.34 (0.34)	3 (35.13)	6.13 (36.73)	13.64 (41.94)	33.44 (43.15)	8.97 (37.70)
Maize	-	0.13 (1.57)	0.21 (1.26)	0.5 (1.54)	1.45 (1.87)	0.29 (1.22)
Moong	-	0.04 (0.47)	0.15 (0.90)	-	0.33 (0.43)	0.09 (0.38)
Sugarcane	0.08 (2.51)	-	0.32 (1.92)	0.82 (2.52)	0.84 (1.08)	0.1 (0.42)
Mint	0.12 (3.76)	-	0.13 (0.78)	-	0.78 (1.01)	0.16 (0.67)
Perennial	-	-	0.15 (0.90)	0.29 (0.89)	0.22 (0.28)	0.13 (0.55)
GCA	3.19	8.54	16.69	32.52	77.5	23.79
NSA	1.54	4.1	7.85	15.71	38.11	10.88
Cropping intensity	207.14	208.29	212.61	207.00	203.36	218.65

Note: Figures in the parentheses indicate the percentage of the respective crop to GCA.

Table 5.3 explains the category-wise cropping pattern of non-member farmers. It is clear that as the landholding size increases, percentage area under fodder to GCA tends to decline sharply. This is due to the fact that, although with increase in landholding size, the herd size also increases but not proportionately. Therefore, the percentage area under fodder had a negative relationship with landholding size while the commercial crops had positive relationship with landholding size. In overall, highest area was found under rice (39.02 per cent), followed by wheat (32.57 per cent to) potato (9.53 per cent), fodder (9.25 per cent), vegetables (5.17 per cent) etc. Cropping intensity was found to be 212.82. Hence, around 72 per cent of GCA was found under wheat and rice.

Table 5.3
Category-wise cropping pattern of non-member farmers of Milkfed (in acres)

Crop	Marginal	Small	Semi-medium	Medium	Large	Overall
Wheat	0.59 (19.16)	3.42 (35.22)	4.5 (27.37)	10.5 (33.69)	21.44 (34.64)	6.87 (32.57)
Barley	-	-	-	-	1.2 (1.94)	0.02 (0.09)
Potato	-	0.23 (2.37)	1.88 (11.44)	2.5 (8.02)	6.5 (10.50)	2.01 (9.53)
Fodder	1.58 (51.30)	1.64 (16.89)	1.94 (11.80)	2 (6.42)	2.44 (3.94)	1.95 (9.25)
Vegetables	0.32 (10.39)	0.89 (9.17)	1.06 (6.45)	2.17 (6.96)	1.11 (1.79)	1.09 (5.17)
Rice	0.59 (19.16)	3.42 (35.22)	6.47 (39.36)	12.33 (39.56)	25.77 (41.63)	8.23 (39.02)
Maize	-	0.11 (1.13)	0.34 (2.07)	0.42 (1.35)	1.33 (2.15)	0.36 (1.71)
Moong	-	-	0.19 (1.16)	0.25 (0.80)	-	0.09 (0.43)
Sugarcane	-	-	-	0.58 (1.86)	2.11 (3.41)	0.38 (1.80)
Mint	-	-	0.06 (0.36)	0.42 (1.35)	-	0.09 (0.43)
GCA	3.08	9.71	16.44	31.17	61.9	21.09
NSA	1.55	4.82	7.89	14.75	29.56	9.91
Cropping intensity	198.71	201.45	208.36	211.32	209.40	212.82

Note: Figures in the parentheses indicate the percentage of the respective crop to GCA.

5.1.2 Education

In case of education, 9 per cent of the member farmers were found to illiterate as against 20 in case of non-member farmers. The proportion of primary and middle pass farmers was higher in case of non-member farmers whereas metric and higher secondary pass farmers were found to more in case of member farmers as compared to non-member farmers. The percentage of graduates and above was same among member as well as non-member farmers. Therefore, the overall level of education was found to be higher among member farmers as compared to non-member farmers (Table 5.4). Years of schooling attended by member farmers (9.88 years) were higher than non-member farmers (9.04 years) (Table 5.5).

Table 5.4

Category-wise literacy level among member and non-member farmers associated with Milkfed

Category	Illiterate	Up to primary	Up to middle	Up to metric	Up to higher secondary	Graduates and above
Land size (Member farmers)						
Landless	2	3	4	10	4	1
Marginal	1	3	2	7	4	-
Small	2	1	3	3	3	-
Semi-medium	-	-	4	4	13	3
Medium	3	2	1	3	3	2
Large	1	-	-	3	3	2
Overall	9	9	14	30	30	8
Non-member						
Landless	11	7	4	5	2	2
Marginal	1	1	1	2	5	1
Small	4	4	5	3	2	1
Semi-medium	2	1	3	5	5	2
Medium	1	2	1	5	2	1
Large	1	2	2	1	2	1
Overall	20	17	16	21	18	8

Table 5.5

Category-wise average number of education years among member and non-member farmers of Milkfed

Category	Member farmers	Non-members
Landless	8.58	8.53
Marginal	9.98	9.34
Small	9.24	9.18
Semi-medium	10.78	9.88
Medium	9.54	8.66
Large	10.45	9.44
Overall	9.88	9.04

5.1.3 Age and Family Structure

Size of family plays an important role in labour intensive unskilled activities such as dairy. The family size of member and non-member farmers was found to be 5.05 and 5.19 respectively. The average family size of member farmers was 4.38 in case of landless farmers, 5.47 in case of marginal farmers, 5.26 in case of small farmers, 4.83 in case of semi-medium farmers, 4.92 in case of medium farmers and 6.56 in case of large farmers as compared to 5.35, 5.09, 4.64, 4.89, 5.5 and 6.11 in case of landless, marginal, small, semi-medium, medium and large farmers respectively. Thus, family size of landless, semi-medium and medium farmers was found to be less in case of member farmers while among other categories such as marginal, small and large farmers, it was found to be more than non-member farmers (Table 5.6). Average age of member farmers was worked out to be 47.49 years as compared to 48.53 years in case of non-member farmers. The landless and large member farmers were found to be younger than non-member farmers. However, marginal, small, semi-medium and medium member farmers were elder than non-member farmers.

Table 5.6

Category-wise family structure and age of the member and non-member farmers associated with Milkfed

Category	Male	Female	Children	Total	Age
Members					
Landless	1.79	1.63	0.96	4.38	45.67
Marginal	2.29	2.06	1.12	5.47	50.06
Small	1.92	1.84	1.5	5.26	51.34
Semi-medium	1.96	1.83	1.04	4.83	46.71
Medium	2.21	2	0.71	4.92	50.21
Large	2.56	2.22	1.78	6.56	40.23
Overall	2.06	1.88	1.11	5.05	47.49
Non-member					
Landless	2.29	2.29	0.77	5.35	51.32
Marginal	2.18	2.18	0.73	5.09	47
Small	2.16	1.9	0.58	4.64	49.63
Semi-medium	2.28	2.11	0.5	4.89	44.84
Medium	2	1.83	1.67	5.5	46.33
Large	2.44	2.67	1	6.11	48.78
Overall	2.23	2.15	0.81	5.19	48.53

5.1.4 Herd Size

Among the various species, buffaloes were reared by 72 per cent of member farmers as against 60 per cent in case of non-member farmers, whereas crossbred cattles were possessed by 39 per cent of the member farmers. However, these were owned by just 16 per cent of the non-member farmers. Similarly, local cows were owned by 30 per cent of the farmers while in case of non-member farmers, these were owned by 33 per cent of the farmers. Further, among all the three species, male young stock was found to be very less as compared to female young stock as well heifers among both the farmers. Similarly, in case of local cows, bullocks were also found to be less in case of member farmers as compared to non-member farmers (Table 5.7 and 5.8).

Table 5.7

Number of member farmers possessing various species of animals of Milkfed

Species	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Buffaloes	13	12	8	22	9	8	72
Heifer	5	4	4	12	6	3	34
Female young stock	7	9	6	18	8	7	55
Male young stock	2	5	3	12	4	1	27
Bullock	2	-	1	2	-	2	7
Crossbred cattles	9	7	7	6	5	5	39
Heifer	3	3	2	5	1	3	17
Female young stock	6	4	4	3	3	5	25
Male young stock	1	3	1	2	-	2	9
Bullock	2	2	2	1	1	2	10
Local cattles	6	4	4	5	9	2	30
Heifer	2	3	4	1	5	2	17
Female young stock	6	2	3	2	5	1	19
Male young stock	4	-	-	1	1	1	7
Bullock	7	2	-	3	2	2	16

Table 5.8

Number of farmers possessing various species of animals of non-member farmers of Milkfed

Species	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Buffaloes	19	7	13	16	8	7	60
Heifer	7	2	7	9	6	4	35
Female young stock	7	3	1	4	6	4	25
Male young stock	1	-	3	4	-	1	9
Bullock	-	-	-	2	-	-	2
Crossbred cattles	2	1	4	4	3	2	16
Heifer	1	-	1	2	1	-	5
Female young stock	-	1	1	2	3	2	9
Male young stock	-	-	1	1	-	-	2
Bullock	1	-	1	2	1	-	5
Local cattles	13	5	6	5	3	1	33
Heifer	7	-	2	1	2	-	12
Female young stock	3	-	1	2	-	-	6
Male young stock	5	-	-	-	-	-	5
Bullock	11	5	11	4	3	-	34

In case of average number of livestock details, the average number of buffaloes was turned out to be 2.66 in case of member farmers as against 2.01 in case of non-member farmers. Average number of crossbred cow per farmer was worked out to be 1.25 while in case of non-member farmers, it was found to be 0.38. Average number of local cows was calculated to be 0.81 and 0.78 in case of member and non-member farmers respectively. However, average number of local cow bullock was turned out to be more than double in case of non-member farmers due to

bringing fodder from fields. Hence, the average number of buffaloes as well as crossbred cattles were turned out to be more in case of member farmers whereas in case of local cows, not much difference was found between both the farmers (Table 5.9 and 5.10).

Table 5.9

Category-wise average number of livestock details of member farmers of Milkfed

Species	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Buffaloes	1.75	2.47	2.08	3.42	2.07	5.12	2.66
Heifer	0.38	0.3	0.42	0.67	0.57	0.67	0.49
Female young stock	1.58	1.18	0.75	1.38	0.93	1.45	1.02
Male young stock	0.08	0.29	0.25	0.58	0.28	0.22	0.3
Bullock	0.08	-	0.08	0.08	-	0.23	0.07
Crossbred cattles	1.04	1.47	1.58	0.88	0.78	2.67	1.25
Heifer	1.16	0.30	0.17	0.25	0.07	0.67	0.24
Female young stock	0.38	0.41	0.5	0.25	0.28	1.44	0.45
Male young stock	0.04	0.24	0.08	0.17	-	0.45	0.14
Bullock	0.08	0.12	0.17	0.04	0.07	0.22	0.1
Local cattles	0.5	0.59	0.92	0.58	1.5	1.44	0.81
Heifer	0.13	0.24	0.33	0.08	0.36	0.34	0.21
Female young stock	0.54	0.12	0.42	0.42	0.17	0.33	0.38
Male young stock	0.21	-	-	0.04	0.07	0.11	0.08
Bullock	0.29	0.12	-	0.13	0.14	0.22	0.16

Table 5.10

Category-wise average number of livestock details of non-member farmers of Milkfed

Species	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Buffaloes	1.23	1.90	2.42	2.45	2.5	2.45	2.01
Heifer	0.23	0.18	0.47	0.5	0.58	0.78	0.41
Female young stock	0.26	0.27	0.11	0.28	0.67	0.56	0.31
Male young stock	0.03	-	0.16	0.23	-	0.11	0.09
Bullock	-	-	-	0.12	-	-	0.02
Crossbred cattles	0.13	0.18	0.37	0.72	0.58	0.56	0.38
Heifer	0.03	-	0.05	0.11	0.08	-	0.05
Female young stock	-	0.09	0.08	0.11	0.33	0.22	0.1
Male young stock	-	-	0.05	0.06	-	-	0.02
Bullock	0.03	-	0.05	0.11	0.08	-	0.05
Local cattles	1.13	0.82	0.89	0.5	0.5	0.22	0.78
Heifer	0.22	-	0.11	0.11	0.25	-	0.14
Female young stock	1	-	0.12	0.11	-	-	0.07
Male young stock	0.16	-	-	-	-	-	0.05
Bullock	0.35	0.45	0.57	0.24	0.25	-	0.34

5.1.5 Farm and Livestock Assets

In case of member farmers, tractor was possessed by 50 per cent of the farmers as against 48 per cent of the non-member farmers. However, trolley was owned by 30 per cent of the member farmers while in case of non-member farmers, 32 per cent of the non-member farmers possessed the same. Combine was possessed by 10 per cent of the member farmers as against 6 per cent in case of non-member farmers. Thresher was possessed by 2 per cent of the member as well as non-

member farmers each. Rotavator was possessed by 12 per cent of member farmers whereas 14 per cent of the non-member farmers. However, laser land leveller was possessed by just 2 per cent of the non-member farmers as compared to 12 per cent of the member farmers. Milking machine was possessed by 18 per cent of the member farmers and 12 per cent of the non-member farmers. In case of type of cattle shed, 9 per cent of the member farmers were having the kuccha cattle shed as against 12 per cent in case of non-member farmers. Semi-concrete was used by 23 per cent of the member farmers as against 19 per cent of the non-member farmers. However, concrete cattle shed facility was acquired by 68 per cent of member farmers as compared to 69 per cent of the non-member farmers. In case of type of chaff cutter, 20 per cent of member farmers were using manual chaff cutter as compared to 23 per cent of the non-member farmers. Motor driven chaff cutter was acquired by 79 per cent of the member farmers as against 76 per cent of the non-member farmers. One per cent of the farmers among both the member as well as non-member farmers was not having the facility of any kind of chaff cutter (Table 5.11 and 5.12).

Table 5.11

Ownership of farm and livestock assets of member farmers of Milkfed

Assets	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Tractor	-	3	4	20	14	9	50
Trolley	-	2	-	7	13	8	30
Combine	-	1	1	2	4	2	10
Thresher	-	-	-	1	-	1	2
Rotavator	-	1	1	4	2	4	12
Laser land leveller	-	-	1	4	4	3	12
Milking machine	1	3	-	6	2	6	18
Type of cattle shed							
Kuccha	5	1	1	2	-	-	9
Semi-concrete	8	4	1	4	5	1	23
Concrete	11	12	10	18	9	8	68
Chaff cutter							
Manual	9	3	2	4	2	-	20
Motor driven	14	14	10	20	12	9	79
No availability	1	-	-	-	-	-	1

Table 5.12

Ownership of farm and livestock assets of non-member farmers of Milkfed

Assets	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Tractor	-	1	10	16	12	9	48
Trolley	-	-	2	10	11	9	32
Combine	-	-	-	-	3	3	6
Thresher	-	-	-	-	2	-	2
Rotavator	-	-	3	4	3	4	14
Laser land leveller	-	-	-	2	-	-	2
Milking machine	2	-	2	3	2	2	11
Type of cattle shed							
Kuccha	8	3	1	-	-	-	12
Semi-concrete	11	-	6	2	-	-	19
Concrete	12	8	12	16	12	9	69
Chaff cutter							
Manual	17	2	3	-	1	-	23
Motor driven	13	9	16	18	11	9	76
No availability	1	-	-	-	-	-	1

5.1.6 Marketed Surplus of Milk

On an average, marketed surplus of milk as percentage of total milk production in case of member farmers was 84.43 per cent as compared to 82.50 per cent in case of non-member farmers (Table 5.13). Among all the categories of the farmers, marketed surplus as percentage of total milk production of non-member farmers was less than the member farmers. This may be due to higher milk production of member farmers and variations in family size, income from other sources etc.

Table 5.13

Category wise domestic consumption and marketed surplus of milk of member and non-member farmers of Milkfed

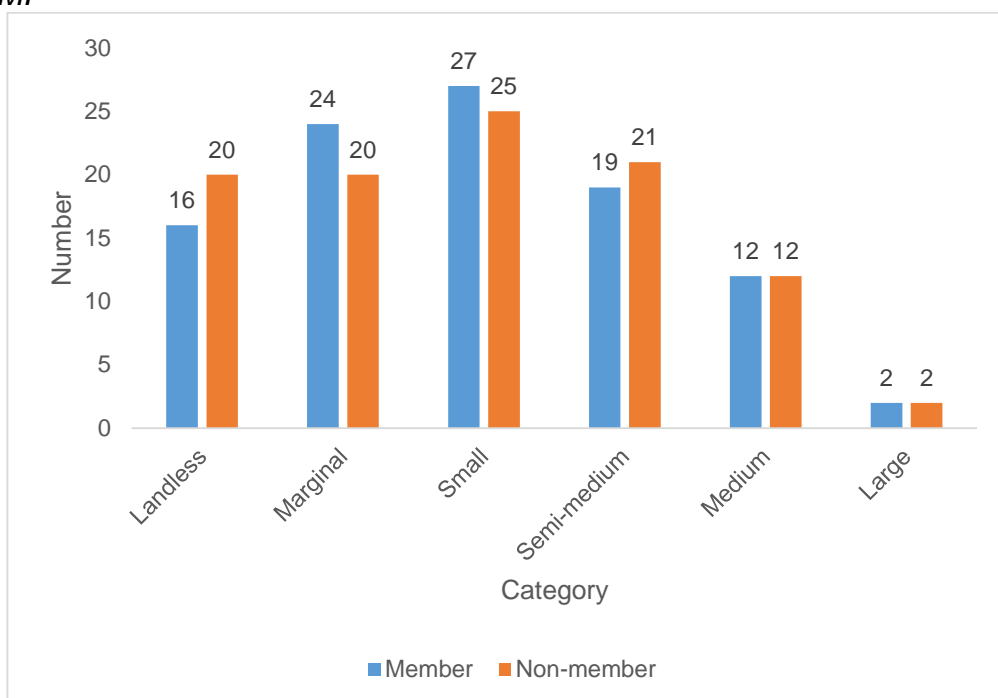
Category	Milk Production	Consumption	MS	% of MS to MP
Member				
Landless	29.99	5.37	24.62	82.09
Marginal	38.90	6.04	32.86	84.47
Small	39.79	5.44	34.35	86.33
Semi-medium	33.80	5.98	27.82	82.31
Medium	38.68	6.00	32.68	84.49
Large	73.56	9.01	64.55	87.75
Overall	38.60	6.01	32.59	84.43
Non-member				
Landless	20.45	4.57	15.88	77.65
Marginal	19.54	4.89	14.65	74.97
Small	25.67	5.60	20.07	78.18
Semi-medium	27.77	5.67	22.1	79.58
Medium	30.45	6.05	24.4	80.13
Large	45.84	6.89	38.95	84.97
Overall	28.92	5.06	23.86	82.50

5.2 Gujarat Cooperative Milk Marketing Federation (GCMMF)

5.2.1 Category-Wise Distribution of Farmers and Land Size

Among the various categories of member farmers as well as non-member farmers, the largest proportion was belonged to small farmers (27 per cent and 25 per cent in case of member and non-member farmers respectively) and the smallest was belonged to large farmers (2 per cent each in case of member as well as non-member). Similarly, the proportion of landless farmers was turned out to be 16 per cent and 20 per cent in case of member and non-member farmers. The proportion of marginal farmers was worked out to be 24 per cent and 20 per cent respectively. Semi-medium farmers were found to be 19 per cent and 21 per cent respectively. Further, as in case of large farmers, the proportion of medium farmers was also found to equal in case of member as well as non-member farmers (12 per cent each).

Fig 5.2
Category-wise distribution of member and non-member farmers associated with GCMMF



The member farmers had an ownership of 5.4 acres of land as against 5.02 acres in case of non-member farmers. Land ownership among all the categories of the farmers was found to be higher in case of member farmers than non-member farmers. In case of member as well as non-member farmers, the tendency of leased-in land was worked out to be higher than leased-out land. Land ownership of member farmers was worked out to be 1.63 acres in case of marginal farmers, 4.03 in case of small farmers, 7.08 in case of semi-medium farmers, 15.63 in case of medium farmers and 34.5 acres in case of large farmers. However, in case of non-member farmers, land ownership was turned out to be 1.48 acres in case of marginal farmers, 4.00 acres in case of small farmers, 7.00 acres in case of semi-medium farmers, 12.33 acres in case of medium farmers and 31.5 acres in case of large farmers. In case of large farmers, leased-in area was worked out to be more than owned area for both the member as well as non-member farmers (Table 5.14).

Table 5.14

Category-wise landholding details of member and non-member farmers of GCMMF (in acres)

Category	Owned land	Leased-in land	Leased-out land	Operational landholding
Member				
Landless	0.06	-	0.06	-
Marginal	1.84	0.08	0.29	1.63
Small	3.81	0.22	-	4.03
Semi-medium	6.11	0.97	-	7.08
Medium	10	5.75	0.13	15.63
Large	11	23.5	-	34.5
Overall	4.06	1.43	0.1	5.4
Non-member				
Marginal	3.5	0.13	2.15	1.48
Small	4.28	-	0.28	4.00
Semi-medium	6.43	0.57	-	7.00
Medium	11.00	1.33	-	12.33
Large	13.50	18.00	-	31.5
Overall	4.71	0.67	0.5	5.02

Table 5.15 and 5.16 depict the cropping pattern of member and non-member farmers respectively. In case of member farmers, the proportion of area under fodder to GCA varied from 37.5 per cent (marginal farmers) to around 3 per cent (large farmers) while in case of non-member farmers, it fluctuated from around 52 per cent (marginal farmers) to about 5 per cent (large farmers). On an average, the percentage under fodder was worked out to be 11.72 per cent and 12.89 per cent for member and non-member farmers respectively. Percentage area under wheat was turned out to be 31.51 per cent in case of member farmers as against 26.59 per cent in case of non-member farmers. However, the area under potato, vegetables and sugarcane was worked out to be higher in case of non-member farmers as compared to member farmers. On the other hand, percentage area under rice was found to be higher in case of member farmers. Therefore, non-member farmers were found to be more diversified as compared to member farmers

as percentage area under traditional crops mainly wheat and rice was worked out to be 53.12 per cent in case of member farmers and 44.16 per cent in case of non-member farmers.

Table 5.15

Category-wise cropping pattern of member farmers of GCMMF (in acres)

Crop	Marginal	Small	Semi-medium	Medium	Large	Overall
Wheat	0.9 (22.5)	3.05 (29.70)	4.9 (29.43)	12.92 (33.41)	27.5 (39.86)	4.84 (31.51)
Potato	-	0.24 (2.34)	1 (6.01)	1.67 (4.32)	6 (8.70)	0.68 (4.43)
Fodder	1.50 (37.5)	1.63 (15.87)	2.16 (12.97)	2.08 (5.38)	2 (2.90)	1.80 (11.72)
Vegetables	0.72 (18.00)	1.94 (18.89)	2.63 (15.80)	7.42 (19.19)	-	2.48 (16.15)
Rice	0.81 (20.25)	2.41 (23.47)	3.11 (18.68)	8 (20.69)	20 (28.99)	3.32 (21.61)
Maize	0.03 (0.75)	0.30 (2.92)	0.32 (1.92)	1.08 (2.79)	2.5 (3.62)	0.38 (2.47)
Sugarcane	0.04 (1.00)	0.70 (6.82)	2.53 (15.20)	5.5 (14.22)	11 (15.94)	1.86 (12.11)
GCA	4	10.27	16.65	38.67	69	15.36
NSA	1.63	4.03	7.08	15.63	34.5	5.4
Cropping intensity	245.40	254.88	235.17	247.41	200	284.45

Table 5.16

Category-wise cropping pattern of non-member farmers of GCMMF (in acres)

Crop	Marginal	Small	Semi-medium	Medium	Large	Overall
Wheat	0.6 (17.86)	2.8 (25.69)	6.05 (32.25)	5.92 (20.90)	22.00 (26.67)	3.30 (26.59)
Barley	-	-	-	1.00 (3.53)	-	0.06 (0.48)
Potato	-	0.52 (4.77)	0.62 (3.30)	4.33 (15.29)	7.5 (9.09)	0.93 (7.49)
Fodder	1.76 (52.38)	1.92 (17.61)	2.00 (10.66)	2.16 (7.63)	4.00 (4.85)	1.6 (12.89)
Vegetables	0.4 (11.90)	2.34 (21.47)	3.43 (18.28)	3.67 (12.96)	19.5 (23.64)	2.22 (17.89)
Rice	0.25 (7.44)	2.22 (20.37)	3.76 (20.04)	4.83 (17.06)	10.00 (12.12)	2.18 (17.57)
Maize	-	0.04 (0.37)	0.23 (1.23)	0.58 (2.05)	7.5 (9.09)	0.28 (2.26)
Sugarcane	0.35 (10.42)	1.06 (9.72)	2.67 (14.23)	5.83 (20.59)	12.00 (14.55)	1.84 (14.83)
GCA	3.36	10.9	18.76	28.32	82.5	12.41
NSA	1.48	4.00	7.00	12.33	31.5	5.02
Cropping intensity	227.02	272.5	268.00	229.68	261.90	247.21

5.2.2 Education

On an average, 10 per cent of the member farmers were found to be illiterate as compared to 16 per cent in case of non-member farmers. The primary pass percentage of member farmers was found to be 11 per cent in case of member farmers as against 24 per cent in case of non-member farmers. 10 per cent of the member farmers were found to be middle passed as compared to 21 per cent in case of non-member farmers. However, the percentage of metric pass farmers was turned out to be equal in case of both the member as well as non-member farmers (22 per cent each). However, the higher secondary pass (30 per cent in case of member and 12 per cent in case of non-member farmers) as well as graduates and above farmers (17 per cent in case of member and 5 per cent in case of non-member

farmers) were found to be much higher in case of member farmers as compared to non-member farmers. Hence, the proportion of illiterate, primary and middle pass farmers was found to be higher in case of non-member farmers and the higher secondary as well as graduated and above pass farmers were turned out to be higher in case of member farmers. Therefore, the level of education was higher in case of member farmers as compared to non-member farmers (Table 5.17). Similarly, average years of school attended by member farmers were worked out to be about 11 years as against around 9 years in case of non-member farmers (Table 5.18).

Table 5.17

Category-wise literacy level among member and non-member farmers associated with GCMMF

Category	Illiterate	Up to primary	Up to middle	Up to metric	Up to higher secondary	Graduates and above
Land size (Member farmers)						
Landless	3	3	3	6	1	-
Marginal	3	5	2	3	5	6
Small	2	-	2	10	10	3
Semi-medium	2	2	2	3	5	5
Medium	-	1	1	-	7	3
Large	-	-	-	-	2	-
Overall	10	11	10	22	30	17
Non-member						
Landless	2	6	6	5	1	-
Marginal	3	5	4	7	-	1
Small	7	7	4	3	1	3
Semi-medium	4	3	4	6	3	1
Medium	-	3	3	1	5	-
Large	-	-	-	-	2	-
Overall	16	24	21	22	12	5

Table 5.18
Category-wise average number of education years among member and non-member farmers of GCMMF

Category	Member farmers	Non-members
Landless	7.93	7.56
Marginal	9.87	8.00
Small	11.29	8.72
Semi-medium	11.15	9.19
Medium	11.83	9.87
Large	12.00	12.00
Overall	11.02	9.06

5.2.3 Age and Family Structure

On an average, total family size of the member farmers was found to be 5.25 as against 5.3 in case of non-member farmers. However, the family size of the landless, small and semi-medium member farmers was found to be higher than non-member farmers. The average number of male members was found to be more among member farmers except semi-medium farmers. Similarly, in case of non-member farmers, the average number of female members was found to be higher in case of semi-medium and medium farmers and within member and non-member farmers both, among large farmers, the number of male and female members were turned out to be equal. Further, average age of the member farmers (44.29 years) was found to be less than the non-member farmers (50.28 years). Average age of the member farmers among all the categories was found to be less than non-member farmers (Table 5.19).

Table 5.19

Category-wise family structure and age of the member as well as non-member farmers of GCMMF

Category	Male	Female	Children	Total	Age
Members					
Landless	2.56	2.56	1.13	6.25	46.8
Marginal	2.92	1.79	0.54	5.25	42.1
Small	2.18	2.04	1.07	5.29	45.2
Semi-medium	2.21	2.32	0.84	5.37	45.5
Medium	2.08	2	0.75	4.83	42.7
Large	2	2	1.5	5.5	36.5
Overall	2.26	2.11	0.88	5.25	44.29
Non-member					
Landless	2.2	2.1	1.2	5.5	48.9
Marginal	2.6	2.3	0.75	5.6	51.35
Small	2.28	2.16	0.6	5.08	53.12
Semi-medium	2.33	2.38	0.5	5.14	49.67
Medium	2.08	2.17	0.92	5	47
Large	2.5	2.5	1.5	6.5	44
Overall	2.32	2.23	0.77	5.3	50.28

5.2.4 Herd Size

The proportion of farmers having buffaloes was found to be equal in case of member as well as non-member farmers (65 per cent each) as shown in Table 5.20 and 5.21. However, the proportion of farmers possessing crossbred cattles as well as local cattles was found to be more in case of member farmer than non-member farmers. Further, the proportion of farmers owning heifer, female young stock, male young stock and bullocks of buffaloes, crossbred cows as well local cows were found to be more in case of non-member farmers than member farmers.

Table 5.20

Number of farmers possessing various species of animals of member farmers of GCMMF

Species	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Buffaloes	3	18	18	14	10	2	65
Heifer	1	3	9	3	5	1	22
Female young stock	1	5	7	4	3	2	22
Male young stock	2	3	5	5	2	1	18
Bullock	-	2	4	-	-	-	6
Crossbred cattles	1	4	3	3	5	1	17
Heifer	-	4	1	-	2	-	7
Female young stock	1	2	1	-	2	1	7
Male young stock	-	-	-	-	-	-	-
Bullock	-	-	-	-	-	-	-
Local cattles	13	17	-	8	4	1	43
Heifer	4	7	-	2	-	-	13
Female young stock	6	5	-	3	-	-	14
Male young stock	3	-	-	1	-	-	4
Bullock	3	-	-	2	3	1	9

Table 5.21

Number of farmers possessing various species of animals of non-member farmers of GCMMF

Species	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Buffaloes	6	16	15	19	8	1	65
Heifer	5	12	7	9	6	0	39
Female young stock	1	5	8	8	4	1	27
Male young stock	3	4	6	8	5	1	27
Bullock	-	2	5	5	1	1	14
Crossbred cattles	-	6	5	-	2	2	15
Heifer	-	5	5	-	1	1	12
Female young stock	-	4	2	-	2	1	9
Male young stock	-	-	2	-	-	1	6
Bullock	-	4	3	-	-	-	7
Local cattles	17	2	8	3	-	-	30
Heifer	9	-	5	3	-	-	17
Female young stock	12	1	8	3	-	-	24
Male young stock	5	-	7	3	-	-	15
Bullock	4	4	6	5	6	-	15

In case of average number of livestock, the average number of buffaloes as well as local cows was found to be more in case of non-member farmers (1.86 in case of buffaloes and 1.61 in case of local cows) as compared to member farmers (1.82 in case of buffaloes and 1.12 in case of local cows) (Table 5.22 and 5.23). The average number of buffaloes' as well as local cows' heifer, male young stock, female young stock and bullocks was found to be more in case of non-member farmers. Therefore, the herd size of non-member farmers was turned out to be more as against member farmers.

Table 5.22

Category-wise livestock details of member farmers of GCMFF

Species	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Buffaloes	0.43	1.42	2.30	2	2.92	3	1.82
Heifer	0.06	0.13	0.42	0.16	0.42	0.5	0.24
Female young stock	0.06	0.21	0.41	0.32	0.34	2	0.31
Male young stock	0.13	0.13	0.19	0.26	0.17	0.5	0.18
Bullock	-	0.08	0.15	-	-	-	0.06
Crossbred cattles	0.13	0.38	0.48	0.47	1	2	0.49
Heifer	-	0.08	0.07	-	0.17	-	0.06
Female young stock	0.06	0.17	0.07	-	0.25	1	0.12
Male young stock	-	-	-	-	-	-	-
Bullock	-	-	-	-	-	-	-
Local cattles	1.44	1.25	-	0.89	0.67	1.5	1.12
Heifer	0.31	0.29	-	0.11	-	-	0.15
Female young stock	0.5	0.25	-	0.21	-	-	0.21
Male young stock	0.19	-	-	0.05	-	-	0.04
Bullock	0.19	-	-	0.11	0.25	0.5	0.13

Table 5.23

Category-wise livestock details of non-member farmers of GCMMF

Species	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Buffaloes	0.45	2	1.64	2.48	1.92	1.5	1.86
Heifer	0.25	0.85	0.4	0.57	0.75	-	0.53
Female young stock	0.05	0.5	0.32	0.71	0.25	1	0.39
Male young stock	0.05	0.2	0.2	0.38	0.42	0.5	0.24
Bullock	-	0.05	0.04	0.19	0.08	0.5	0.08
Crossbred cattles	-	0.6	0.44	-	0.5	3	0.35
Heifer	-	0.25	0.08	-	0.08	1	0.1
Female young stock	-	0.1	0.24	-	0.34	0.5	0.13
Male young stock	-	-	0.04	-	-	0.5	0.02
Bullock	-	0.05	0.04	-	-	-	0.02
Local cattles	1.4	0.25	0.64	0.57	-	-	1.61
Heifer	0.55	-	0.24	0.14	-	-	0.2
Female young stock	1.15	0.1	0.4	0.29	-	-	0.41
Male young stock	0.1	-	0.28	0.14	-	-	0.12
Bullock	0.2	0.2	0.24	0.24	0.5	-	0.25

5.2.5 Farm and Livestock Assets

In case of member farmers, about 45 per cent of the farmers possessed tractors as against 54 per cent in case of non-member farmers (Table 5.24 and 5.25). Trolley was possessed by 39 per cent and 42 per cent of the non-member farmers respectively. Combine harvester was owned by 3 per cent of the member farmers whereas it was found to be 6 per cent in case of non-member farmers. None of the member farmers was having thresher whereas it was owned by 2 per cent of the non-member farmers. However, the proportion of farmers having rotavator and milking machine was turned out to be more in case of member farmers as compared

to non-member farmers. In case of type of cattle shed, 8 per cent of the member farmers and 2 per cent of the non-member farmers were using kuccha cattle shed while 20 per cent of the member farmers and 13 per cent of the non-member farmers were having the facility of semi-concrete type of cattle shed facility. Concrete cattle shed facility was used by 72 per cent of the member farmers and 85 per cent of the non-member farmers. Motor driven chaff cutter facility was also found to be higher in case of non-member farmers (94 per cent) as compared to member farmers (79 per cent). Thus, the non-member farmers were having the more facility of farm as well as livestock assets.

Table 5.24

Ownership of farm and livestock assets of member farmers of GCMMF

Assets	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Tractor	-	1	27	17	12	2	45
Trolley	-	1	27	15	12	2	39
Combine	-	-	1	1	1	-	3
Thresher	-	-	-	-	-	-	-
Rotavator	-	1	7	7	10	2	27
Laser land leveller	-	-	3	-	-	-	3
Milking machine	-	-	2	2	3	-	7
Type of cattle shed							
Kuccha	7	1	-	-	-	-	8
Semi-concrete	4	11	4	1	-	-	20
Concrete	5	12	23	18	12	2	72
Chaff cutter							
Manual	9	6	4	1	-	-	20
Motor driven	6	18	23	18	12	2	79
No availability	1	-	-	-	-	-	1

Table 5.25

Ownership of farm and livestock assets of non-member farmers of GCMMF

Assets	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Tractor	-	1	18	21	12	2	54
Trolley	-	1	6	21	12	2	42
Combine	-	-	1	1	3	1	6
Thresher	-	-	-	1	-	1	2
Rotavator	-	-	3	6	4	2	15
Laser land leveller	-	-	1	-	4	-	5
Milking machine	-	-	1	-	3	1	5
Type of cattle shed							
Kuccha	2	-	-	-	-	-	2
Semi-concrete	7	3	2	1	-	-	13
Concrete	11	17	23	20	12	2	85
Chaff cutter							
Manual	6	-	-	-	-	-	6
Motor driven	14	20	25	21	12	2	94
No availability	-	-	-	-	-	-	-

5.2.6. Marketed Surplus of Milk

On an average, the marketed surplus of milk as percentage of total milk production in case of non-member farmers (83.83 per cent) of GCMMF was slightly more than the member farmers (82.95 per cent) as shown in Table 5.26. However, the proportion of marketed surplus of milk in case of landless, small and large member farmers was higher than the non-member farmers.

Table 5.26

Category wise domestic consumption and marketed surplus of milk of member and non-member farmers of GCMMF

Category	Milk Production (MP)	Domestic Consumption (DC)	Marketed Surplus (MS)	% of MS to MP
Member				
Landless	26.25	4.56	21.69	82.63
Marginal	22.20	4.67	17.53	78.96
Small	24.96	4.80	20.16	80.77
Semi-medium	29.57	5.63	23.94	80.96
Medium	43.91	6.41	37.5	85.40
Large	45.5	7	38.5	84.62
Overall	30.79	5.25	25.54	82.95
Non-member				
Landless	21.34	3.98	17.36	81.35
Marginal	23.34	4.08	19.26	82.52
Small	25.56	5.50	20.06	78.48
Semi-medium	26.78	4.63	22.15	82.71
Medium	38.14	5.05	33.09	86.76
Large	40.53	6.61	33.92	83.69
Overall	29.94	4.84	25.1	83.83

5.3 Baani Milk Producer Company Limited

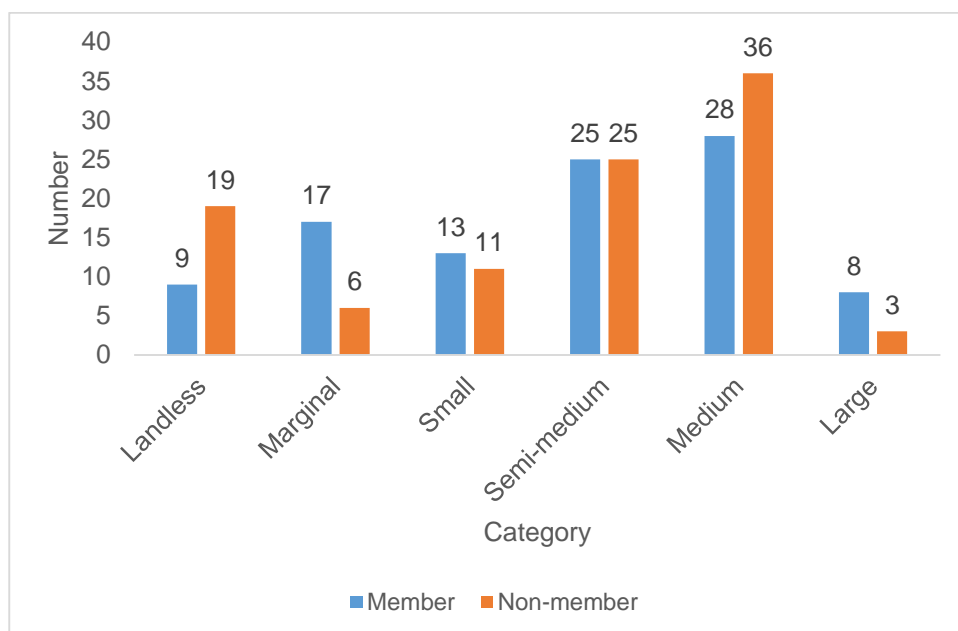
5.3.1 Category-Wise Distribution of Farmers and Land Size

Among the various categories of member as well as non-member farmers, the largest proportion of farmers was belonged to medium farmers (28 per cent in case of member farmers and 36 per cent in case of non-member farmers), followed by semi-medium farmers in case of both member as well as non-member farmers (25 per cent each). However, the significant difference was found in case of landless and marginal farmers for member and non-member farmers. The proportion of landless farmers was calculated to be 9 per cent in case of member farmers as against 19 per cent in case of non-member farmers. On the other hand, in case of marginal farmers, the proportion of member farmers (17 per cent) was worked out to be more as compared to non-member farmers (6 per cent). The proportion of small farmers was worked out to be 13 per cent in case of member farmer and 11 per cent in case of non-member farmers. The smallest proportion of farmers was

belonged to large farmers in case of both member (8 per cent) as well as non-member farmers (3 per cent).

Fig 5.3

Category-wise distribution of member and non-member farmers associated with BMPCL



Category-wise landholding details of the member as well as non-member farmers are presented in Table 5.27. Among marginal farmers, the member farmers had an operated area of 1.94 acres as against 1.84 acres in case of non-member farmers. Further, among marginal farmers of member as well as non-member both, the tendency of leasing-out was present and none of the farmers was found to be involved in leased-in land tendency. The operated area of small farmers was found to be more in case of member farmers (4.46 acres) as compared to non-member farmers (4.27 acres). However, in case of semi-medium farmers, the operated area was more in non-member farmers (8.40 acres) as compared to member farmers (8.24 acres). Similarly, in case of medium farmers, the operated area of non-member farmers (15.22 acres) was worked out to be more as compared to member farmers (13.72 acres). The operated area of large farmers was 28.12 acres and 27.67 acres in case of member and non-member farmers respectively. In overall, the operated area was more in case of member farmers (9.95 acres) as against non-member farmers (8.99 acres).

Table 5.27:

Category-wise landholding details of member and non-member farmers of BMPCL (in acres)

Category	Owned land	Leased-in land	Leased-out land	Operated area
Member				
Marginal	2.53	-	0.59	1.94
Small	4.92	-	0.46	4.46
Semi-medium	7.76	0.48	-	8.24
Medium	13.04	0.68	-	13.72
Large	18.75	9.37	-	28.12
Overall	8.97	1.16	0.18	9.95
Non-member				
Marginal	2.67	-	0.83	1.84
Small	5.73	0.18	1.64	4.27
Semi-medium	8.32	0.08	-	8.40
Medium	13.39	2.39	0.56	15.22
Large	28.67	3.34	4.34	27.67
Overall	8.59	1.00	0.60	8.99

Table 5.28 and 5.29 describes the cropping pattern of the member and non-member farmers. Among the marginal member farmers, the highest proportion of GCA was under wheat (26.92 per cent) followed by fodder (23.19 per cent), rice (20.70 per cent) and vegetables (19.67 per cent). However, in case of non-member farmers, the proportion of GCA was found under fodder crop (45.48 per cent). Along with feeding the domestic animals, it was also grown for commercial purposes followed by wheat (25.59 per cent). Among small farmers, the area under wheat was highest in case of member farmers (31.98 per cent) but, in case of non-member farmers, the area under rice was found to be highest (31.10 per cent). Among semi-medium, medium and large farmers, area under wheat was highest in case of both member as well as non-member farmers. In case of overall category of farmers, the area under wheat was worked out to be above 35 per cent in case of both the categories of farmers. Similarly, area under rice was more in case of non-member semi-medium, medium, large and overall categories of the farmers as compared to

member farmers. Area under fodder was 20.47 per cent and 24.39 per cent in case of member and non-member farmers respectively. Area under vegetables was found to be more in case of all the categories of member farmers except medium and large farmers. Similarly, overall area under potato was above 5 per cent in case of both the farmers. Area under fodder was 10.06 per cent in case of member farmers and 12.15 per cent in case of non-member farmers. Area under vegetables was more in case of member farmers (3.16 per cent) as compared to non-member farmers (0.36 per cent). However, area under rice was more in case of non-member farmers (23.84 per cent) as compared to member farmers (18.85 per cent). Cotton was found to be above 23 per cent of GCA in case member farmers and above 19 per cent in case of non-member farmers. Cropping intensity was worked out to be more in case of non-member farmers (247.27 per cent) as compared to member farmers (203.72 per cent).

Table 5.28

Category-wise cropping pattern of member farmers of BMPCL (in acres)

Crop	Marginal	Small	Semi-medium	Medium	Large	Overall
Wheat	1.30 (26.92)	3.00 (31.98)	6.04 (34.93)	11.14 (36.83)	17.00 (31.47)	7.25 (35.77)
Barley	0.08 (1.66)	-	0.36 (2.08)	-	2.5 (4.63)	0.33 (1.63)
Potato	-	0.46 (4.90)	0.60 (3.47)	1.39 (4.60)	5.63 (10.42)	1.15 (5.67)
Fodder	1.12 (23.19)	1.92 (20.47)	2.00 (11.57)	2.22 (7.34)	3.76 (6.96)	2.04 (10.06)
Vegetables	0.95 (19.67)	0.54 (5.76)	0.38 (2.20)	1.00 (3.31)	-	0.64 (3.16)
Rice	1.00 (20.70)	2.23 (23.77)	1.92 (11.10)	4.68 (15.47)	15.38 (28.47)	3.82 (18.85)
Maize	-	-	0.12 (0.69)	0.11 (0.36)	0.75 (1.39)	0.14 (0.69)
Moong	-	-	0.91 (5.26)	1.89 (6.25)	-	0.09 (0.44)
Cotton	0.38 (7.87)	1.23 (13.11)	4.96 (28.69)	7.82 (25.85)	9.00 (16.66)	4.81 (23.73)
GCA	4.83	9.38	17.29	30.25	54.02	20.27
NSA	1.94	4.46	8.24	13.72	28.12	9.95
Cropping intensity	248.97	210.31	209.83	220.48	192.10	203.72

Table 5.29

Category-wise cropping pattern of non-member farmers of BMPCL (in acres)

Crop	Marginal	Small	Semi-medium	Medium	Large	Overall
Wheat	1.08 (25.59)	2.45 (29.88)	6.00 (33.52)	10.30 (31.58)	21.67 (47.79)	8.00 (35.99)
Barley	-	0.10 (1.22)	0.48 (2.68)	1.50 (4.60)	-	0.47 (2.11)
Potato	-	0.55 (6.71)	0.60 (3.35)	1.72 (5.27)	4.34 (9.57)	1.18 (5.31)
Fodder	1.66 (45.48)	2.00 (24.39)	2.48 (13.85)	3.16 (9.69)	3.33 (7.34)	2.70 (12.15)
Vegetables	0.08 (2.19)	-	0.08 (0.45)	1.12 (3.43)	-	0.08 (0.36)
Rice	0.58 (15.89)	2.55 (31.10)	3.48 (19.44)	7.31 (22.41)	16.00 (35.29)	5.30 (23.84)
Maize	-	-	0.24 (1.34)	0.23 (0.71)	-	0.17 (0.76)
Moong	-	-	1.10 (6.15)	1.20 (3.68)	-	0.10 (0.45)
Cotton	0.25 (6.85)	0.55 (6.71)	3.44 (19.22)	6.08 (18.64)	-	4.23 (19.03)
GCA	3.65	8.2	17.9	32.62	45.34	22.23
NSA	1.84	4.27	8.4	15.22	27.67	8.99
Cropping intensity	198.37	192.04	213.10	214.32	163.86	247.27

5.3.2 Education

In case of education, around 14 per cent of member and 15 per cent of the non-member farmers were found to be illiterate. 7 per cent of the member and 10 per cent of the non-member farmers were up to primary passed. Similarly, 15 per cent of member and 23 per cent of the non-member farmers were up to middle passed farmers. Farmers up to metric passed were also found to be higher in case of non-member farmers (28 per cent) as against member farmers (19 per cent). However,

higher secondary passed were found more in case of member farmers (41 per cent) as against non-member farmers (19 per cent). In case of graduates and above, the proportion of member and non-member farmers was worked out to be 4 per cent and 5 per cent respectively. Hence, the proportion of non-member farmers was more in case of all the levels of education except higher secondary passed farmers (Table 5.30). Further, as shown in Table 5.31, member farmers (8.98 years) attended school for more years as compared to non-member farmers (8.41 years).

Table 5.30
Category-wise literacy level among member and non-member farmers associated with BMPCL

Category	Illiterate	Up to primary	Up to middle	Up to metric	Up to higher secondary	Graduates and above
Land size (Member farmers)						
Landless	4	-	2	1	1	1
Marginal	4	1	4	2	6	-
Small	1	-	4	3	5	-
Semi-medium	-	2	1	9	12	1
Medium	4	3	3	4	12	2
Large	1	1	1	-	5	-
Overall	14	7	15	19	41	4
Non-member						
Landless	1	2	11	1	3	1
Marginal	-	-	2	4	-	-
Small	1	-	3	6	1	-
Semi-medium	6	4	2	9	4	-
Medium	5	4	4	8	11	4
Large	2	-	1	-	-	-
Overall	15	10	23	28	19	5

Table 5.31

Category-wise average number of education years among member and non-member farmers of BMPCL

Category	Member farmers	Non-members
Landless	7.77	8.31
Marginal	9.39	8.66
Small	9.82	8.54
Semi-medium	11.60	8.06
Medium	10.01	9.77
Large	10.03	3.00
Overall	8.98	8.41

5.3.3 Age and family structure

On an average, the total size of the family was calculated to be 4.68 in case of member farmers as against 5.7 in case of non-member farmers. Among all the categories of the farmers, the size of the family was more in case of non-member farmers except small farmers. In case of overall member farmers, the number of male member (2.00) was higher than female members (1.88) but, in case of overall non-member farmers, the number of female members (2.32) was higher than male members (2.18). In case of member farmers, the number of females was more in case of marginal, small and large farmers as compared to male members. In case of non-member farmers, the number of female members was found to be more in case of landless, small, semi-medium and medium farmers. On an average, the number of children was 0.8 and 1.2 in case of member and non-member farmers respectively. In case of overall farmers, the average age was calculated to be 42.19 years in case of member farmers as against 48.66 years in case of non-member farmers. Among, all the categories of the farmers, the average of member farmers was worked out to be less in case of member farmers as compared to non-member farmers. Hence, member farmers were found to be younger than non-member farmers (Table 5.32).

Table 5.32

Category-wise family structure and age of the member as well as non-member farmers of BMPCL

Category	Male	Female	Children	Total	Age
Members					
Landless	2.44	1.89	1.12	5.45	48.88
Marginal	1.82	2.12	1.00	4.94	42.76
Small	2.08	2.15	0.92	5.15	43.15
Semi-medium	2.00	1.72	0.96	4.68	39.64
Medium	2.04	1.75	1.57	5.36	43.93
Large	1.63	1.88	1.50	5.01	33.75
Overall	2.00	1.88	0.80	4.68	42.19
Non-member					
Landless	1.26	2.16	2.47	5.89	49
Marginal	2.00	1.83	1.83	5.66	44.34
Small	1.82	2.36	0.81	5.00	49.45
Semi-medium	2.20	2.24	1.24	5.68	50.04
Medium	2.25	2.36	1.19	5.80	47.72
Large	3	2.33	0.67	6	52
Overall	2.18	2.32	1.2	5.7	48.66

5.3.4 Herd Size

Buffaloes were reared by around 78 per cent of the member farmers and 75 per cent of the non-member farmers. Crossbred cattles were kept by 23 per cent of the member farmers and 15 per cent of the non-member farmers. Further, local cows were kept by the 33 per cent of the member farmers and 16 per cent of the non-member farmers. In case of buffaloes, the number of farmers having heifers, female young stock and male young stock was higher in case of member farmers whereas the number of farmers having bullock was more in case of non-member farmers. Farmers possessing male young stock of crossbred cattles was more in case of non-member farmers. Farmers having the young stock of local cows was also more in case of member farmers as compared to non-member farmers (Table 5.33 and 5.34).

Table 5.33

Number of member farmers of BMPCL possessing various species of animals

Species	Landle ss	Marginal	Small	Semi- medium	Medium	Large	Overall
Buffaloes	8	15	10	18	20	7	78
Heifer	4	10	8	9	12	4	47
Female young stock	4	9	10	12	14	3	52
Male young stock	3	3	5	10	11	3	35
Bullock	1	1	2	4	3	-	11
Crossbred cattles	-	1	3	9	10	-	23
Heifer	-	1	2	4	8	-	15
Female young stock	-	-	3	4	9	-	16
Male young stock	-	-	-	3	8	-	11
Bullock	-	-	1	2	7	-	10
Local cattles	1	1	2	7	14	8	33
Heifer	1	1	2	5	11	4	24
Female young stock	-	1	1	5	11	5	23
Male young stock	1	1	2	5	7	7	23
Bullock	3	5	-	4	2	-	14

Table 5.34

Number of non-member farmers of BMPCL possessing various species of animals

Species	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Buffaloes	11	3	11	17	31	2	75
Heifer	4	2	6	7	13	2	34
Female young stock	7	1	4	8	17	2	39
Male young stock	-	-	-	6	12	2	20
Bullock	5	1	2	4	2	-	14
Crossbred cattles	4	-	-	6	5	-	15
Heifer	4	-	-	6	3	-	13
Female young stock	4	-	-	6	2	-	12
Male young stock	2	-	-	6	3	-	11
Bullock	4	-	-	6	2	-	12
Local cattles	5	3	3	2	2	1	16
Heifer	4	3	-	-	-	1	8
Female young stock	2	1	2	-	1	1	7
Male young stock	1	2	2	-	1	1	7
Bullock	9	2	-	7	9	1	28

Category-wise of average number of various species milch animals of member as well non-member farmers are shown in Table 5.35 and 5.36 respectively. In case of buffaloes, average number of buffaloes, heifers, male young stock was more in case of member farmers while the average number of male young stock and bullocks was higher in case of non-member farmers. On the other hand, the average number of crossbred cattles, female young stock, male young stock and bullock was more in case of non-member farmers and the average number of heifers was more in case of member farmers relative to non-member farmers. In case of local cows, the average number of local cows, heifers, female young stock, male young stock was

worked out to be in case of member farmers whereas the number of bullocks was worked out to be in case of non-member farmers. The bullocks were used mainly for bringing fodder from fields by the non-member farmers.

Table 5.35
Category-wise average number of livestock details of member farmers of BMPCL

Species	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Buffaloes	1.83	1.92	2.71	2.26	2.84	4.64	2.75
Heifer	0.92	0.58	0.61	0.92	1.04	1.37	0.87
Female young stock	0.94	0.62	0.15	0.61	0.5	0.87	0.64
Male young stock	0.34	0.92	0.15	0.50	0.15	1.37	0.40
Bullock	0.11	0.09	0.15	0.05	0.07	-	0.09
Crossbred cattles	-	0.18	0.15	1.56	0.75	-	0.35
Heifer	-	0.18	1.03	1.02	0.39	-	0.20
Female young stock	-	-	0.45	1.11	0.21	-	0.06
Male young stock	-	-	-	0.82	0.14	-	0.04
Bullock	-	-	0.33	0.14	0.11	-	0.11
Local cattles	0.22	0.18	0.89	1.78	0.28	3.38	0.63
Heifer	0.22	0.06	0.66	0.92	0.08	1.5	0.18
Female young stock	-	0.2	0.34	0.89	0.07	1.25	0.34
Male young stock	0.11	0.06	0.23	0.77	0.15	0.88	0.11
Bullock	0.45	0.29	-	0.22	0.04	-	0.13

Table 5.36

Category-wise average number of livestock details of non-member farmers of BMPCL

Species	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Buffaloes	1.05	1.5	3.27	2.28	3.28	3.33	2.5
Heifer	0.21	0.33	0.73	0.32	0.78	1.33	0.54
Female young stock	0.37	0.33	0.36	0.72	0.39	2.00	0.82
Male young stock	-	-	-	0.44	0.06	0.67	0.27
Bullock	0.26	0.16	0.18	0.16	0.39	-	0.14
Crossbred cattles	0.73	-	-	0.92	0.11	-	0.51
Heifer	0.42	-	-	0.24	0.11	-	0.18
Female young stock	0.32	-	-	0.48	0.08	-	0.22
Male young stock	0.11	-	-	0.24	0.06	-	0.11
Bullock	0.21	-	-	0.24	0.19	-	0.12
Local cattles	0.53	0.83	0.27	0.32	0.19	1.33	0.37
Heifer	0.26	0.50	-	-	-	0.33	0.09
Female young stock	0.09	0.33	0.02	-	0.05	0.67	0.3
Male young stock	0.02	0.03	0.02	-	0.05	0.33	0.09
Bullock	0.47	0.33	-	0.28	0.25	0.33	0.32

5.3.5 Farm and Livestock Assets

In case of farm and livestock assets, tractor was possessed by 73 per cent of the member farmers and 72 per cent of the non-member farmers. Trolley was owned by 61 per cent of the member farmers and 57 per cent of the non-member farmers. Combine was owned by 13 per cent of the member farmers and 2 per cent of the non-member farmers. About 5 per cent of the member farmers and 1 per cent of the non-member farmers were having thresher. Rotavator and laser land leveller were

possessed by 34 per cent and 27 per cent respectively of the member farmers and 25 per cent and 12 per cent respectively by the non-member farmers. Milking machine was possessed by the 4 per cent of the member farmers and non-member farmers each. About 92 per cent of the member farmers and 83 per cent of the non-member farmers had concrete cattle shed facility. Kuccha cattle shed was possessed by 4 per cent of the member farmers and 10 per cent of the non-member farmers. 94 per cent of the member farmers were using motor driven chaff cutter as against 86 per cent of the non-member farmers. One per cent of the member farmers and 4 per cent of the non-member farmers were not having the facility of any kind of chaff cutter. Hence, the ownership of farm and livestock assets was more in case of member farmers as against non-member farmers (Table 5.37 and 5.38).

Table 5.37

Ownership of farm and livestock assets of member farmers of BMPCL

Assets	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Tractor	-	7	5	25	28	8	73
Trolley	-	-	2	23	28	8	61
Combine	-	-	-	9	4	-	13
Thresher	-	-	-	-	5	-	5
Rotavator	-	-	-	13	17	4	34
Laser land leveller	-	-	-	12	11	4	27
Milking machine	-	-	-	-	-	4	4
Type of cattle shed							
Kuccha	3	1	-	-	-	-	4
Semi-concrete	2	-	2	-	-	-	4
Concrete	4	16	11	25	28	8	92
Chaff cutter							
Manual	2	1	2	-	-	-	5
Motor driven	6	16	11	25	28	8	94
No availability	1	-	-	-	-	-	1

Table 5.38

Ownership of farm and livestock assets of non-member farmers of BMPCL

Assets	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Tractor	-	2	6	25	36	3	72
Trolley	-	2	3	16	33	3	57
Combine	-	-	-	1	1	-	2
Thresher	-	-	-	1	-	-	1
Rotavator	-	2	3	4	13	3	25
Laser land leveller	-	-	2	1	9	-	12
Milking machine	-	-	-	1	1	2	4
Type of cattle shed							
Kuccha	7	2	1	-	-	-	10
Semi-concrete	5	-	2	-	-	-	7
Concrete	7	4	8	25	36	3	83
Chaff cutter							
Manual	8	2	-	-	-	-	10
Motor driven	7	4	11	25	36	3	86
No availability	4	-	-	-	-	-	4

5.3.6 Marketed Surplus of Milk

Marketed surplus of milk as percentage of total milk production was slightly more in case of non-member farmers (82.95 per cent) of BMPCL as compared to member farmers (82.59 per cent). However, the marketed surplus of milk as percentage of total milk production in case of small and medium member farmers was higher as compared to non-member farmers.

Table 5.39

Category wise domestic consumption and marketed surplus of milk of member and non-member farmers of Milkfed

Category	Milk Production	Domestic Consumption	MS	% of MS to MP
Member				
Landless	18.65	3.56	15.09	80.91
Marginal	20.34	4.43	15.91	78.22
Small	20.77	4.87	15.90	76.55
Semi-medium	28.76	4.72	24.04	83.59
Medium	27.88	4.61	23.27	83.46
Large	36.12	5.55	30.57	84.63
Overall	26.88	4.41	22.47	82.59
Non-member				
Landless	24.10	4.36	19.74	81.91
Marginal	27	4.33	22.67	83.96
Small	19.81	4.66	15.15	76.48
Semi-medium	25.64	4.88	20.76	80.97
Medium	29.92	5.03	24.89	83.19
Large	35.33	5.33	30	84.91
Overall	26.62	4.54	22.08	82.95

5.4 Summary

The above analysis of member and non-member farmers of formal milk market reveals that there exists variations among member as well non-member farmers in case of various socio-economic characteristics such as age, education, family structure, landholding size, ownership of farm and livestock assets etc. The proportion of landless farmers was more in informal milk market as they were resource poor farmers and were dependent on credit and advance payment facility and players of informal milk market were giving them this facility. However, small

farmers (including landless, marginal and small farmers) as well as smallholder dairy farmers were not excluded from formal milk market as their proportion was significant in formal milk market. Therefore, the hypothesis framed that smallholder dairy farmers are excluded from formal milk market was rejected.

CHAPTER 6

ROLE OF DAIRY FARMING IN AUGMENTING INCOME AND EMPLOYMENT OF THE FARMERS

Dairy farming is a supportive activity for enhancing the income of the farmers and providing them employment opportunities. The objective of this chapter is to find whether there is any difference in the share of income and annual employment opportunities from dairy farming between the farmers under formal and informal milk markets.

6.1 The Punjab State Cooperative Milk Producers Federation Limited (Milkfed)

Table 6.1 represents category-wise share of income from various sources of the member farmers of Milkfed. For the landless farmers, dairy farming was found to be the major source of income constituting around 32 per cent of total income. Similarly, in case of marginal, small and semi-medium farmers, dairying was found to be the second largest source of income contributed around 28 per cent, 32 per cent and 24 per cent of gross income respectively. For the medium and large farmers too, it was found to be the second largest source of income next to crop farming contributing above 11 per cent. Similarly, in case of overall farmers, the contribution of dairy farming was worked out to be around one fifth of gross income next to crop farming that constituted around 54 per cent. Thus, it may be concluded that dairying is a lifeline for the farmers mainly for landless, marginal, small and semi-medium farmers who receive about or above one fourth of their gross income from this enterprise.

Category-wise contribution of income from various sources of the non-member farmers of Milkfed is illustrated in Table 6.2. Dairying contributed around 28 per cent of the total income to landless farmers. For the marginal farmers, it contributed around 16.31 per cent that was far less than member marginal farmers (about 28 per cent) due to larger involvement of non-member marginal farmers in service sector (41.29 per cent). In case of small farmers, the share of dairying was found to be nearly 30 per cent and 23.55 per cent in case of semi-medium farmers. In case of medium and large farmers, the contribution of dairying was worked out to be around 12 per cent and 7 per cent. Hence, the share of income from dairying among the various categories was found almost equal between member and non-member farmers of Milkfed except marginal and large farmers. In case of marginal farmers, the share of income from dairy farming was lesser due to the involvement of farmers

in job market and in case of large farmers, due to the smaller average size of milch animals and low price of milk received by non-member, the share of dairying was less in case of non-member farmers as compared to their counterparts.

Table 6.1

Category-wise income from various sources of member farmers associated with Milkfed (in ₹)

Category	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Crop farming	-	44588 (6.24)	295416.67 (39.23)	602083.34 (59.77)	1192857.14 (73.22)	2767778.78 (76.87)	603630 (54.10)
Leased-out income	-	203676.47 (28.51)	-	-	26857.14 (1.65)	175000 (4.86)	54135 (4.85)
Hiring out the agricultural Implements	-	23529.41 (3.29)	48750 (6.47)	61666.67 (6.12)	133928.57 (8.22)	161111.12 (4.47)	57900 (5.19)
Sale of assets	19541.67 (4.26)	17264.71 (2.42)	46416.67 (6.16)	18083.34 (1.80)	28142.86 (1.73)	29444.44 (0.82)	24125 (2.16)
Dairy farming	148041.67 (32.24)	201647.06 (28.23)	240833.34 (31.98)	240833.3 (23.91)	193714.28 (11.89)	422777.8 (11.74)	221680 (19.87)
Other allied activities	11083.3 (2.41)	5647.06 (0.79)	-	-	-	-	3620 (0.32)
Wage employment	76833.3 (16.73)	5647.05 (0.79)	-	-	-	-	19400 (1.74)
Self-employment	74583.4 (16.24)	102941.18 (14.41)	33333.4 (4.43)	-	-	-	39400 (3.53)
Remittances from abroad	27083.3 (5.90)	11764.71 (1.65)	23333.3 (3.10)	-	28571.4 (1.75)	-	15300 (1.37)
NREGA	1166.7 (0.25)	-	-	-	-	-	280 (0.03)
Pension	48333.4 (10.53)	31764.7 (4.45)	45000 (5.98)	24583.3 (2.44)	25000 (1.53)	44444.5 (1.23)	35800 (3.21)
Service	52500 (11.43)	65882.3 (9.22)	20000 (2.66)	60000 (5.96)	-	-	40600 (3.64)
Total	459166.74	714352.65	753083.38	1007249.95	1629071.39	3600556.64	1115870

Note: Figures in the parentheses shows the percentage of total income

Table 6.2

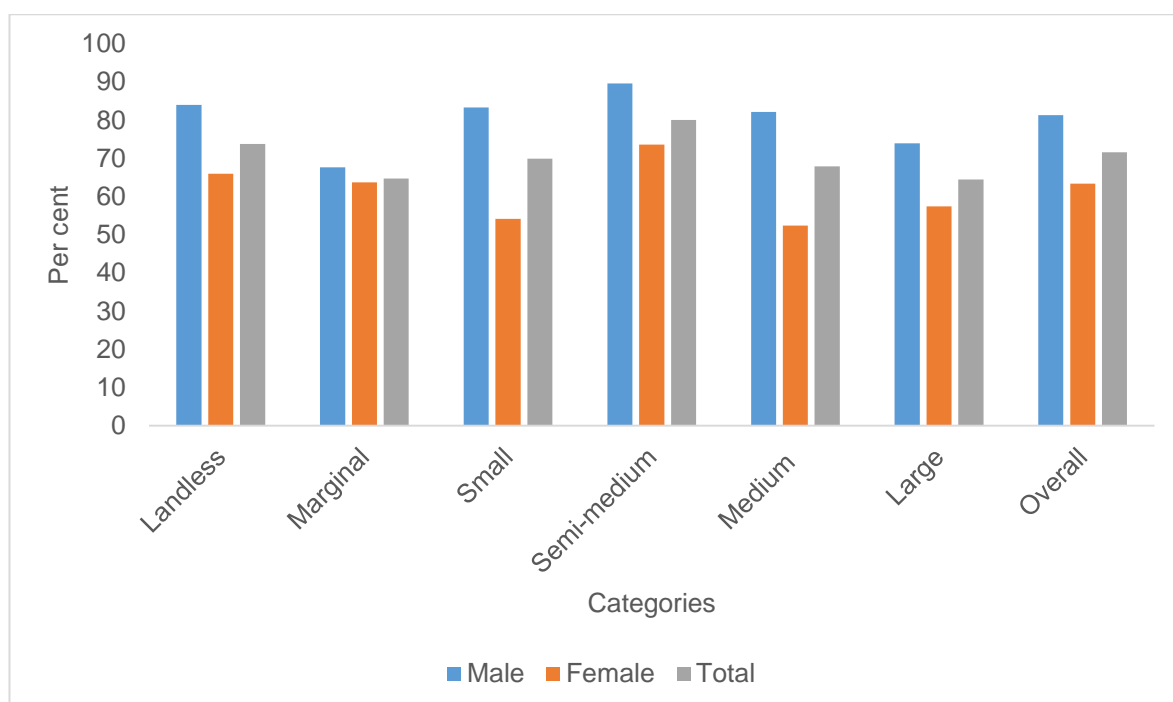
Category-wise income from various sources of the non-member farmers of Milkfed (in ₹)

Category	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Crop farming	-	47727.27 (5.14)	287632 (49.19)	547778 (64.62)	1111668 (74.35)	2472222 (89.48)	514400 (56.64)
Leased-out income	-	90545 (9.75)	8395 (1.44)	17778 (2.10)	13333 (0.89)	4444 (0.16)	16755 (1.84)
Hiring out the agricultural Implements	-	-	-	11112 (1.31)	95833 (6.41)	11111 (0.40)	23500 (2.59)
Sale of assets	12613 (3.72)	29545 (3.18)	19211 (3.29)	35333 (4.17)	19583 (1.31)	10000 (0.36)	20420 (2.25)
Dairy farming	95838 (28.28)	151364 (16.31)	173684 (29.70)	199611 (23.55)	185833 (12.43)	191666 (6.94)	154840 (17.05)
Other allied activities	807 (0.24)	-	10526 (1.80)	-	-	-	2250 (0.25)
Wage employment	48549 (14.33)	-	-	-	-	-	15050 (1.66)
Self-employment	167742 (49.50)	27273 (2.94)	39474 (6.75)	-	-	-	62500 (6.88)
Remittances from abroad	-	77272 (8.32)	10526 (1.80)	36111 (4.26)	-	33333 (1.21)	20000 (2.20)
NREGA	2339 (0.69)	-	-	-	-	-	725 (0.08)
Pension	7742 (2.28)	121218 (13.06)	22632 (3.87)	-	57000 (3.81)	-	27212 (3.00)
Service	3226 (0.95)	383273 (41.29)	12632 (2.16)	-	12000 (0.80)	40000 (1.45)	50600 (5.57)
Total	338856	928217.27	584712	847723	1495250	2762776	908252

Note: Figures in the parentheses shows the percentage of total income

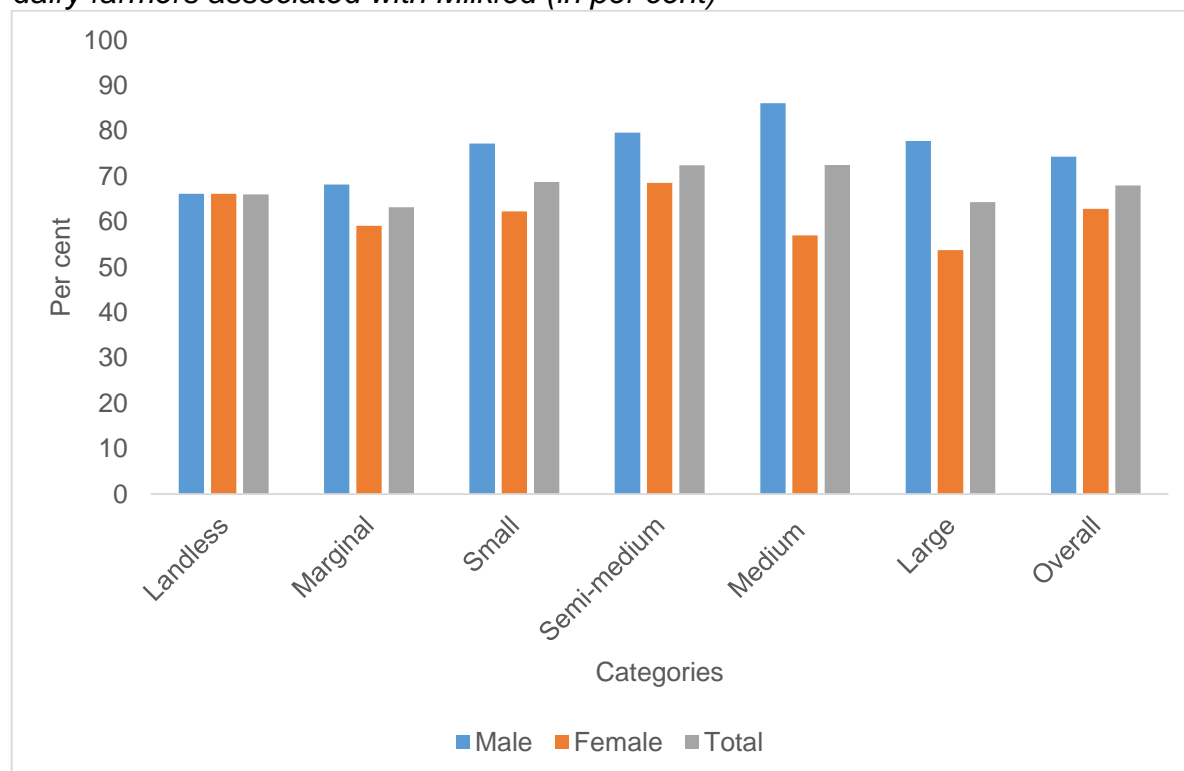
The enterprise of dairy farming is considered as a source of gainful employment provider mainly for the rural landless, marginal and small farmers whose land-size is less and their opportunity cost in getting job in other sectors is almost negligible. In this context, the contribution of dairy farming in providing self-employment to family members associated with Milkfed is shown in Fig. 6.1. Around 84 per cent and 66 per cent of the male and female respectively were found to be engaged in this sector. In overall landless farmers, around 74 per cent of adult family members were employed in dairying. The contribution of semi-medium male and female farmers was worked out to be around 90 per cent and 73 per cent respectively. The contribution of marginal farmers was found to be comparatively less as among marginal farmers, the share of male as well as female members above 60 was found higher than other categories and they were not involved in this enterprise. Among overall category of farmers, dairying provided employment to about 71 per cent of adult family members with 81 per cent of total male members and 63 per cent of female members.

Fig. 6.1
Contribution of dairy farming in self-employment of family members of member dairy farmers associated with Milkfed (in per cent)



The contribution of dairy farming in the provision of self-employment to non-member of Milkfed is explained in Fig. 6.2. Around 66 per cent of the total adult landless family members were found to be involved in this sector with the equal share of male as well as female members. The share of marginal and small farmers was worked out to be around 63 per cent and 69 per cent respectively. Among the medium and large farmers, the overall share of family members was calculated to be 72.5 and about 64 per cent respectively. However, among these two categories the share of female members was worked out to be comparatively less due to higher involvement of hired labour. In overall, dairy provided self-employment to 68 per cent of adult members having around 73 per cent share of male members and 63 per cent of female members. Thus, it may be summed up that along with providing self-employment to male members, it is also a source of employment of family female members as the potential activities in dairying were found to be performed by women. Therefore, dairying has emerged a significant tool for women empowerment too.

Fig. 6.2
Contribution of dairy farming in self-employment of family members of non-member dairy farmers associated with Milkfed (in per cent)



The participation of hired and family male as well female labour in different activities of dairy farming, per household utilisation of labour as well as per milch animal utilisation of labour of member and non-member farmers of Milkfed is shown in Table 6.3 and 6.4 respectively. Data revealed that, among the various activities involved in dairying enterprise, cutting fodder, bringing, chaff cutting and feeding took highest time (1.34 hours for member farmers and 1.69 for non-member farmers), followed by milking (1.19 hours for member farmers and 1.00 for non-member farmers) for the member farmers as well as non-member farmers. Family women spent highest time in milking (0.71 hours for member farmers and 0.75 for non-member farmers), followed by cattle shed cleaning (0.57 hours for member farmers and 0.42 for non-member farmers). Participation of non-member male farmers in cattle shed cleaning was found to be comparatively low. Also, due to facility of farm gate selling milk to some of the non-member farmers, time spent on selling milk was found less as compared to member farmers. Annual employment generation in man-days per household was worked out to be 232.88 days as against 187.59 days in case of non-member farmers. Annual employment generation man-days per milch animal was worked out to be 63.6 days in case of member farmers as compared to 70.87 days in case of non-member farmers. The annual employment generation man-days per milch animal was higher among non-member farmers because their time spent on cutting fodder was higher than member farmers as landless non-member farmers were usually go to fields of other farmers and collect the grass grown on the edges of their field sides. Therefore, despite more annual employment generation man-days per household, the annual employment generation man-days per milch animal was found to be less in case of member farmers of Milkfed. The higher annual employment generation may days per household in case of member farmers was also higher due to large number of herd size. In this context, dairy farming provides potential employment to male as well as female farmers.

Table 6.3

Labour utilisation in various activities of member dairy farmers associated with Milkfed (activities in hours/day)

Activities	Hired male labour	Hired female labour	Family male labour	Family female labour	Total
Cutting fodder, bringing, chaff cutting and feeding	0.24	-	0.97	0.13	1.34
Cattle shed cleaning	0.14	0.03	0.30	0.54	1.01
Animal cleaning	0.16	-	0.47	0.37	1
Grazing	0.01	-	0.09	0.00	0.1
Milking	0.06	-	0.42	0.71	1.19
Selling milk	0.03	-	0.71	0.06	0.8
Making cattle dung cake	0.01	0.01	0.00	0.38	0.4
Total time spent/day/household	0.64	0.036	2.97	2.19	5.84
Time spent in man-hours/day/household	0.64	0.024	2.97	1.47	5.10
Annual employment generation in man-day/household	29.20	1.10	135.51	67.07	232.88
Total time spent/day/milch animal	0.13	0.01	0.82	0.65	1.61
Time spent in man-hours/day/milch animal	0.13	0.01	0.82	0.44	1.4
Annual employment generation man-day/milch animal	5.93	0.36	37.41	19.90	63.6

Table 6.4

Labour utilisation in various activities of non-member dairy farmers of Milkfed (activities in hours/day)

Activities	Hired male labour	Hired female labour	Family male labour	Family female labour	Total
Cutting fodder, bringing, chaff cutting and feeding	0.15	-	1.31	0.23	1.69
Cattle shed cleaning	0.07	0.01	0.11	0.41	0.6
Animal cleaning	0.07	-	0.51	0.15	0.73
Grazing	-	-	0.02	-	0.02
Milking	0.01	-	0.24	0.75	1
Selling milk	0.02	-	0.40	0.04	0.46
Making cattle dung cake	-	0.01	0.00	0.21	0.22
Total time spent/day/household	0.32	0.02	2.58	1.79	4.71
Time spent in man-hours/day/household	0.32	0.01	2.58	1.20	4.11
Annual employment generation in man-day/household	14.68	0.56	117.56	54.79	187.59
Total time spent/day/milch animal	0.15	0.005	0.92	0.72	1.795
Time spent in man-hours/day/milch animal	0.15	0.003	0.92	0.48	1.55
Annual employment generation man-day/milch animal	6.84	0.14	41.98	21.91	70.87

6.2 Gujarat Cooperative Milk Marketing Federation (GCMMF)

The perusal of table 6.5 represents the category-wise share of income from various sources of the member and non-member dairy farmers of GCMMF. Among the landless member farmers, income from self-employment (40.79 per cent) contributes the largest share followed by dairying (26.57 per cent). However, the share of dairying among marginal farmers was calculated to around 40 per cent and

was found to be major source of income. In case of small farmers, dairying contributed around 27.5 per cent which was next to the share of crop farming (45.91 per cent). The share of crop farming had the topmost place among semi-medium, medium and large farmers. Dairy farming constituted 13.84 per cent of gross income to semi-medium farmers and 7.69 per cent of large farmers whereas its share in case of medium farmers was just worked out to be 2 per cent as after receiving around 87.6 per cent of gross income from crop farming, they were also fetching significant income from hiring out the agricultural machinery such as combine, laser land leveller etc., pension, sale of assets etc. In overall category of farmers, farmers were getting highest share of income from crop farming (about 55 per cent), followed by dairy farming (21.03 per cent). Therefore, among overall farmers, dairying contributed one fifth of the total income. Similarly, the category-wise contribution of income from various sources among the non-member farmers of GCMMF is described in Table 6.6. Among the landless farmers, just like member farmers, self-employment was found to be topmost contributor of gross income having share of about 38 per cent, followed by wage employment (20.45 per cent). Contrary to the member farmers, dairy was found to be the third contributor of gross income having share of 14.41 per cent. This was due to smaller size of milch animals and to some extent, difference in milk price received by both the parties. The share of dairying in case of marginal farmers was calculated to be 15.48 per cent as against about 40 per cent in case of member farmers. Since, the absolute income of non-member farmers was more than the member farmers due to higher share of pension, remittances from abroad, self-employment, therefore, their dependence on dairying was found to be relatively low and hence, the share of dairying was far less than member farmers. Among small farmers, the share of crop farming was found to be highest (around 57 per cent), followed by dairy farming having share of 11.82 per cent as against around 27.56 per cent in case of member farmers. The fact behind this difference was due to the significant income from service sector. GCMMF in the study area was not procuring milk from all the villages. Therefore, in its milk collection centre farmers usually used to sell milk from another villages as well. Hence, farmers receiving sufficient income from non-farm means did not prefer to sell milk in another villages and therefore they participated in informal market. The share of income from dairying in case of semi-medium, medium and large farmers was worked out to be 11.48 per cent, 6.18 per cent and 6.08 per cent respectively.

In overall, it was found to be 10.33 per cent. To sum up, it may be concluded that selling milk in formal market has a positive impact on income as compared to selling in informal market.

Table 6.5

Category-wise income from various sources of member farmers associated with GCMMF (in ₹)

Category	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Crop farming	-	53458.33 (17.31)	274074.07 (45.91)	459210.56 (57.10)	1133333.34 (87.63)	2600000 (88.89)	362080 (54.75)
Leased-out income	1875 (0.95)	8625 (2.79)	-	-	3750 (0.29)	-	2820 (0.43)
Hiring out the agricultural Implements	-	-	35185.19 (5.89)	20526.31 (2.55)	40000 (3.09)	-	18200 (2.75)
Sale of assets	24312.5 (12.32)	46041.67 (14.91)	32462.46 (5.44)	34789.47 (4.33)	22916.67 (1.77)	100000 (3.42)	35065 (5.30)
Dairy farming	52437.5 (26.57)	123375 (39.94)	164555.56 (27.56)	111263.16 (13.84)	25833.34 (2.00)	225000 (7.69)	139070 (21.03)
Other allied activities	3125 (1.58)	-	-	1578.95 (0.20)	12500 (0.97)	-	2300 (0.35)
Wage employment	32875 (16.66)	-	-	-	-	-	5260 (0.80)
Self-employment	80500 (40.79)	18750 (6.07)	7407.41 (1.24)	21052.63 (2.62)	25000 (1.93)	-	26380 (3.99)
Remittances from abroad	-	36250 (11.74)	42222.23 (7.07)	78947.37 (9.82)	-	-	35100 (5.31)
NREGA	1468.75 (0.74)	-	-	-	-	-	235
Pension	-	18200 (5.89)	36666.67 (6.14)	37894.74 (4.71)	30000 (2.32)	-	25068 (3.79)
Service	750 (0.38)	4166.67 (1.35)	4444.45 (0.74)	38947.37 (4.84)	-	-	9720 (1.47)
Total	197343.75	308866.67	597018.04	804210.56	1293333.35	2925000	661298

Note: Figures in the parentheses shows the percentage of total income

Table 6.6

Category-wise income from various sources of non-member farmers associated with GCMMF (in ₹)

Category	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Crop farming	-	48500 (9.78)	304600 (56.96)	493334 (64.91)	891666.67 (74.05)	2400000 (83.33)	344450 (53.02)
Leased-out income	-	75500 (15.23)	8400 (1.57)	-	-	-	17200 (2.65)
Hiring out the agricultural Implements	-	-	36000 (6.73)	69524 (9.15)	166666.67 (13.84)	250000 (8.68)	48600 (7.48)
Sale of assets	26000 (14.18)	22000 (4.44)	15480 (2.89)	16857.14 (2.22)	22083.33 (1.83)	55000 (1.91)	20210 (3.11)
Dairy farming	26425 (14.41)	76725 (15.48)	63240 (11.82)	87238.09 (11.48)	73750 (6.12)	175000 (6.08)	67110 (10.33)
Other allied activities	2632 (1.44)	-	2000 (0.37)	-	29166.67 (2.42)	-	4545.46 (0.70)
Wage employment	37500 (20.45)	7500 (1.51)	5800 (1.08)	-	-	-	11200 (1.72)
Self-employment	70000 (38.17)	77500 (15.63)	12000 (2.24)	3571.42 (0.47)	-	-	32500 (5.00)
Remittances from abroad	15000 (8.18)	67500 (13.62)	8400 (1.57)	19047.62 (2.51)	-	-	41500 (6.39)
NREGA	5850 (3.19)	-	480 (0.09)	-	-	-	1290 (0.20)
Pension	-	79000 (15.94)	24000 (4.49)	70476.19 (9.27)	-	-	36600 (5.63)
Service	-	41500 (8.37)	54400 (10.17)	-	20833.33 (1.73)	-	24400 (3.76)
Total	183407	495725	534800	760048.46	1204166.67	2880000	649605.46

Note: Figures in the parentheses shows the percentage of total income

Figure 6.3 scrutinizes the role of dairy farming in providing self-employment to family members of farmers associated with GCMMF. Among the landless farmers, around 69 per cent of adult family members were engaged in this enterprise having around 73 per cent share of male members and 68 per cent share of female members. Among the marginal farmers the overall share, share of male members and that of female members varied from around 84 per cent to 86 per cent. Therefore, the male and female members were almost equally involved in this sector whereas among small farmers, the share of female members (87 per cent) was far more than the male members (79 per cent). Among large farmers, all of the adult male as well as female members were found to be involved in this sector as the large farmers were entirely dependent upon farm income mainly upon crop farming and therefore despite lesser share in income from dairying they were actively engaged in this supplementary income providing sector. In overall category, the share of male, female and overall adult members was found to be about 82 per cent, 79 per cent and 80 per cent respectively.

Fig. 6.3
Contribution of dairy farming in self-employment of family members of member dairy farmers associated with GCMMF (in per cent)

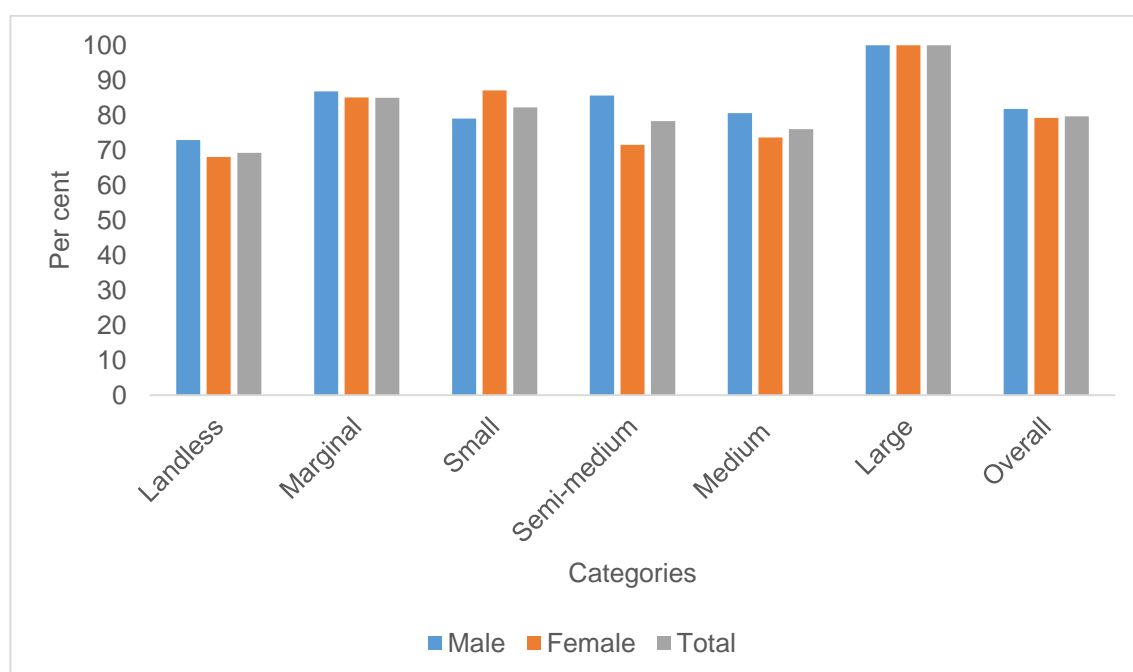
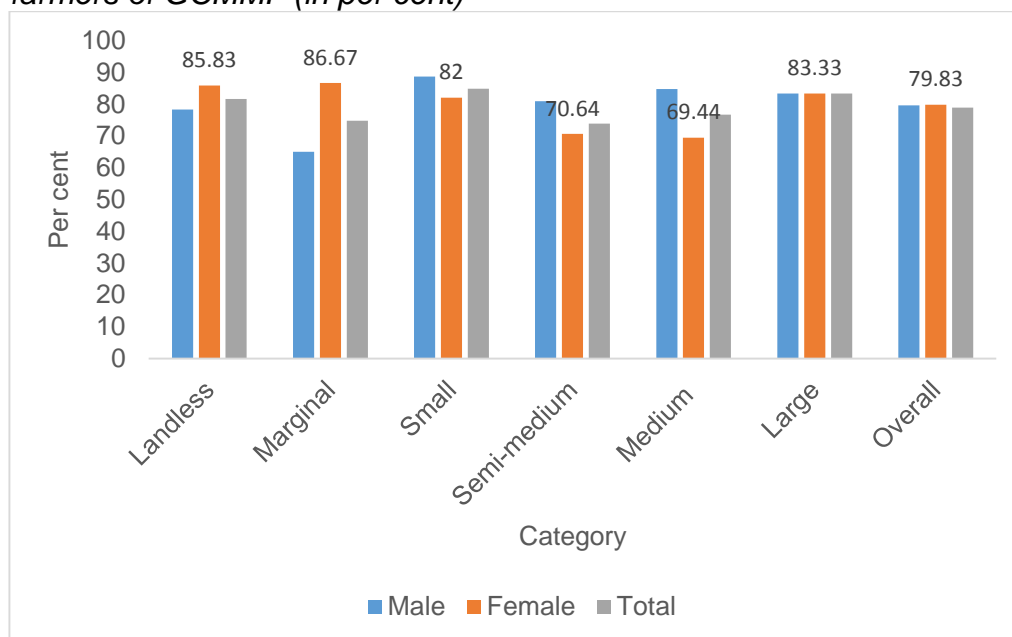


Fig. 6.4 analyses the contribution of dairying in providing self-employment to family members of non-member farmers of GCMMF. In case of landless as well marginal farmers, the share of female farmers (86 per cent and 87 per cent of landless and marginal farmers respectively) was found to more than male members (78 per cent and 65 per cent of landless and marginal farmers respectively) whereas in case of large farmers, there was equal share of male as well female members in dairy farming (83.33 per cent). Among the overall adult family members, the small farmers were found to be highly participating in this enterprise as about 85 per cent of the family members were involved in this occupation. The share of male and female farmers was worked out to be 89 per cent and 82 per cent respectively. Among the overall category of farmers, around 79 per cent of the family members were self-employed in milk production and marketing having share of male and female members of 79 per cent and 80 per cent respectively. Hence, female were more involved in dairying than male members as among non-members, male members were mainly involved in non-farm business. For this reason also, women preferred to sale milk from their farm gate and not to milk collection centres of GCMMF that was at distance from their residence.

Fig. 6.4
Contribution of dairy farming in self-employment to family members of non-member dairy farmers of GCMMF (in per cent)



The participation of hired and family male as well female labour in different activities of dairy farming, per household utilisation of labour as well as per milch animal utilisation of labour of member and non-member farmers of GCMMF is shown in Table 6.7 and 6.8 respectively. Among the various activities involved in dairying enterprise, cutting fodder, bringing, chaff cutting and feeding was found to be consume highest time (2.07 hours for member farmers and 2.55 for non-member farmers), followed by animal cleaning in case of member farmers (1.27 hours) and milking in case of non-member farmers (1.28 hours). Women (hired and family) spent highest time in milking (0.68 hours for member farmers and 0.79 for non-member farmers), followed by animal cleaning in case of member farmers (0.64 hours) and cattle shed cleaning for non-member farmers (0.66 hours). Due to facility of farm gate selling milk to some of the non-member farmers, time spent on selling milk was found less as compared to member farmers. Annual employment generation in man-days per household was worked out to be 276.48 days as against 267 days in case of non-member farmers. Annual employment generation man-days per milch animal was worked out to be 79 days in case of member farmers as compared to 84.84 days in case of non-member farmers. The annual employment generation man-days per milch animal was higher among non-member farmers due to the higher time spent on cutting fodder. Therefore, despite more annual employment generation man-days per household, the annual employment generation man-days per milch animal was found to be less in case of member farmers of GCMMF. The higher annual employment generation may days per household in case of member farmers was also higher due to large number of herd size. In this context, dairy farming provides potential employment to male as well as female farmers.

Table 6.7

Labour utilisation in various activities of member dairy farmers of GCMMF (activities in hours/day)

Activities	Hired male labour	Hired female labour	Family male labour	Family female labour	Total
Cutting fodder, bringing, chaff cutting and feeding	0.18	0.01	1.78	0.10	2.07
Cattle shed cleaning	0.05	0.11	0.39	0.34	0.89
Animal cleaning	0.09	0.01	0.54	0.63	1.27
Grazing	0.01	-	0.22	0.03	0.26
Milking	0.00	0.04	0.41	0.64	1.09
Selling milk	0.09	-	0.64	0.25	0.98
Making cattle dung cake	-	0.04	0.00	0.29	0.33
Total time spent/day/household	0.42	0.20	3.98	2.28	6.89
Time spent in man-hours/day/household	0.42	0.13	3.98	1.53	6.06
Annual employment generation in man-day/household	19.16	5.93	181.58	69.81	276.48
Total time spent/day/milch animal	0.08	0.02	1.18	0.69	1.97
Time spent in man-hours/day/milch animal	0.08	0.01	1.18	0.46	1.73
Annual employment generation man-day/milch animal	3.53	0.57	53.84	21.06	79

Table 6.8

Labour utilisation in various activities of non-member dairy farmers of GCMMF (activities in hours/day)

Activities	Hired male labour	Hired female labour	Family male labour	Family female labour	Total
Cutting fodder, bringing, chaff cutting and feeding	0.23	-	1.95	0.37	2.55
Cattle shed cleaning	0.05	0.14	0.14	0.52	0.85
Animal cleaning	0.07	-	0.71	0.29	1.07
Grazing	-	-	0.1	0.07	0.17
Milking	0.02	-	0.47	0.79	1.28
Selling milk	0.01	-	0.36	0.03	0.4
Making cattle dung cake	-	0.11	-	0.32	0.43
Total time spent/day/household	0.38	0.25	3.73	2.39	6.75
Time spent in man-hours/day/household	0.38	0.17	3.73	1.58	5.85
Annual employment generation in man-days/household	17.3	7.5	170.2	72.0	267.0
Total time spent/day/milch animal	0.13	0.02	1.34	0.57	2.06
Time spent in man-hours/day/milch animal	0.13	0.01	1.34	0.3762	1.86
Annual employment generation man-day/milch animal	5.93	0.60	61.14	17.16	84.84

6.3 Baani Milk Producers' Company Limited (BMPCL)

Category-wise share of income from various sources of member and non-member farmers of BMPCL is shown in Table 6.9 and 6.10 respectively. The share of income of member farmers from dairy farming was 10.21 per cent as compared to 7.23 per cent in case of non-member farmers. The share of income from dairy farming varied from 36.65 per cent in case of landless member farmers to 6.08 per cent in case of large member farmers while in case of non-member farmers, it varied from 31.38 per cent in case of landless farmers to 3.33 per cent in case of large farmers. The

highest share of income of both member as well as non-member farmers was from crop farming (72.86 in case of member farmers and 74.86 per cent in case of non-member farmers) followed by dairy farming and the least share was from NREGA (0.02 per cent in case of member farmers and 0.08 per cent in case of non-member farmers). The share of income in case of member farmers from leased-out income, wage employment, self-employment and remittances from abroad was less than one per cent. Similarly, in case of non-member farmers, the share of income from self-employment was less than one per cent.

Figure 6.5 and 6.6 represents the share of family members involved in dairy farming in case of member as well as non-member farmers respectively. The share of family members involved in dairy farming in case of member farmers was 75.41 per cent as against 70.53 per cent in case of non-member farmers. The share of male member farmers was 87.17 per cent and 77.17 per cent in case of non-member farmers. Similarly, the share of female member farmers was 67.84 per cent and the share of female non-member farmers was 67.42 per cent. In case of member farmers, the share of overall family members involved in dairying was highest among landless farmers (88.89 per cent) and least was among large farmers (81.25 per cent) whereas in case of non-member farmers, this share was highest among marginal farmers (79.44 per cent) and least was among large farmers (55.56 per cent). In case of member as well as non-member farmers, among all the categories, the share of male members in this enterprise was highest in case of small farmers (92.31 per cent in case of member farmers 90.91 per cent in case of non-member farmers) and least was among large farmers in case of both among member as well as non-member farmers (81.25 per cent in case of member farmers and 55.56 per cent in case of non-member farmers). The share of female member farmers was highest in case of landless farmers (96.3 per cent) as compared to marginal and large farmers (77.78 per cent each) in case of non-member farmers. However, the share of female member farmers was least in case of semi-medium farmers (54.67 per cent) and in case of non-member farmers, it was least among small farmers (66.67 per cent).

Table 6.9

Category-wise income from various sources of member farmers associated with BMPCL (in ₹)

Category	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Crop farming	-	49642.35 (19.97)	304615.23 (54.21)	662000 (74.12)	705000 (77.23)	2325000 (93.40)	599750 (72.86)
Leased-out income	-	15882.35 (6.39)	18461.34 (3.29)	-	-	-	5100 (0.62)
Hiring out the agricultural Implements	-	17647.67 (7.10)	-	48400 (5.42)	4732.34 (0.52)	-	28350 (3.44)
Sale of assets	26111.12 (22.43)	33235.29 (13.37)	48461.45 (8.62)	15200 (1.70)	24821.42 (2.72)	13125 (0.53)	26100 (3.17)
Dairy farming	42666.67 (36.65)	53883.45 (21.67)	61923.07 (11.02)	82320 (9.22)	108214.34 (11.85)	151250 (6.08)	84030 (10.21)
Other allied activities	-	705.88 (0.28)	-	26000 (2.91)	10714.45 (1.17)	-	9620 (1.17)
Wage employment	16666.67 (14.32)	-	-	-	-	-	1500 (0.18)
Self-employment	11128.23 (9.56)	-	-	16000 (1.79)	-	-	5000 (0.61)
Remittances from abroad	-	14705.88 (5.91)	38441.34 (6.84)	-	-	-	7500 (0.91)
NREGA	1833.34 (1.57)	-	-	-	-	-	165 (0.02)
Pension	18000 (15.46)	39411.13 (15.85)	34615.32 (6.16)	19200 (2.15)	22285.21 (2.44)	-	28440 (3.45)
Service	-	23529.46 (9.46)	55384.15 (9.86)	24000 (2.69)	37142.85 (4.07)	-	27600 (3.35)
Total	116406.03	248643.46	561901.9	893120	912910.61	2489375	823155

Note: Figures in the parentheses shows the percentage of total income

Table 6.10

Category-wise income from various sources of non-member farmers associated with BMPCL (in ₹)

Category	Landless	Marginal	Small	Semi-medium	Medium	Large	Overall
Crop farming	-	62666.57 (22.20)	309545.34 (48.35)	708200 (82.15)	1238888.89 (81.40)	2366467 (87.44)	731860 (74.86)
Leased-out income	-	25000 (8.86)	56363.78 (8.80)	-	16666.67 (1.10)	130000 (4.80)	18600 (1.90)
Hiring out the agricultural Implements	-	63433 (22.47)	36363.34 (5.68)	16000 (1.86)	39166.34 (2.57)	-	26500 (2.71)
Sale of assets	29000 (22.41)	12500 (4.43)	15181.83 (2.37)	10000.86 (1.16)	22777.78 (1.50)	33333.56 (1.23)	19630 (2.01)
Dairy farming	40736.45 (31.48)	42500 (15.05)	81818.44 (12.78)	78880.31 (9.15)	80611.12 (5.30)	90000 (3.33)	70730 (7.23)
Other allied activities	-	-	4545.56 (0.71)	9000 (1.04)	5694.45 (0.37)	-	8400 (0.86)
Wage employment	3352.05 (2.59)	8333.34 (2.95)	-	-	-	-	16150 (1.65)
Self-employment	13421.20 (10.37)	-	-	8000 (0.93)	-	-	4550 (0.47)
Remittances from abroad	10526.32 (8.13)	-	27272.24 (4.26)	32000 (3.71)	35294.11 (2.32)	-	25000 (2.56)
NREGA	1894.74 (1.46)	1200.56 (0.43)	-	-	-	-	780 (0.08)
Pension	-	-	18181.23 (2.84)	-	27333.48 (1.80)	86666.67 (3.20)	14440 (1.48)
Service	30482.34 (23.55)	66667 (23.62)	90909.32 (14.20)	-	55555.67 (3.65)	-	41000 (4.19)
Total	129413.10	282300.47	640181.08	862081.17	1521988.51	2706467.23	977640

Note: Figures in the parentheses shows the percentage of total income

Fig. 6.5
Contribution of dairy farming in self-employment to family members of member dairy farmers of BMPCL (in per cent)

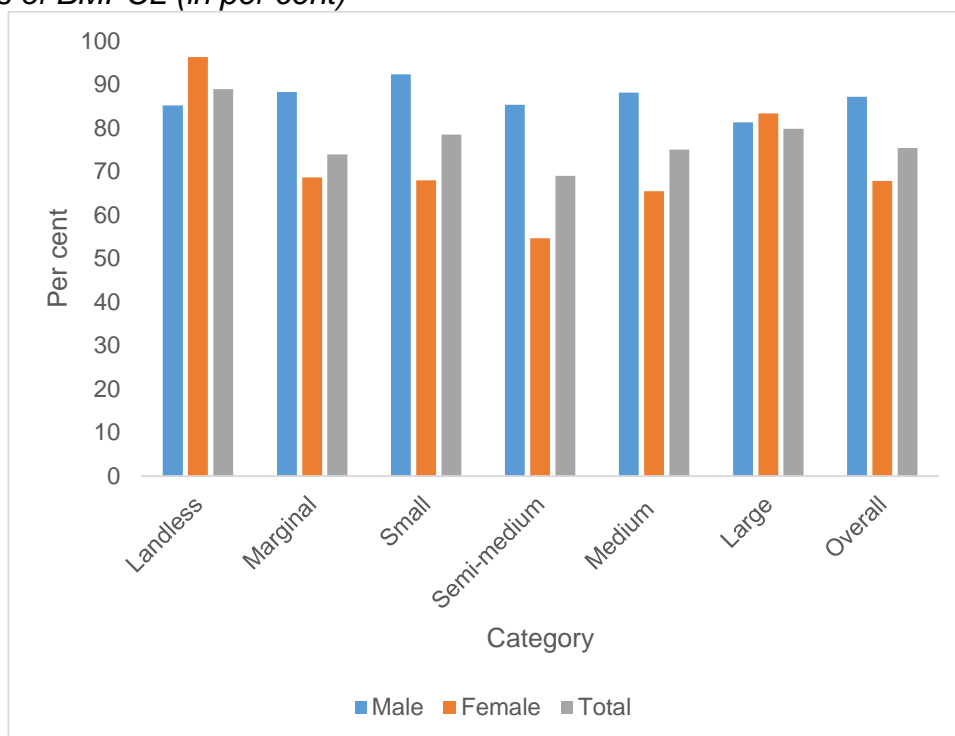
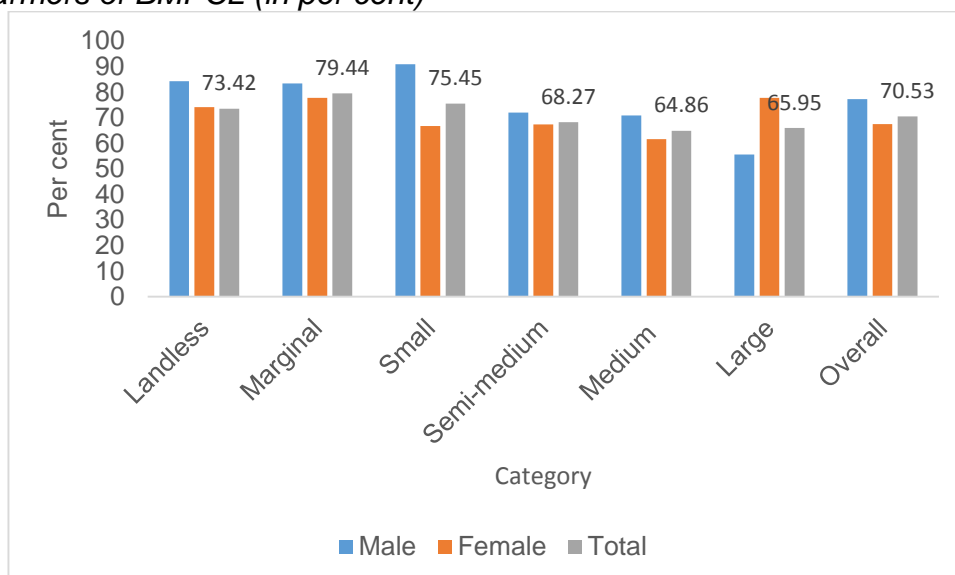


Fig. 6.6
Contribution of dairy farming in self-employment to family members of non-member dairy farmers of BMPCL (in per cent)



Labour utilisation of hired and family male and female labour in various activities of dairy farming, annual employment generation man days per household, annual employment generation per milch animal is depicted in Table 6.11 and 6.12 for member and non-member farmers of BMPCL respectively. Among all the activities

involved in dairy farming cutting fodder, bringing, chaff cutting and feeding was found to be the highest time consuming activity in case of both the member (2.35 hours) as well as non-member farmers (2.11 hours) followed by milking (1.37 hours in case of member farmers and 1.33 in case of non-member farmers). Annual employment generation man days per household was found to be 274.03 days for member farmers and 253.90 days for non-member farmers. Further, annual employment generation man day per milch animal was 91.15 days and 88.04 days for member and non-member farmers respectively.

Table 6.11

Labour utilisation in various activities of member dairy farmers of BMPCL (activities in hours/day)

Activities	Hired male labour	Hired female labour	Family male labour	Family female labour	Total
Cutting fodder, bringing, chaff cutting and feeding	0.33	-	1.57	0.45	2.35
Cattle shed cleaning	0.08	0.22	0.09	0.65	1.04
Animal cleaning	0.15	-	0.84	0.18	1.17
Grazing	-	-	0.02	-	0.02
Milking	0.04	-	0.51	0.82	1.37
Selling milk	0.05	-	0.43	0.03	0.51
Making cattle dung cake	-	0.19	-	0.29	0.48
Total time spent/day/household	0.65	0.41	3.46	2.42	6.94
Time spent in man-hours/day/household	0.65	0.27	3.46	1.62	6.01
Annual employment generation in man-day/household	29.66	12.53	157.86	73.98	274.03
Total time spent/day/milch animal	0.22	0.14	1.15	0.80	2.30
Time spent in man-hours/day/milch animal	0.22	0.09	1.15	0.54	2.00
Annual employment generation man-day/milch animal	10.04	4.15	52.47	24.50	91.15

Table 6.12

Labour utilisation in various activities of non-member dairy farmers of BMPCL (activities in hours/day)

Activities	Hired male labour	Hired female labour	Family male labour	Family female labour	Total
Cutting fodder, bringing, chaff cutting and feeding	0.27	-	1.45	0.39	2.11
Cattle shed cleaning	0.13	0.16	0.07	0.59	0.95
Animal cleaning	0.17	0.03	0.79	0.21	1.2
Grazing	-	-	-	-	-
Milking	0.02	-	0.53	0.78	1.33
Selling milk	0.07	-	0.39	-	0.46
Making cattle dung cake	-	0.15	-	0.19	0.34
Total time spent/day/household	0.66	0.34	3.23	2.16	6.39
Time spent in man-hours/day/household	0.66	0.23	3.23	1.45	5.57
Annual employment generation in man-day/household	30.11	10.39	147.37	66.03	253.90
Total time spent/day/milch animal	0.23	0.12	1.12	0.75	2.21
Time spent in man-hours/day/milch animal	0.23	0.079	1.12	0.50	1.93
Annual employment generation man-day/milch animal	10.49	3.60	51.10	22.85	88.04

6.4 Summary

In the end, it may be concluded that dairy is a supportive activity for enhancing the income of the farmers and providing additional employment opportunities. The share of income from dairy farming was higher in case of member farmers as compared to non-member farmers. Similarly, annual employment generation man day per household was also higher for member farmers than non-member farmers.

CHAPTER 7

FARMERS' PARTICIPATION IN FORMAL MILK MARKETS: COST, RETURNS AND DETERMINANTS

Along with the emergence of formal milk markets in Punjab, traditional milk market still dominates and involves significant number of intermediaries also. Thereby, in informal milk market, the price spread between producer and consumer expands and producer's share in consumer's rupee declines. That also reduces the marketing efficiency as well. Hence, it is stated that formal milk market enhances consumers' gross returns by ensuring them better prices and ensured market in all seasons. Thus, the main aim of this chapter is to compare the cost and returns of milk production under both the formal as well as informal milk market and to examine the various factors determining the farmers' participation in formal milk markets and its impact on gross income.

7.1 Cost and Returns of Milk Production

7.1.1 The Punjab State Cooperative Milk Producers Federation Limited (Milkfed)

Table 7.1 represents the species-wise costs from milk production among member as well as non-member farmers associated with Milkfed. Per day gross cost or cost C of buffalo milk production was found to be slightly more among member farmers (₹ 250.61) as compared to non-member farmers (₹ 244.97). Feeding costs were worked out to be major cost component in buffalo milk production as it constituted around 70 per cent of gross cost in case of member farmers and 67 per cent in non-member farmers. Human labour cost was found to be the second largest component of gross cost among member as well as non-member farmers. However, it was higher among non-member farmers as compared to member farmers. In both the cases, TVC was calculated above 91 per cent. In case of crossbred cows too, feeding costs accounted around 70 per cent in case of farmers associated with Milkfed as against 67 per cent among non-member farmers. However, the human labour cost was worked out to be less in case of member farmers as against non-member farmers. This may be due to the fact that among non-member farmers, most of landless farmers were resource poor farmers who either collect grass for fulfilling the need of green fodder from the fields of other farmers situated at far distance from their residence. Cutting grass much more time than cutting green

fodder from field. A little difference was found in gross cost of member (₹ 258.59) and non-member farmers (₹ 254). In case of local cows, feeding cost constituted about 68 per cent and 63 per cent in member and non-member farmers of Milkfed respectively. Human labour charges accounted around 19 per cent in case of member farmers and around 23 per cent in case of non-member farmers. Gross cost was found almost equal for both the parties. However, it was marginally higher for non-member farmers. Hence, among all the species, feed and fodder cost was worked out to be single largest cost component among member and non-member farmers followed by human labour cost. Among all the species, TVC was found to be more than 90 per cent.

Table 7.2 represents the per day returns from milk production among member and non-member farmers. A significant difference was found in gross returns from buffalo milk production among member (₹ 556.82) and non-member farmers (₹ 451.22). This was due to a slightly higher milk yield of member farmers and major difference in milk price in both. The significant difference in milk price received by member and non-member farmers was due to the determination strategies of milk price. In case of formal milk market, price of milk was determined on the basis of fat and SNF whereas in case of informal milk market several marketing channels were observed such as selling milk to private dairies, sweet shops, local traders and directly to consumers. The determination of price in each channel was based on different parameters. It was found that price paid by private dairies was much lower than price paid by Milkfed. Net return per litre of milk was also higher in formal milk market than in informal milk market. Gross margin of the member milk producers was worked out to be ₹ 335.91 as against around ₹ 235 of non-member milk producers. Further, input-output ratio was worked out to be 2.22 in case of member farmers indicating that one rupee investment in buffalo milk production fetches ₹ 2.22. However, in case of non-member farmers, it was 1.84 indicating that one rupee investment in buffalo milk production fetches ₹ 1.84. In case of crossbred cows too, a notable difference was calculated in case of gross returns due to significant difference in price received by both the parties. Hence, net returns were found to be ₹ 259.29 and ₹ 158.77 for member and non-member farmers respectively. Cost per litre of milk was found to be same in case of both the parties but net return per litre of milk was much higher for member farmers of Milkfed. Similarly, input-output ratio was calculated 1.98 and 1.59 for member and non-member farmers respectively. In

case of local cows also, gross returns were significantly higher in case of member farmers due to higher price received by member farmers. Net returns were found more than double in case of member farmers (₹ 29.82) as compared to non-member farmers (₹ 8.22). Hence, input-output ratio was worked out to be 1.11 in case of member farmers indicating the economic viability of project whereas it was found 1.00 in case of non-member farmers indicating that the project is neither worthwhile nor unprofitable. Hence, there was a highly difference between the price received by member farmers as compared to non-member farmers in all the species. Therefore, net return, net return per litre of milk, gross margin and input-output ratio were found to be higher among member farmers. In this context, it may be concluded that selling milk to formal market is more profitable than in informal market.

Table 7.1

Component-wise costs from milk production of member and non-member farmers associated with Milkfed (in ₹/day/milch animal)

Component	Member farmers			Non-member farmers		
	Buffalo	Crossbred cow	Local cow	Buffalo	Crossbred cow	Local cow
Green fodder	44.72 (17.84)	46.76 (18.08)	38.83 (17.94)	41.37 (16.89)	42.89 (16.89)	33.24 (15.30)
Dry fodder	40.89 (16.32)	40.84 (15.79)	33.26 (15.37)	38.01 (15.52)	40.58 (15.98)	33.21 (15.28)
Concentrate	90.32 (36.04)	94.82 (36.67)	76.03 (35.13)	85.64 (34.96)	87.65 (34.51)	71.51 (32.91)
Feed and fodder cost	175.93 (70.20)	182.42 (70.54)	148.12 (68.44)	165.02 (67.36)	171.12 (67.37)	137.96 (63.49)
Veterinary	4.9 (1.96)	6.28 (2.43)	4.36 (2.01)	4.7 (1.92)	5.6 (2.20)	4.9 (2.25)
Misc.	4.8 (1.92)	5.2 (2.01)	4.53 (2.09)	4.6 (1.88)	4.6 (1.81)	4.6 (2.12)
Hired male labour	4.33 (1.73)	5.51 (2.13)	2.95 (1.36)	2.62 (1.07)	9.12 (3.59)	0.93 (0.43)
Hired female labour	0.26 (0.10)	0.17 (0.07)	0.21 (0.10)	0.21 (0.09)	-	-
Family male labour	22.24 (8.87)	22.07 (8.53)	22.02 (10.18)	28.95 (11.82)	24.11 (9.49)	26.9 (12.38)
Family female labour	16.49 (6.58)	13.13 (5.08)	16.03 (7.41)	18 (7.35)	15.8 (6.22)	23.13 (10.64)
Human labour cost	43.32 (17.29)	40.88 (15.81)	41.21 (19.04)	49.78 (20.32)	49.03 (19.30)	50.96 (23.45)
Interest on fixed capital	12.06 (4.81)	13.12 (5.07)	10.06 (4.65)	11.07 (4.52)	12.47 (4.91)	9.8 (4.51)
Depreciation	9.6 (3.83)	10.69 (4.13)	8.13 (3.76)	9.8 (4.00)	11.18 (4.40)	9.09 (4.18)
Total Variable Cost	228.95 (91.36)	234.78 (90.79)	198.22 (91.59)	224.1 (91.48)	230.35 (90.69)	198.42 (91.31)
Total Fixed Cost	21.66 (9.21)	23.81 (9.21)	18.19 (8.41)	20.87 (8.52)	23.65 (9.31)	18.89 (8.69)
Cost A	199.82	210.27	168.3	186.95	201.62	157.48
Cost B	211.88	223.39	178.36	198.02	214.09	167.28
Cost C (gross cost)	250.61	258.59	216.41	244.97	254	217.31
Value of dung	8.04	6.73	6.48	7.87	7.9	7.93
Net cost	242.57	251.86	209.93	237.1	246.1	209.38

Note: Figures in the parentheses shows the percentage of gross cost or cost C.

Table 7.2

Component-wise returns from milk production of member and non-member farmers of Milkfed (in ₹/day/milch animal)

Category Base	Member farmers			Non-member farmers		
	Buffalo	Crossbred Cow	Local Cow	Buffaloes	Crossbred cows	Local cows
Price/litre of milk	50.3	27.63	27.06	42.81	22.9	25.6
Yield	11.07	18.5	8.86	10.54	17.68	8.5
Gross return	556.82	511.15	239.75	451.22	404.87	217.6
Net return (or) Dairy Net Income	314.25	259.29	29.82	214.12	158.77	8.22
Cost /litre of milk	21.91	13.61	29.82	22.5	13.92	24.63
Net return/litre of milk	28.39	14.01	3.37	20.31	8.98	0.97
Dairy Gross Receipts (DGR)	564.86	517.89	246.23	459.09	412.77	225.53
Dairy Farm (Family) Business Income	365.04	307.62	77.93	272.14	211.15	68.05
Dairy Family Labour Income	352.98	294.50	67.87	261.07	198.68	58.25
Gross Margin of Milk Producers	335.91	283.11	48.01	234.99	214.35	27.11
Input-output ratio	2.22	1.98	1.11	1.84	1.59	1.00

7.1.2 Gujarat Cooperative Milk Marketing Federation (GCMMF)

Component-wise costs of milk production of member and non-member milk producers of GCMMF are depicted in Table 7.3. In case of buffalo milk production, feed and fodder cost was found to be the major cost component as it constituted around 65.63 per cent and 61.78 per cent for member and non-member milk producers respectively. Human labour cost was the second major cost component. However, the human labour cost was worked out to be higher among non-member milk producers than member milk producers as most of the non-member milk producers were those farmers whose fields of green fodder were at a far distance from their residence and it took too much time for bringing green fodder at their home. Gross cost or cost C was calculated to be ₹ 274.18 and ₹ 265.66 for the member and non-member farmers respectively. TVC accounted around 92 per cent for both the parties. Similarly, in case of crossbred cows, feeding cost accounted around 66 per cent in both the categories of milk producers. Gross cost was worked out to be ₹ 272.18 and ₹ 262.92 for the member and non-member milk producers respectively. In case of local cows, feeding cost accounted about 62 per cent in case of member milk producers and 58 per cent in case of non-member milk producers. Human labour cost stood at second rank in the cost components. Gross cost was worked out to be ₹ 231.65 and ₹ 228.04 for the member and non-member farmers respectively. Thus, feeding costs are the major cost components and among feeding cost, concentrate cost is highest. Among human labour cost, most of labour work is carried out by family labour. Due to small size of average landholding and landless farmers, hired labour is used rarely.

Table 7.3

Component-wise costs from milk production of the member and non-member farmers of GCMMF (in ₹/day/milch animal)

Component	Member farmers			Non-member farmers		
	Buffalo	Crossbred cow	Local cow	Buffalo	Crossbred cow	Local cow
Green fodder	45.37 (16.55)	45.58 (16.75)	33.67 (14.53)	41.58 (15.65)	41.33 (15.72)	30.00 (13.16)
Dry fodder	40.73 (14.86)	41.47 (15.24)	33.74 (14.57)	40.02 (15.06)	40.67 (15.47)	31.38 (13.76)
Concentrate	93.84 (34.23)	94.12 (34.58)	76.00 (32.81)	82.52 (31.06)	92.07 (35.02)	70.86 (31.07)
Feed and fodder cost	179.94 (65.63)	181.17 (66.56)	143.41 (61.91)	164.12 (61.78)	174.07 (66.21)	132.24 (57.99)
Veterinary	5.33 (1.94)	5.44 (2.00)	4.45 (1.92)	5.70 (2.15)	6.00 (2.28)	5.79 (2.54)
Misc.	4.90 (1.79)	4.88 (1.79)	4.53 (1.96)	5.27 (1.98)	5.67 (2.16)	5.27 (2.31)
Hired male labour	4.34 (1.58)	3.87 (1.42)	1.73 (0.75)	5.35 (2.01)	6.46 (2.46)	3.99 (1.75)
Hired female labour	3.57 (1.30)	1.49 (0.55)	0.59 (0.25)	1.83 (0.69)	4.14 (1.57)	0.49 (0.21)
Family male labour	37.37 (13.63)	34.54 (12.69)	33.23 (14.34)	38.65 (14.55)	44.58 (13.15)	35.58 (15.60)
Family female labour	16.73 (6.10)	14.91 (5.48)	24.88 (10.74)	23.02 (8.67)	20.47 (3.98)	24.93 (10.93)
Human labour cost	62.01 (22.62)	54.81 (20.14)	60.43 (26.09)	68.85 (25.92)	55.65 (21.17)	64.99 (28.50)
Interest on fixed capital	11.93 (4.35)	13.88 (5.10)	10.18 (4.39)	12.09 (4.55)	11.80 (4.49)	11.10 (4.87)
Depreciation	10.07 (3.67)	12.00 (4.41)	8.65 (3.73)	9.63 (3.62)	9.73 (3.70)	8.65 (3.79)
Total Variable Cost	252.18 (91.98)	246.30 (90.49)	212.82 (91.87)	243.94 (91.82)	241.39 (91.81)	208.29 (91.34)
Total Fixed Cost	22.00 (8.02)	25.88 (9.51)	18.83 (8.13)	21.72 (8.18)	21.53 (8.19)	19.75 (8.66)
Cost A	208.15	208.85	163.36	191.9	206.07	156.43
Cost B	220.08	222.73	173.54	203.99	217.87	167.53
Cost C (gross cost)	274.18	272.18	231.65	265.66	262.92	228.04
Value of dung	7.80	8.10	8.06	7.70	7.33	7.48
Net cost	266.38	264.08	223.59	257.96	255.59	220.56

Note: Figures in the parentheses shows the percentage of gross cost or cost C.

Gross returns from milk production of the member and non-member farmers of GCMMF are represented in Table 7.4. In case of member milk producer, gross returns from the buffalo milk production were calculated to be ₹ 566.81 as against ₹ 489.68 in case of non-member milk producers. This was due to difference in milk price received by member and non-member milk producers. Net returns were also found to be higher among member milk producer (₹ 300.43) than non-member milk producers (₹ 231.72). Input-output ratio was worked out to be 2.07 for member milk producers as against 1.84 in case of non-member milk producers. Gross returns were also found to be higher for member milk producers in case of crossbred cows. However, there was not much difference in price received by the farmers between both the parties. Gross margin of the milk producers were worked out to be ₹ 308.07 and ₹ 281.81 in case of member and non-member milk producers respectively. The gross returns of local cows too were more among member milk producers (₹ 252.15) as compared to non-member milk producers (₹ 234.35). Similarly, net returns were found to be ₹ 28.56 and ₹ 13.79 of the member and non-member milk producers respectively. Gross margin of the milk producers were calculated to be ₹ 47.39 and ₹ 33.54 of the member and non-member milk producers. Input-output ratio was worked out to be higher in case of member milk producer (1.09) as compared to non-member milk producers (1.03). Hence, selling milk to formal milk market was found to be more advantageous than selling in informal milk market. However, both the price as well as yield were not significantly higher in case of formal milk market.

Table 7.4

Component-wise returns from milk production of member and non-member farmers of GCMMF (in ₹/day/milch animal)

Category Base	Member farmer			Non-member farmers		
	Buffaloes	Crossbred cows	Local cows	Buffaloes	Crossbred cows	Local cows
Price/litre of milk	49.46	26.91	27.23	46.24	25.4	26.01
Yield	11.46	20.30	9.26	10.59	20.31	9.01
Gross return	566.81	546.27	252.15	489.68	515.87	234.35
Net return (or) Dairy Net Income	300.43	282.19	28.56	231.72	260.28	13.79
Cost /litre of milk	23.24	13.01	24.15	24.13	12.58	24.47
Net return/litre of milk	26.22	13.90	3.08	21.88	12.81	1.53
Dairy Gross Receipts (DGR)	574.61	554.37	260.21	497.38	523.2	241.83
Dairy Farm (family) Business Income	366.46	345.52	96.85	305.48	317.13	85.4
Dairy Family Labour Income	354.53	331.64	86.67	293.39	305.33	74.3
Gross Margin of Milk Producers	322.43	308.07	47.39	253.44	281.81	33.54
Input-output ratio	2.07	2.01	1.09	1.84	1.96	1.03

7.1.3 Bani Milk Producer Company Limited (BMPCL)

Table 7.5 exhibits the cost from milk production for the member and non-member milk producers of BMPCL. In case of buffalo milk production, feed and fodder cost was worked out to be more than 65 per cent of gross cost in case of both member (65.02 per cent) as well as non-member (66.08 per cent) milk producers followed by human labour cost (22.42 per cent and 22.56 per cent for member and non-member milk producers respectively). Total variable cost constituted more than 91 per cent in case of both the member and non-member producers. Gross cost or Cost C was calculated to be ₹ 279.88 and ₹ 275.77 for member and non-member farmers respectively. Similarly, in case of crossbred cows, feeding cost contributed more than 66 per cent of the gross cost under both the formal as well as informal milk market. Cost C was calculated to be ₹ 298.59 and ₹ 294.16 for the member and non-member farmers respectively and TVC also constituted more than 91 per cent of the gross cost for both the farmers. In case of local cows too, above 61 per cent of the gross cost was constituted by feeding cost followed by human labour cost for both the farmers under formal and informal milk markets. Gross cost was calculated to be ₹ 246.33 and ₹ 250.73 for member and non-member farmers respectively. Hence, cost structure was found almost similar between member and non-member farmers among all the three species.

Gross returns from milk production of all the three species for member and non-member farmers of BMPCL are described in Table 7.6. Per litre price of buffalo milk under formal milk market was calculated to be ₹ 44.93 as compared to ₹ 40.04. Accordingly, gross returns were found to be ₹ 494.23 and ₹ 484.48 for member and non-member farmers respectively. Gross margin of milk production was calculated to be ₹ 247.18 and ₹ 238.93 for member and non-member farmers respectively. Input-output ratio was found to be 1.77 and 1.76 for member and non-member farmers respectively. Similarly, in case of crossbred cows, gross returns of the member and non-member farmers were found to be ₹ 580.11 and ₹ 555.88 respectively. The price of milk in case of crossbred cows was worked out to be ₹ 27.73 and ₹ 26 for member and non-member farmers respectively. Input-output ratio was worked out to be 1.94 and 1.89 respectively. Gross margin of milk producers was also higher in case of member milk producers (₹ 314.84) as compared to non-member milk producers (₹ 293.96). The gross returns of local cows were found to be ₹ 330.98 and ₹ 320.19 respectively. Gross margin of the member milk producers

was found to be ₹ 113. 53 as compared to ₹ 99.65 in case of non-member milk producers. The yield level of local cow milk was worked out to be 12.35 litres and 11.85 litres per day for the member and non-member farmers respectively. Input-output ratio was worked out to be 1.34 and 1.28 for member and non-member farmers respectively. However, in case of local cows, price of milk was found to be higher in case of informal milk market (₹. 27.02) as compared to formal milk market (₹ 26.8). Therefore, formal and informal milk market was found to be highly competitive in case of cow milk.

Table 7.5

Component-wise costs from milk production of the member and non-member farmers of BMPCL (in ₹/day/milch animal)

Component	Member farmers			Non-member farmers		
	Buffalo	Crossbred cow	Local cow	Buffalo	Crossbred cow	Local cow
Green fodder	44.69 (15.97)	50.00 (16.75)	35.43 (14.38)	45.13 (16.37)	49.61 (16.86)	37.5 (14.96)
Dry fodder	42.78 (15.29)	48.47 (16.23)	36.73 (14.91)	47.45 (17.21)	48.61 (16.53)	36.25 (14.46)
Concentrate	94.51 (33.77)	99.38 (33.28)	81.45 (33.07)	89.66 (32.51)	97.3 (33.08)	81.25 (32.41)
Feed and fodder cost	181.98 (65.02)	197.85 (66.26)	153.61 (62.36)	182.24 (66.08)	195.52 (66.47)	155 (61.82)
Veterinary	5.64 (2.02)	6.73 (2.25)	4.39 (1.78)	4.72 (1.71)	5.9 (2.01)	5.4 (2.15)
Misc.	4.90 (1.75)	5.21 (1.74)	4.02 (1.63)	4.26 (1.54)	5.23 (1.78)	5.18 (2.07)
Hired male labour	6.38 (2.28)	5.46 (1.83)	5.55 (2.25)	5.12 (1.86)	5.5 (1.87)	4.34 (1.73)
Hired female labour	4.07 (1.45)	3.92 (1.31)	4.12 (1.67)	3.98 (1.44)	4.02 (1.37)	4.87 (1.94)
Family male labour	39.09 (13.97)	40.03 (13.41)	36.45 (14.80)	38.9 (14.11)	41.2 (14.01)	38.38 (15.31)
Family female labour	13.20 (4.72)	14.00 (4.69)	17.34 (7.04)	14.2 (5.15)	12.1 (4.11)	15 (5.98)
Human labour cost	62.74 (22.42)	63.41 (21.24)	63.46 (25.76)	62.2 (22.56)	62.82 (21.36)	62.59 (24.96)
Interest on fixed capital	13.41 (4.79)	14.13 (4.73)	11.69 (4.75)	12.51 (4.54)	13.69 (4.65)	12.56 (5.01)
Depreciation	11.21 (4.01)	11.26 (3.77)	9.16 (3.72)	9.84 (3.57)	11 (3.74)	10 (3.99)
Total Variable Cost	255.26 (91.20)	273.2 (91.50)	225.48 (91.54)	253.42 (91.90)	269.47 (91.61)	228.17 (91.00)
Total Fixed Cost	24.62 (8.80)	25.39 (8.50)	20.85 (8.46)	22.35 (8.10)	24.69 (8.39)	22.56 (9.00)
Cost A	214.18	230.43	180.85	210.16	227.17	184.79
Cost B	227.59	244.56	192.54	222.67	240.86	197.35
Cost C (gross cost)	279.88	298.59	246.33	275.77	294.16	250.73
Value of dung	8.21	7.93	8.03	7.87	7.55	7.63
Net cost	271.67	290.66	238.3	267.9	286.61	243.1

Note: Figures in the parentheses shows the percentage of gross cost or cost C.

Table 7.6

Component-wise returns from milk production of member and non-member farmers of BMPCL (in ₹/day/milch animal)

Category Base	Member farmer			Non-member farmers		
	Buffaloes	Crossbred cows	Local cows	Buffaloes	Crossbred cows	Local cows
Price/litre of milk	44.93	27.73	26.8	40.04	26	27.02
Yield	11	20.92	12.35	12.1	21.38	11.85
Gross return	494.23	580.11	330.98	484.48	555.88	320.19
Net return (or) Dairy Net Income	222.56	289.45	92.68	216.58	269.27	77.09
Cost /litre of milk	24.70	13.89	19.30	22.14	13.41	20.51
Net return/litre of milk	20.23	13.84	7.50	17.90	12.59	6.51
Dairy Gross Receipts (DGR)	502.44	588.04	339.01	492.35	563.43	327.82
Dairy Farm (family) Business Income	288.26	357.61	158.16	282.19	336.26	143.03
Dairy Family Labour Income	274.85	343.48	146.47	269.68	322.57	130.47
Gross Margin of Milk Producers	247.18	314.84	113.53	238.93	293.96	99.65
Input-output ratio	1.77	1.94	1.34	1.76	1.89	1.28

7.2 Determinants of Farmers' Participation in Formal Milk Markets in Punjab

7.2.1 The Punjab State Cooperative Milk Producers Federation Limited (Milkfed)

Table 7.7 explains the various determinants of farmers' decisions to participate in formal milk market. In selection equation, dummy was taken as dependent variable for the participation in formal milk market. The positive and significant sign (at 5 per cent) of the age coefficient indicates that more is the age of the farmer, higher will be the probability of the farmer to participate in formal milk market. The reason behind this was that the milk collection centres or VCSs of Milkfed in the studied village were established three to four decades ago and most of the farmers were linked with it since then. The positive as well as significant sign of the education (at one per cent) also indicates that more the number of education years, more will be the probability of the farmer to participate in formal milk market. Further, the inverse relationship was found between the operated area and farmers' participation in formal milk market i.e. lesser the operated area of farmer, more will be the probability of the farmers' participation in formal milk market. The herd size was the strong predictor of farmers' participation in formal milk market i.e. as herd size increases, farmers prefer to participate in formal milk market. The reason behind this is that Milkfed also gives some incentives on selling large quantity of milk. The negative and significant coefficient of distance also explains that lesser the distance between the milk collection centre and farmers' residence, more will be probability of farmers' participation in formal milk market. Further, in the second stage of econometric analysis, treatment model was used instead of OLS for correcting the sample selection biasedness. In this equation, gross income was positively affected by education, operated area, herd size and participation in formal milk market. However, the farmers with large number of operated area will be having more gross income as indicated by the strong predictor of the coefficient of operated area. Further, the participation in formal milk market raises the income by ₹ 2195.55. Along with these factors, there are also some other factors that also raises the income of the farmers as indicated by the positive and significant sign of the coefficient of constant.

Table 7.7

Treatment Effect Model of Gross Income for Milkfed

Predictor	Coefficient	SE	P>z
Dependent Variable: Binary which assumes value 1 for participation in formal milk market and 0 otherwise			
Family size (number of persons)	-0.117	0.074	0.113
Age (years)	0.030**	0.013	0.017
Education (years)	0.101*	0.031	0.001
Operated area (acres)	-0.105*	0.037	0.006
Herd Size (number of milch animals)	0.203*	0.052	0.000
Distance (km)	-0.317**	0.131	0.016
Constant	-2.520*	0.901	0.005
Gross income			
Family size (number of persons)	463.01	318.16	0.146
Age (years)	-140.73	587.55	0.172
Education (years)	434.84*	153.29	0.005
Operated area (acres)	876.04*	467.48	0.000
Herd Size (number of milch animals)	646.82**	251.91	0.010
Distance (km)	129.92	295.34	0.120
Formal Participation	2195.55**	205.31	0.016
Constant	601.53**	365.62	0.029
ath (ρ)	0.345	0.321	0.726
LR test of independent equations			
Chi-squared (1)			0.000
Probability> chi squared			0.343

Note: *, **, *** indicates statistically significant at 1 per cent, 5 per cent and 10 per cent level respectively.

7.2.2 Gujarat Cooperative Milk Marketing Federation (GCMMF)

The factors determining the participation of farmers in formal milk market i.e. GCMMF is shown in Table 7.8. The positive and significant sign of herd size indicates that more is the herd size, more will be the probability of farmers' participation in formal milk market. Further, farmers residing at lesser distance from Village Cooperative Society (VCS) of GCMMF were more likely to participate in this market as shown by negative and strongly significant sign of distance coefficient. Gross income of the farmers involved in formal milk market was positively affected by operated area, herd size, participation in formal milk market. Income is increased by ₹ 4566.12 with increase in operated area. Participation in formal milk market raises the income of the farmers by ₹ 1210.33. However, there were some other

factors due to which income was increased by ₹ 4966.36 as indicated by the positive and significant sign of constant.

Table 7.8

Treatment Effect Model of Gross Income for GCMMF

Predictor	Coefficient	SE	P>z
Dependent Variable: Binary which assumes value 1 for participation in formal milk market and 0 otherwise			
Family size (number of persons)	-0.039	0.060	0.329
Age (years)	-0.011	0.011	0.334
Education (years)	0.059	0.031	0.052
Operated area (acres)	-0.007	0.057	0.892
Herd Size (number of milch animals)	0.015***	0.062	0.080
Distance (km)	-0.456*	0.082	0.000
Constant	-0.069	0.832	0.833
Gross income			
Family size (number of persons)	-249.73	260.33	0.985
Age (years)	-145.73	156.45	0.607
Education (years)	128.57	124.78	0.158
Operated area (acres)	4566.12**	78.44	0.020
Herd Size (number of milch animals)	88.12**	96.82	0.024
Distance (km)	124.25	189.63	0.650
Formal Participation	1210.334*	423.11	0.003
Constant	4966.36*	2048.75	0.009
ath (ρ)	0.345	0.821	0.322
LR test of independent equations			
Chi squared	0.000		
Probability> chi squared	0.226		

Note: *, **, *** indicates statistically significant at 1 per cent, 5 per cent and 10 per cent level respectively.

7.2.3 Bani Milk Producers Company Limited (BMPCL)

The results of the treatment effect model used to determine the farmers' participation in formal milk market i.e. BMPCL are shown in Table 7.9. The negative and significant sign of the age and distance coefficient indicates that lesser the age as well as distance, more is the probability to participate in formal milk market. Similarly, farmers' participation in formal milk market also increases with increase in herd size as shown by the positive and significant sign of herd size coefficient. Moreover, there some other factors that also determine the farmers' participation in

formal milk market. Further, gross income of the farmers participating in formal milk market is positively affected by operated area. Participation of farmers in formal milk market also raises the income of the farmers by ₹ 985.83. Along with these factors, there are some other factors as well that also increases the gross income of the farmers as indicated by the positive and significant sign of constant.

Table 7.9
Treatment Effect Model of Gross Income for BMPCL

Predictor	Coefficient	SE	P>z
Dependent Variable: Binary which assumes value 1 for participation in formal milk market and 0 otherwise			
Family size (number of persons)	-0.466	0.092	0.308
Age (years)	-0.047**	0.013	0.041
Education (years)	-0.036	0.032	0.261
Operated area (acres)	0.032	0.033	0.337
Herd Size (number of milch animals)	0.072**	0.085	0.031
Distance (km)	-0.095***	0.199	0.063
Constant	4.862**	0.937	0.048
Gross income			
Family size (number of persons)	-365.85	163.66	0.260
Age (years)	-352.06	172.25	0.417
Education (years)	-225.27	226.96	0.378
Operated area (acres)	58.55*	55.06	0.000
Herd Size (number of milch animals)	963.21	603.35	0.110
Distance (km)	-252.77	99.42	0.311
Formal Participation	985.83***	521.34	0.072
Constant	496.66**	221.89	0.029
ath(ρ)	0.578**	0.405	0.330
LR test of independent equations			
Chi squared	0.00		
Probability> chi squared	0.132		

Note: *, **, *** indicates statistically significant at 1 per cent, 5 per cent and 10 per cent level respectively.

7.4 Summary

In a nutshell, the price of milk was higher in case of formal milk markets as compared to informal milk markets except the price of local cow milk in case of BMPCL.

However, the price of cow milk was found to be competitive. There was no significant differences between the yield levels of milk and the yield level of milk in case of crossbred cows was found to be slightly higher in case of informal milk market as compared to formal milk market of GCMMF and BMPCL. Further, gross returns were higher in case of formal milk market. These were partially due to higher price and partially due to marginal difference in yield level. In case of milk price, especially in case of local cows and crossbred cows, milk market was found to highly competitive. In case of determinants of farmers' participation in formal milk markets in Punjab, the chapter reveals that distance was the main determinant due to which farmers participate in all the three formal milk markets. With increase in herd size also, farmers had the tendency to shift towards the formal milk market in all the three markets. In Milkfed, with increase in age, farmers participation in formal milk market also increases as VCSs of Milkfed in the studied village were established three to four decades ago and most of the farmers were linked with it since then. Participation in formal milk market also had a positive impact on farmers' gross income.

CHAPTER 8

FARMERS' PERCEPTIONS TOWARDS FORMAL MILK MARKETS IN PUNJAB

The main aim of this chapter is to analyze the farmers' perceptions towards formal milk markets in Punjab i.e. reasons for selling milk to formal milk markets in Punjab and reasons for not selling milk to formal milk markets by non-member farmers, constraints perceived by the farmers regarding the production and marketing of milk under both the formal as well as informal markets and the various suggestions given by the farmers under both the channels.

8.1 The Punjab State Cooperative Milk Producers Federation Limited (Milkfed)

Table 8.1 represents the various reasons for selling milk to Milkfed by member farmers. Timely payment was found to be major reason for selling milk to Milkfed by the farmers as Milkfed makes payment to farmers after every 10 days without any kind of delay. Higher price of milk paid by Milkfed to farmers was found to be the second most important reason. The price paid by Milkfed to farmers was higher as compared to the all other prices existed in informal markets. Lesser distance of milk collection point of Milkfed was also found to be the significant reason for participating in this market. In some geographically as well as demographically large villages like Swaddi Kalan, there was also the facility of sub-milk collection points in the village so as to procure milk from the near points of their residence. Good relations with the officials of village cooperative societies and the determination of milk price on the basis of fat and SNF were found to be other causes for selling milk to Milkfed.

Table 8.1

Reasons for selling milk to Milkfed by member farmers

Reasons	Mean score	Rank
Higher price	58.87	II
Timely payment	70.82	I
Provision of veterinary and technical input services	36.17	VI
Fat and SNF based price	36.49	V
Good relations	42.76	IV
Near from residence	54.89	III

Despite having various benefits of selling milk to Milkfed, all the farmers in the study area were not likely to sell milk to Milkfed due to various reasons. In fact, they were preferred to dispose off through informal market. Advance payment facility made by the informal market functionaries to farmers was found to be the foremost reason for not selling milk to Milkfed (Table 8.2). As payment was made by Milkfed to farmers after every 10 days and it was based only on the quantity of milk sold during the previous 10 days. Hence, farmers were not paid in advance and not more amount than payable on the basis of quantity of milk sold was paid to them. However, in informal milk market (comprising private dairies, sweet shops and household consumers), farmers were in a position to receive payment in advance as well as in a large amount also. Most of the landless farmers in informal market were resource poor farmers. In this context, informal milk market found to be acted as a lending agency for them without receiving interest and farmers were in a position to repay the amount by selling milk to them. Second reason was found to be the distance of Milkfed's milk collection point from the residence of milk sellers. Some private dairies in informal market were found to be nearer than Milkfed's milk collection point and therefore, they were found to be prefer informal market which is near from their residence from getting rid of longer distance, time as well as transportation cost. In the study area, the owners of the informal milk market were mostly found to be the same village. Therefore, they were having good terms with milk sellers and in this way, milk sellers were not willing to leave the dealing relations with them. Hence, 47 per cent of the farmers were selling milk to informal market due to fair relations with milk buying agency irrespective of price and mode of payment. About 34 per cent of the farmers were selling milk to either household consumers or some sweet shops and they were charging higher prices (around ₹ 47 for buffalo milk and ₹ 29.5 for cow milk) from them mainly from household consumers irrespective of measuring fat or SNF. Lack of time for selling milk to Milkfed was found to be fifth reason. These farmers were selling milk either directly to consumers or the nearest milk buying agency due to the shortage of time as for these farmers, the milk collection point was situated more farther than other agencies to which milk was sold. Farm gate facility for selling milk was reported by 25 per cent of the farmers. These farmers were selling milk directly to consumers and consumers had to come to milk sellers' residence for procuring milk instead of milk sellers had to go to consumers' residence. Therefore, they were selling milk to

consumers. Besides this, consumers were also paying higher prices. 3 per cent of the farmers selling milk to informal market reported that the secretary of the Milkfed's village cooperative society belongs to the opposition's political party in the context of village gram panchayat elections. Therefore, they do not want to sell milk to cooperative society although the society is paying better price than informal market.

Table 8.2

Reasons for not selling milk to Milkfed by non-member farmers

Reasons	Agreed farmers	Rank
Distance from residence	52	II
Lack of time	29	V
Farm gate facility for selling milk	25	VI
Good relations with buying agency	47	III
Advance payment facility	65	I
Fixed and higher price irrespective of fat and SNF	34	IV
Political reason	3	VII

Table 8.3 explains the constraints perceived by the farmers associated with Milkfed. Higher cost of feeding inputs mainly the concentrate was found to be major problem reported the dairy farmers. Low net returns from dairying enterprise was found to be the second problem faced by the milk producers. Due to the expensive cost of inputs, labour charges etc., net returns were turned out to be very less. As per the milk sellers, although, Milkfed is paying better prices in the study area but by taking into consideration the cost of milk production, the price seems to be low. Hence, low price of milk was studied to be the third major constraint among farmers. Dairying requires more labour as compared to capital and therefore, it involves much work load to the farmers. Inferior quality of feeding inputs was found to be the fifth constraint faced by the farmers as the cattle feed selling in the markets is adulterated with inferior products which is harmful for the animals. Incidence of diseases among milch animals was the sixth reason for the farmers. This incidence was found to be higher among crossbred cows as compared to local cows and buffaloes due to their more sensitivity to weather conditions. Seasonal fluctuation in milk production was also found to be the one of the significant problems as during the summer season,

milch animals stop giving milk due to the end of the lactation period and got dried. Therefore, as per the farmers unlike other enterprises dairying does not provide stable income to the farmers for the whole year.

Table 8.3
Constraints perceived by member farmers associated with Milkfed

Constraint	Mean score	Rank
Low price	57.69	III
Higher cost of feeding inputs	67.7	I
Inferior quality of feeding inputs	46.25	V
Lesser fat content	32.53	VIII
Seasonal fluctuations in milk production	39.1	VII
Incidence of diseases among animals	46.08	VI
Requires much work load or labour intensive activity	53.98	IV
Low net returns	58.67	II

Table 8.4 depicts the rank-wise problems faced by the non-member farmers of Milkfed. Low price of milk was found to be foremost constraint among farmers. Price paid by the buyers of informal market especially by the private dairies was much lower than the paid by Milkfed. Higher feeding cost was found to be second problem for milk producers. Therefore due to the low prices and higher feeding cost, low net returns was found to be the third constraint perceived by the farmers. As the supply of milk varies seasonally, therefore in winter season, due to the excess supply of milk, the prices tend to fall rapidly. As a result, farmers are penalized. Similarly, seasonal fluctuations in milk production was found to be another constraint among farmers. Consequently, income from the sale of milk also varies seasonally. Dairying involves significant number of labour intensive activities such as cutting green fodder from field, bringing it home, cutting it with chaff cutter, feeding the green fodder as well as dry fodder to animals, cooking the feed, cattle shed cleaning, giving water to animals, cleaning the animals, milking the animals, selling milk and making cattle dung cake etc. Therefore, it requires much labour and therefore the labour charges were also higher. Incidence of diseases and inferior quality of feeding inputs were found to be the two another issues among farmers.

Table 8.4

Constraints perceived by non-member farmers of Milkfed

Constraint	Mean score	Rank
Low price	70.32	I
Higher feeding cost	65.3	II
Inferior quality of feeding inputs	35.35	VIII
Seasonal fluctuations in milk price	53.1	IV
Seasonal fluctuations in milk production	44.36	V
Incidence of diseases among animals	37.07	VII
Much work load of labour intensive activity	41.27	VI
Low net returns	55.23	III

Table 8.5 represents the rank-wise various suggestions given by the farmers of Milkfed to improve the production and marketing conditions of dairying. About 79 per cent of the farmers suggested that there should be the reasonable market price of feeding inputs while 62 per cent of the farmers demanded subsidy from government on feeding inputs mainly on cattle feed. Around 56 per cent of the farmers claimed in favour of rise in price so that after deducting cost of production, farmers are left with reasonable net returns. Although, milk prices tends to remain more stable in formal milk market as compared to informal market, but these were not fixed for the entire year and in winter, prices of Milkfed were also found to be fell down. Hence, 52 per cent of the farmers stated the reduction in seasonal fluctuations in milk price so that farmers are not penalized in peak season. 40 per cent of the farmers suggested for the improved veterinary facilities. These facilities should provide without any kind of delay and Milkfed should actively engaged in the provision of medicines as well as veterinary doctors. Apart from these, around 26 per cent of the farmers demanded the organisation of training and extension programmes for the milk producers for the better milk production techniques.

Table 8.5

Suggestions given by the member farmers of Milkfed to improve the production and marketing conditions

Suggestions	Agreed farmers	Rank
Increase in price	56	III
Improved veterinary facilities	40	V
Reasonable price of feeding inputs	79	I
Provision of subsidy on feeding inputs	62	II
Reduction in fluctuations in milk price	52	IV
Organisation of training and extension programmes for production conditions	26	VI

Rank-wise suggestions given by the non-member farmers of Milkfed regarding production and marketing conditions are described in Table 8.6. Around 78 per cent of farmers suggested regarding the price hike of milk to make dairying more profitable enterprise. 64 per cent of the farmers demanded the reduction in the retail price of feeding inputs. Around 49 per cent of the farmers demanded the imposition of checks by the government on the significant fluctuations in milk price. As per them, government should determine floor price of milk. Provision of proper veterinary facilities were suggested by 46 per cent of the farmers. They stressed on the need of timely and adequate supply of medicines at subsidised rates. Around 36 per cent of the farmers felt the need of rationing on the supply of feeding inputs at subsidised rates.

Table 8.6

Suggestions given by the non-member farmers of Milkfed to improve the production and marketing conditions

Suggestions	Agreed farmers	Rank
Increase in price	78	I
Improved veterinary facilities	46	IV
Reasonable price of feeding inputs	64	II
Provision of subsidy on feeding inputs by government	36	V
Reduction in fluctuations in milk price	49	III

8.2 Gujarat Cooperative Milk Marketing Federation (GCMMF)

The various reasons for selling milk to GCMMF by the member farmers are scrutinized in Table 8.7. Timely payment was found to be the most prominent reason for selling milk to GCMMF as this transfers payment into farmers' account after every three days. Higher price of milk as compared to the other informal markets was found to be the next reason for selling milk to this agency. Thirdly, the measurement of fat and SNF as well as weight system of milk was found to be very transparent. Fourthly, the farmers were having good relations with the officials of village cooperative society. Fifthly, as against other formal and informal milk markets, price of GCMMF payable to farmers does not fluctuate seasonally and hence, farmers receive assured price for the whole year. Sixthly, sometimes GCMMF also provides advance payment to some resource-poor farmers. Further, price of milk paid by the GCMMF is determined on the basis of Fat and SNF. In this context, milk with higher fat content fetches higher price. Lastly, lesser distance of milk collection point of GCMMF from farmers' residence as compared to other milk buying agencies was found to be the other reason for selling milk to GCMMF.

Table 8.7

Reasons for selling milk to GCMMF by member farmers

Reasons	Mean score	Rank
Higher price	69.05	II
Timely payment	70.33	I
Transparent system measurement of fat and SNF as well as weight	53.74	III
Fat and SNF based price	37.22	VII
Good relations	47.83	IV
Near from residence	30.47	VIII
Advance payment	46.21	VI
No seasonal fluctuations in milk price	47.15	V

Table 8.8 represents the rank-wise various reasons for not selling milk to GCMMF by the non-member farmers. Longer distance from farmers' residence to milk collection point was found to be the major reason for not selling milk to GCMMF as the milk collection points of GCMMF were not located in every village. Advance payment facility provided by informal milk markets was found to be the reason for not selling milk to GCMMF. Although, advance payment facility was also found to

be there in formal milk market (GCMMF), but it was limited to a few farmers and the magnitude of this facility was very less. Thirdly, some farmers were having the facility of selling milk directly to consumers as well as milk vendors from their farm gates. Therefore, they prefer this marketing channel instead of selling to GCMMF. Fourthly, farmers selling milk to consumers and sweet shops were receiving already fixed price of milk irrespective of fat and SNF and hence, they were not willing to sell in other markets. Due to shortage of time, it was difficult for some of the non-member farmers to bring milk to milk collection points of GCMMF, therefore, they were not able to sell milk to this channel. As this agency was established in Punjab in 2015, therefore, some of the non-member farmers were not aware of this formal milk market in cooperative sector. Some of the non-member farmers were having good dealing relations with milk buying agency in informal milk market and they were not willing to sell milk to other agencies although, they were getting lower prices as compared to GCMMF. Lastly, cash payment facility was not preferred by some of the non-member farmers and GCMMF makes payment through transferring into bank accounts. Therefore, the farmers were selling milk to informal market.

Table 8.8

Reasons for not selling milk to GCMMF by non-member farmers

Reasons	Agreed farmers	Rank
Distance from residence	60	I
Lack of time	23	V
Farm gate facility for selling milk	26	III
Good relations with buying agency	60	VII
Advance payment facility	36	II
Fixed and higher price irrespective of fat and SNF	24	IV
Not aware	19	VI
No cash payment facility	10	VIII

Table 8.9 represents the constraints perceived by the member farmers of GCMMF. Higher cost of feeding inputs was found to be the major constraint among member farmers of GCMMF followed by incidence of diseases among milch animals. Thirdly, dairy farming was found to be the labour intensive enterprise and the requirement of labour was found to be the another major problem. Fourthly, due to the higher

feeding as well as labour cost, the net returns in dairy farming were found to be very low. Fifthly, as per the farmers, the enterprise of dairying cannot be considered a stable source of income and employment as there are seasonal fluctuations in milk production. Sixthly, inferior quality of feeding inputs was found to be the another significant constraint among farmers as the cattle feed selling in the market includes some impurities. Low price of milk and less fat content in milk were also prevalent among farmers.

Table 8.9
Constraints perceived by member farmers of GCMMF

Constraints	Mean score	Rank
Low price of milk	39.27	VII
Higher cost of feeding inputs	73.97	I
Inferior quality of feeding inputs	39.28	VI
Less fat content in milk	30.38	VIII
Seasonal fluctuations in milk production	51.64	V
Incidence of diseases	58.18	II
Labour intensive activity	56.04	III
Low net returns	53.24	IV

The various constraints perceived by the non-member farmers of GCMMF are described in Table 8.10. Low price of milk was found to be the major problem followed by low net returns. Higher cost of feeding inputs was found to be the third major constraint followed by labour intensive enterprise. Incidence of diseases among milch animals was also found to be significant constraint. Apart from these, inferior quality of feeding inputs was also found to be major problem. Besides, seasonal fluctuations in milk production and less fat content in milk were also found to be prevalent.

Table 8.10

Constraints perceived by non-member farmers of GCMMF

Constraints	Mean score	Rank
Low price of milk	71.5	I
Higher cost of feeding inputs	62.64	III
Inferior quality of feeding inputs	39.5	VI
Less fat content in milk	28.37	VIII
Seasonal fluctuations in milk production	34.01	VII
Incidence of diseases	46.21	V
Labour intensive activity	51.97	IV
Low net returns	67.8	II

Table 8.11 explains the various suggestions given by the member farmers of GCMMF for the further improvement of production and marketing practices. Around 69 per cent of the farmers suggested to increase the price of milk. About 54 per cent of the farmers suggested that the feeding inputs especially the cattle feed should be available on subsidised rates. As per 38 per cent of the farmers, the market price of feeding inputs should be available on reasonable price. Around 32 per cent of the farmers demanded bonus on the quantity of milk sold. Around 30 per cent of the member farmers demanded the provision of veterinary facilities at subsidised rates. Around 13 per cent of the farmers demanded training and extension programmes and 12 per cent of the farmers demanded the provision of literature on dairying production and marketing updates. Further, 9 per cent of the farmers suggested the expansion of milk collection points of GCMMF to more village as they had to travel for other neighbour village for selling milk to VCS of GCMMF.

Table 8.11

Suggestions given by the member farmers of GCMMF to improve the production and marketing conditions

Suggestions	Agreed farmers	Rank
Increase in price	69	I
Subsidised veterinary facilities	30	V
Reasonable price of feeding inputs	38	III
Provision of subsidy on feeding inputs by government	54	II
Organisation of training and extension programmes	13	VI
Provision on literature on dairy production and marketing practices	12	VII
Bonus on milk price	32	IV
Facility of milk collection point in each village	9	VIII

Table 8.12 explains the suggestions put forward by non-member farmers of the GCMMF. 85 per cent of the farmers demanded the rise in the price of milk. 41 per cent of the farmers reported that there should be the reduction in the price of feeding inputs and 40 per cent of the farmers demanded subsidy from government on feeding inputs. Further, 29 per cent of the farmers suggested to organize training and extension programmes by the government for the provision of knowledge regarding better production and marketing strategies. Moreover, 17 per cent of the farmers emphasised on the provision of proper and timely improved veterinary facilities.

Table 8.12

Suggestions given by the non-member farmers of GCMMF to improve the production and marketing conditions

Suggestions	Agreed farmers	Rank
Increase in price	85	I
Improved veterinary facilities	17	V
Reasonable price of feeding inputs	41	II
Provision of subsidy on feeding inputs by government	40	III
Organisation of training and extension programmes	29	IV

8.3 Baani Milk Producer Company Limited (BMPCL)

The rank-wise various reasons for selling milk to BMPCL by the member farmers are explained in Table 8.13. Good relations with the officials of company was found to be the most important reason for selling milk to BMPCL. Lesser distance of BMPCL's milk collection centre from farmers' residence was observed to be second most important reason followed by timely payment. Higher price, determination of milk price on the basis of fat and SNF and transparent system of measurement of milk weight as well as fat and SNF were found to be the other major reasons for selling milk to BMPCL.

Table 8.13

Reasons for selling milk to BMPCL by the member farmers

Reasons	Mean Score	Rank
Higher price	51.01	IV
Timely payment	54.17	III
Fat and SNF based price	38.96	V
Good relations	59.63	I
Transparent system	38.82	VI
Near from residence	57.41	II

However, the non-member farmers were not selling milk to BMPCL due to various reasons as explained in Table 8.14. Good dealing relations from a long time with the players of informal milk market was found to be the most dominant reason for not selling milk to formal milk market i.e. BMPCL. Longer distance of BMPCL than informal market from farmers' residence was found to be the second most prominent reason for not selling milk to informal milk market. Milk vendors were found to be dominant players in informal milk market. As milk vendors, consumers and sweet shop keepers were purchasing milk from farmers without measuring fat and SNF and farmers were receiving higher prices. Thereby, fixed and higher price irrespective of fat and SNF was found to be third reason for not selling milk to BMPCL. As milk vendors and consumers were buying milk from farmers from their farm gate and hence, farm gate facility for selling milk was another reason for selling milk to informal market. Provision of advance payment facility, lack of time for bringing milk to sell BMPCL and unawareness regarding the new entrance of

producer company (Baani) in milk market were another major problems for not selling milk to BMPCL.

Table 8.14
Reasons for not selling milk to BMPCL by non-member farmers

Reasons	Agreed farmers	Rank
Distance from residence	57	II
Lack of time	21	VI
Farm gate facility for selling milk	30	IV
Good relations with buying agency	67	I
Advance payment facility	29	V
Fixed and higher price irrespective of fat and SNF	44	III
Not aware	1	VII

Farmers selling milk to BMPCL were facing various problems. These are explained in Table 8.15. Higher cost of feeding inputs was most prevalent constraint in the study area followed by low price of milk. Low net returns from milk was also found to be main problem. Moreover, requirement of much labour time in dairying enterprise, incidence of diseases to dairy animals and thereby more veterinary expenses, inferior quality of feeding inputs, seasonal fluctuations in milk production and lesser fat content in milk were the other problems faced by the member milk producers.

Table 8.15
Constraints perceived by member farmers of BMPCL

Constraints	Mean score	Rank
Low price of milk	61.08	II
Higher cost of feeding inputs	61.47	I
Inferior quality of feeding inputs	43.94	VI
Less fat content in milk	34.47	VIII
Seasonal fluctuations in milk production	39.79	VII
Incidence of diseases	49.7	V
Labour intensive activity	54.73	IV
Low net returns	56.82	III

The constraints perceived by non-member farmers of BMPCL are explained in Table 8.16. Low price of milk was found to be the most serious problem among farmers. Higher cost of feeding inputs was the another major problem faced by the farmers. Therefore, they also highlighted the problem of low net returns from milk production. Fourthly, dairy farming is mainly the labour intensive activity and requires more labour time. Therefore, it also raises the work load among farmers. Apart from these problems, incidence of diseases was also found to be higher among farmers and farmers also complained about veterinary cost as well. Further, seasonal fluctuations in milk production, inferior quality of feeding inputs and less fat content of milk were also the problems that were faced by the farmers.

Table 8.16
Constraints perceived by non-member farmers of BMPCL

Constraints	Mean score	Rank
Low price of milk	68.90	I
Higher cost of feeding inputs	66.09	II
Inferior quality of feeding inputs	38.77	VII
Less fat content in milk	33.71	VIII
Seasonal fluctuations in milk production	40.43	VI
Incidence of diseases	48.13	V
Labour intensive activity	51.38	IV
Low net returns	54.59	III

Farmers associated with BMPCL also suggested some policy measures to improve the production and marketing conditions of dairy farming as described in Table 8.17. Firstly, they demanded the reasonable price of feeding inputs. After that, around 81 per cent of the farmers stated that price of milk should also be increased and 67 per cent of the farmers suggested that government or milk buying agencies should provide subsidy on feeding inputs so that net returns of the farmers may rise. Around 45 per cent of the farmers emphasised on the improved veterinary facilities to be provided on the farm gate of the farmers without any kind of delay and at reasonable price. Moreover, about 6 per cent of the farmers also suggested that formal milk markets should procure milk from the farm gates of the farmers rather than procuring

at one milk collection point in the village as bringing milk at milk collection centres took time.

Table 8.17

Suggestions given by the member farmers of BMPCL to improve the production and marketing conditions

Suggestions	Agreed farmers	Rank
Increase in price	81	II
Farm gate facility of selling milk	6	V
Improved veterinary facilities	45	IV
Reasonable price of feeding inputs	87	I
Provision of subsidy on feeding inputs by government	67	III

The various suggestions given by the non-member farmers of BMPCL are given in Table 8.18. Around 83 per cent of the farmers suggested regarding hike in milk price and 72 per cent of the farmers suggested that there should be the reasonable price of feeding inputs and 31 per cent of the farmers demanded the provision of subsidy on feeding inputs. Further, 26 per cent of the farmers suggested that there should be the improved veterinary conditions in the study area. Lastly, around 16 per cent of the farmers demanded the organisation of training and extension programmes.

Table 8.18

Suggestions given by the non-member farmers of BMPCL to improve the production and marketing conditions

Suggestions	Agreed farmers	Rank
Increase in price	83	I
Improved veterinary facilities	26	IV
Reasonable price of feeding inputs	72	II
Provision of subsidy on feeding inputs by government	31	III
Organisation of training and extension programmes	16	V

8.4 Summary

The above analysis reveals that farmers sell milk to formal milk markets mainly due to timely payment, higher price, lesser distance between milk collection centres and farm gates and good relation with officials of formal milk markets. However, non-member farmers were not selling milk to formal milk market agencies mainly due to the provision of advance payment and credit facilities provided by the informal milk market agencies. However, farmers under both the markets formal as well as informal milk market faced the problems regarding low price, higher cost of feeding inputs, labour intensive activity and low net returns. Therefore, they also suggested to improve the price of milk, provision of subsidies on feeding inputs and fixation of reasonable price of feeding inputs to improve the milk production and marketing conditions.

CHAPTER 9

SUMMARY AND CONCLUSIONS

9.1 Background of the Study

The prosperous agrarian economy of Punjab is now facing the agrarian crisis in terms of declining the productivity levels, rising cost of cultivation and declining net profits. Hence, depending only upon a crop sector is no more a profitable enterprise. Dairy farming as an allied activity may act as boon for correcting all these problems. However, informal milk marketing system involves some constraints for the efficient marketing of milk due to the involvement of large number of intermediaries that automatically reduces the producer's share in consumer's rupee, low price of milk, large price fluctuations and hence, very low net returns to the consumers. In this context, emerging formal milk markets including cooperative sector, private registered companies and producer companies may play a significant role for the efficient marketing and disposal of milk and thus, may provide assured market to farmers as well.

Various studies have examined the production and marketing analysis of formal as well as informal milk markets at national as well as international level. Smallholder dairy farmers were found to be excluded from private formal channel but not from cooperative channel (Sharma, 2015; Sharma et al., 2015). In overall, there was no relationship between the herd size and farmers' participation in formal milk market (BIRTHAL et al., 2016; BIRTHAL et al., 2017). The monthly income from both crossbred cows as well as buffaloes was more in member farmers of women dairy cooperative societies' members than non-members (Kumari and Malhotra, 2016; Kumar and Sharma, 1999; Singh and Sharma, 2006; Meena et al., 2010). Further, the impact of women dairy cooperatives was positive on income and employment (Meena et al., 2009; Seema et al., 2013). In a comparison between constraints faced by cooperative and non-cooperative farms, the non-cooperative farms were found to be faced major constraints and high severity as compared to cooperative farms (Sarkar and Ghosh, 2010) as the market intermediaries in the non-cooperative channel were receiving much higher abnormal profits as well as profit efficiency as compared to cooperative channel (Sarkar and Ghosh, 2010a). However, despite the significant emergence of modern market especially cooperatives, still traditional

market was found to play an important role (Kumar, 2010; Sharma, 2015; Kumar et al., 2010; Kumar et al., 2011; Kumar and Staal, 2010). In this context, the present study has analysed the potential of new companies in the formal milk market in Punjab. The objectives of the study are; (1) to examine the procurement operations of the integrating firms in procuring milk; (2) to study the socio-economic profile of both the producers involved in formal and informal milk marketing channels; (3) to calculate the cost of milk production and returns of producers marketing under the formal as well as informal markets; (4) to work out the contribution of income from dairy farming in total income of the milk producers in the formal and informal milk markets; (5) to investigate the labour utilisation in dairy farming for both the producers under formal as well as informal milk markets; (6) to identify the factors influencing the participation of the milk producers in formal dairy channels; (7) to study the various constraints faced by the milk producers regarding production and marketing in both the channels; (8) to suggest the various policy measures to improve the conditions and safeguard the interests of the milk producers involved in formal milk marketing.

9.2 Methodology

The entire study is primarily based on primary data conducted through field survey with the help of survey schedule during October 2017 to March 2018. Three companies, two cooperatives viz. Milkfed and Kaira Milk Union a tier of Gujarat Cooperative Milk Marketing Federation (GCMMF) and a producer company namely, Bani Milk Producer Company Limited (BMPCL) were selected for the present study. Further, three districts were selected (one district for each company) on the basis of highest milk procurement. Thus, Ludhiana district was selected for Ludhiana Milk Union (under Milkfed), Gurdaspur district was selected for Kaira Milk Union (under GCMMF) and Bathinda district was selected for BMPCL. Thus, for the three companies involved in formal milk market, three districts were selected. Further, from each district four villages were selected and from each village 50 farmers i.e. 25 farmers supplying milk to formal and 25 farmers selling milk to informal milk market were selected. Thus, from each district 200 farmers were selected and a total of 600 farmers from three districts i.e. 300 farmers selling milk to formal markets (100 farmers selling milk to each formal milk market) and 300 farmers selling milk to informal milk market were selected.

9.3 Operations of Formal Milk Markets in Punjab

Milkfed came into existence in 1973 to boost the enterprise of dairy farming in the state. The main aim of establishment of Milkfed was to provide a lucrative milk market to milk producers by offering them remunerative prices as well as providing them technical inputs in order to intensify milk production. Presently, Milkfed has 11 milk unions (Amritsar, Bathinda, Ferozpur, Faridkot, Gurdaspur, Hoshiarpur, Jalandhar, Ludhiana, Patiala, Ropar and Sangrur) in the state. KDCMPUL started from cooperative movement in 1946. At present, GCMMF has 18 district milk unions. Bani Milk Producer Company was incorporated in 11 August, 2014 with its head office in Patiala, Punjab under the sub-section 2 of section 7 of companies act, 2013. Currently, it is procuring milk from eight districts of Punjab viz. Bathinda, Mansa, Barnala, Faridkot, Moga, Sri Muktsar Sahib and Sangrur. Milkfed as well as GCMMF both are working on three-tier structure viz. milk producers cooperative societies at village level, milk unions at district level and Federation as an apex body at State level. There are two types of dairy farmers under Milkfed; a) Commercial Dairy Farmers b) Small Milk Producers. Commercial dairy farmers are those dairy farmers who supply milk above 50 kg of milk per day. These are also known as progressive dairy farmers. On the other hand, farmers supplying less than 50 kg of milk supply through societies are known as small milk producers. In case of Kaira Milk Union (a district union of GCMMF), an equal treatment is given to each milk producer irrespective of quantity of milk for sale. BMPCL has also categorised its farmers into three categories viz. category A (those who supply milk for minimum 300 days and above in a year and minimum quantity of milk supplied is 7000 ltr and above), category B (those who supply milk for 269-299 days in a year and quantity of milk supplied is 2500-6999 ltr) and category C (those who supply milk for 200-268 days in a year and quantity of milk supplied is 500-2499 ltr). For supplying milk, commercial dairy farmers have to become members of district milk unions with a membership fee of ₹ 1000. They are given commission of 2.5 per cent of the value of milk supplied to Milkfed after every year. However, for becoming societies' member, a small milk producers have to pay ₹ 105. They are distributed the bonus from 2.5-3.0 per cent under the bonus distribution scheme. In case of Kaira Milk Union, there is no condition as well as membership fee for the farmers for supplying milk. For selling milk to BMPCL, a farmer has to become its member firstly by applying its membership form. For taking membership, a candidate must be above

18 years and he/she must possess at least one or above milch animals. Further, after accepting the terms and conditions of company, a milk producer has to fill the registration form. The fee of this form is ₹ 200 for males and ₹ 150 for females. Milkfed provides various technical input services such as better quality of green fodder seed (both rabi and kharif), cattle feed and mineral mixture. The provision of these input services is area-oriented or these are distributed zone-wise. Besides this, Milkfed also provides veterinary services, medicines, artificial insemination (AI) services, semen services etc. To progressive or commercial dairy farmers, it provides milking machines at 25-50 per cent subsidised rates. KDCMPUL, Batala also provides various types of cattle feed. The various types of these cattle feeds such as nutri rich, nutri gold, nutri hi five powder and buffalo special. BMPCL also provides two types of cattle feed and one type of mineral mixture to the farmers viz. baani feed, baani geed gold, baani mineral mixture. In case of all the three companies, price of milk is determined on the basis of fat and SNF. Milkfed makes payment to farmers after every 10 days on cash basis. KDCMPUL makes payment to milk producers after every three days. It is transferred into their bank accounts of either HDFC bank or Corporation bank.

9.4 Socio-Economic Characteristics of Member and Non-Member Farmers of Formal Milk Markets in Punjab

Dairying was found to be an enterprise of resource-poor farmers as around 53 per cent of the farmers associated with Milkfed, 67 per cent of the farmers associated with GCMMF and 39 per cent of the farmers associated with BMPCL were belonged to landless, marginal and small farmers. In case of all the three formal milk markets, average size of operated area was found to be higher among member farmers as compared to non-member farmers. Member farmers attended more years of schooling than non-member farmers in case of all the three formal milk markets. Member farmers of Milkfed were found to be slightly younger than non-member farmers. However, in case of GCMMF as well as BMPCL, there was significant age difference among member and non-member farmers as member farmers were found to be much younger than non-member farmers. Average family size of the Milkfed, GCMMF and BMPCL member farmers was found to be less than non-member farmers. In case of herd size, the average number of buffaloes and crossbred cattles was found to be more in case of Milkfed member farmers as

compared to non-member farmers whereas the average number of local cattles was found to be more in case of non-member farmers. However, in case of GCMMF, the average number of buffaloes was found to be less in case of member farmers as compared to non-member farmers and in case of BMPCL, the average number of crossbred cattles was calculated to be less in case of member farmers as compared to their counterparts. Marketed surplus of milk was found to be more in case of Milkfed member farmers as compared to non-member farmers whereas in case of GCMMF and BMPCL, this was found to slightly more among non-member farmers as compared to member farmers.

9.5 Role of Dairy Farming in Augmenting Income and Employment of the Farmers

In case of all the three formal milk markets, the share of income from dairy farming was more among member farmers as compared to their counterparts. In case of Milkfed, the contribution of income from dairy farming was worked out to be 19.87 per cent as compared to 17.05 per cent in case of non-member farmers. Among member farmers of GCMMF, the contribution of dairy farming in total income was worked out to be 21.03 per cent while it was calculated to be 10.33 per cent in case of non-member farmers. Similarly, in case of BMPCL, the share of income from dairy farming was worked out to be 10.21 per cent for member farmers and 7.23 per cent for non-member farmers. In case of employment generation, dairying provided employment to about 71 per cent of adult family members with 81 per cent of total male members and 63 per cent of female members of Milkfed member farmers as against 68 per cent of overall adult members with 73 per cent share of male members and 63 per cent of female members in case of non-member farmers. In case of GCMMF member farmers, the share of overall family adult members in generating self-employment was worked out to be 80 per cent with 82 per cent share of male members and 79 per cent share of female members. On the other hand, among non-member farmers of GCMMF, the share of overall adult members, male members and female members in creating self-employment was found to be 79 per cent, 79 per cent and 80 per cent respectively. Further, in case of BMPCL, the share of overall, male and female member farmers in self-employment in dairying was worked out to be 75.41 per cent, 87.17 per cent and 67.84 per cent respectively and in case of non-member farmers, the share of dairying in creating self-employment

was worked out to be 70.53 per cent, 77.17 per cent and 67.42 per cent in case of overall adult members, male and female farmers respectively. In case of all the three formal milk markets, among the various activities involved in dairying enterprise, cutting fodder, bringing, chaff cutting and feeding took highest time for member as well as non-member farmers. Also, due to facility of farm gate selling milk to some of the non-member farmers, time spent on selling milk was found less as compared to member farmers in case of all the three formal milk markets. In case of Milkfed and GCMMF, the annual employment generation man-days per milch animal was higher among non-member farmers because their time spent on cutting fodder was higher than member farmers as landless non-member farmers were usually go to fields of other farmers and collect the grass grown on the edges of their field sides. Therefore, despite more annual employment generation man-days per household, the annual employment generation man-days per milch animal was found to be less in case of member farmers of Milkfed and GCMMF. However, in case of BMPCL, annual employment generation per household and annual employment generation per milch animal were both found to be higher in case of member farmers as compared to non-member farmers.

9.6 Cost and Returns from Milk Production

In case of Milkfed, per day gross cost of buffalo milk production was found to be slightly more among member farmers (₹ 250.61) as compared to non-member farmers (₹ 244.97). Among GCMMF member and non-member farmers, gross cost was calculated to be ₹ 274.18 and ₹ 265.66 for the member and non-member farmers respectively for buffalo milk production. In case of BMPCL, Gross cost of buffalo milk production was calculated to be ₹ 279.88 and ₹ 275.77 for member and non-member farmers respectively. Hence, in case of all the three formal milk markets, gross cost of buffalo milk production was calculated to more among member farmers as compared to non-member farmers. In case of crossbred cows, gross cost of Milkfed member farmers was ₹ 258.59 as compared to ₹ 254 in case of non-member farmers. Gross cost of crossbred cows of GCMMF member farmers was calculated to be ₹ 272.18 as compared to ₹ 262.92 in case of non-member farmers. Similarly, gross cost of BMPCL member farmers in case of crossbred cows was worked out to be ₹ 298.59 as compared to ₹ 294.16 in case of their counterparts. Hence, in case of crossbred cows too, the cost of milk production was

found to be more in case of member farmers as compared to their counterparts. In case of local cows, cost C was calculated to be ₹ 216.41 for Milkfed member farmers as compared to ₹ 217.31 for Milkfed non-member farmers. Similarly, gross cost of milk production for crossbred cows was found to be ₹ 231.65 and ₹ 228.04 in case of member and non-member farmers respectively. Further, gross cost of BMPCL member and non-member farmers in case of local cow milk production was calculated to be ₹ 246.33 and ₹ 250.73 respectively. Among all the species, total variable cost accounted around or more than 90 per cent of total cost in case of member as well as non-member farmers. Further, the price of milk was higher in case of formal milk markets as compared to informal milk markets except the price of local cow milk in case of BMPCL. However, the price of cow milk was found to be competitive. There was no significant difference between the yield levels of milk and yield level of milk in case of crossbred cows was found to be slightly higher in case of informal milk market as compared to formal milk market of GCMMF and BMPCL. Further, gross returns were higher in case of formal milk market was partially due to higher price and partially due to marginal difference in yield level. In case of milk price, especially in case of local cows and crossbred cows, milk market was found to highly competitive.

9.7 Farmers' Participation in Formal Milk Markets

Distance was the main determinant due to which farmers participate in all the three formal milk markets. In case of Milkfed, Further, the inverse relationship was found between the operated area and farmers' participation in formal milk market i.e. lesser the operated area of farmer, more will be the probability of the farmers' participation in formal milk market. With increase in herd size also, farmers had the tendency to shift towards the formal milk market in all the three markets. In Milkfed, with increase in age, farmers participation in formal milk market also increases as VCSs of Milkfed in the studied village were established three to four decades ago and most of the farmers were linked with it since then. Gross income was positively affected by education, operated area, herd size and participation in Milkfed milk market. In case of GCMMF, gross income of the farmers involved in formal milk market was positively affected by operated area, herd size, participation in formal milk market. Income is increased by ₹ 4566.12 with increase in operated area. In case of BMPCL, gross income of the farmers participating in formal milk market was

positively affected by operated area. Hence, participation in formal milk market also had a positive impact on farmers' gross income in case of all the three formal milk markets.

9.8 Farmers' Perceptions towards Formal Milk Markets

In case of Milkfed, timely payment was found to be the major reason for selling milk to Milkfed by the farmers as Milkfed makes payment to farmers after every 10 days without any kind of delay. Higher price of milk paid by Milkfed to farmers was found to be the second most important reason. The price paid by Milkfed to farmers was higher as compared to the all other prices existed in informal markets. Lesser distance of milk collection point of Milkfed was also found to be the significant reason for participating in this market. In some geographically as well as demographically large villages like Swaddi Kalan, there was also the facility of sub-milk collection points in the village so as to procure milk from the near points of their residence. Good relations with the officials of village cooperative societies and the determination of milk price on the basis of fat and SNF were found to be other causes for selling milk to Milkfed.

Higher cost of feeding inputs mainly the concentrate was found to be major problem reported the Milkfed member farmers. Low net returns from dairying enterprise was found to be the second problem faced by the milk producers. Due to the expensive cost of inputs, labour charges etc., net returns were turned out to be very less. As per the milk sellers, although, Milkfed is paying better prices in the study area but by taking into consideration, the cost of milk production, the price seems to be low. Hence, low price of milk was studied to be the third major constraint among farmers. Dairying requires more labour as compared to capital and therefore, it involves much work load to the farmers. Inferior quality of feeding inputs was found to be the fifth constraint faced by the farmers as the cattle feed selling in the markets is adulterated with inferior products which is harmful for the animals. Incidence of diseases among milch animals was the sixth reason for the farmers. This incidence was found to be higher among crossbred cattle as compared to local cows and buffaloes due to their more sensitivity to weather conditions. Seasonal fluctuation in milk production was also found as during the summer season, milch animals stop giving milk due to the end of the lactation period and got dried. Therefore, as per the farmers unlike other

enterprises dairying does not provide stable income to the farmers for the whole year.

Milkfed member farmers also gave some suggestions to improve the production and marketing conditions of dairying. About 79 per cent of the farmers suggested that there should be the reasonable market price of feeding inputs while 62 per cent of the farmers demanded subsidy from government on feeding inputs mainly on cattle feed. Around 56 per cent of the farmers claimed in favour of rise in price so that after deducting cost of production, farmers are left with reasonable net returns. Although, milk prices tends to remain more stable as compared to informal market, but these were not fixed for the entire year and in winter prices of Milkfed were also found to be fell down. Hence, 52 per cent of the farmers stated the reduction in seasonal fluctuations in milk price so that farmers are not penalized in peak season. 40 per cent of the farmers suggested for the improved veterinary facilities. These facilities should provide without any kind of delay and Milkfed should actively engaged in the provision of medicines as well as veterinary doctors. Apart from these, around 26 per cent of the farmers demanded the organisation of training and extension programmes for the milk producers for the better milk production techniques.

In case of GCMMF, timely payment was found to be the most prominent reason for selling milk to GCMMF as this transfers payment into farmers' account after every three days. Higher price of milk as compared to the other informal markets was found to be the next reason for selling milk to this agency. The measurement of fat and SNF as well as weight system of milk was found to be very transparent. Farmers were having good relations with the officials of village cooperative society. As against other formal and informal milk markets, price of GCMMF payable to farmers does not fluctuate seasonally and hence, farmers receive assured price for the whole year. Sometimes GCMMF also provides advance payment to some resource-poor farmers. Further, price of milk paid by the GCMMF is determined on the basis of Fat and SNF. In this context, milk with higher fat content fetches higher price. Lastly, lesser distance of milk collection point of GCMMF from farmers' residence as compared to other milk buying agencies was found to be the other reason for selling milk to GCMMF.

Higher cost of feeding inputs was found to be the major constraint among member farmers of GCMMF followed by incidence of diseases among milch animals. Thirdly, dairy farming was found to be the labour intensive enterprise and the requirement of labour was found to be the another major problem. Fourthly, due to the higher feeding as well as labour cost, the net returns in dairy farming were found to be very low. Fifthly, as per the farmers, the enterprise of dairying cannot be considered a stable source of income and employment as there are seasonal fluctuations in milk production. Sixthly, inferior quality of feeding inputs was found to be the another significant constraint among farmers as the cattle feed selling in the market includes some impurities. Low price of milk and less fat content in milk were also prevalent among farmers.

Around 69 per cent of the farmers suggested on the increase in the price of milk. About 54 per cent of the farmers suggested that the feeding inputs especially the cattle feed should be available on subsidised rates. As per 38 per cent of the farmers, the market price of feeding inputs should be available on reasonable price. Around 32 per cent of the farmers demanded bonus on the quantity of milk sold. Around 30 per cent of the member farmers demanded the provision of veterinary facilities at subsidised rates. Around 13 per cent of the farmers demanded training and extension programmes and 12 per cent of the farmers demanded the provision of literature on dairying production and marketing updates. Further, 9 per cent of the farmers suggested the expansion of milk collection points of GCMMF to more village as they had to travel for other neighbour villages for selling milk to VCS of GCMMF.

In case of BMPCL member farmers, good relations with the officials of company was found to be the most important reason for selling milk to BMPCL. Lesser distance of BMPCL's milk collection centre from farmers' residence was observed to be second most important reason followed by timely payment. Higher price, determination of milk price on the basis of fat and SNF and transparent system of measurement of milk weight as well as fat and SNF were found to be the other major reasons for selling milk to BMPCL.

Higher cost of feeding inputs was most prevalent constraint among BMPCL member farmers followed by low price of milk. Low net returns from milk was also found to be main problem. Moreover, requirement of much labour time in dairying enterprise,

incidence of diseases to dairy animals and thereby more veterinary expenses, inferior quality of feeding inputs, seasonal fluctuations in milk production and lesser fat content in milk were the other problems faced by the member milk producers.

Further, the member farmers demanded the reasonable price of feeding inputs. After that, around 81 per cent of the farmers stated that price of milk should also be increased and 67 per cent of the farmers suggested that government or milk buying agencies should provide subsidy on feeding inputs so that net returns of the farmers may rise. Around 45 per cent of the farmers emphasised on the improved veterinary facilities to be provide on the farm gate of the farmers without any kind of delay and at reasonable price. Moreover, about 6 per cent of the farmers also suggested that formal milk markets should procure milk from the farm gates of the farmers rather than procuring at one milk collection point in the village as bringing milk at milk collection centres takes time.

9.9 Conclusions and Policy Suggestions

The entire analysis of the three formal milk markets indicates that farmers' association with the formal milk markets is beneficial for the farmers as this fetches higher returns as compared to the farmers involved in informal milk markets in Punjab. Moreover, formal milk markets provides guaranteed market to the farmers and the seasonal variations in the price of milk were very less as compared to the farmers selling milk to informal milk markets in Punjab. Hence, participation in formal milk markets in Punjab guaranteed market to the farmers and farmers did not have any marketing risk as the same was observed in informal milk market. Timely payment, higher price, transparent system, good dealing with the officials of formal milk markets in villages and fat and SNF based price were found to be major reasons for farmers' participation in formal milk markets in Punjab. However, despite having all the positive points of formal milk markets in Punjab, the informal milk market was also seen to play an important role due to numerous reasons. Landless, marginal and small farmers were seen to be heavily relying upon informal milk markets especially private dairies, directly to consumers, sweet shops etc. Long distance between farmers' residence to formal milk markets' milk collection centres, access to credit facility and advance payment facility was the prominent reason for farmers' participation in informal milk market. Besides this, farm gate facility of selling milk by

the farmers directly to consumers was also one of the main reasons for selling milk to informal milk market. Milkfed and GCMMF was not found to be excluding small dairy farmers but BMPCL had identified dairy farmers on the basis of volume of milk sold to BMPCL in a year. However, to increase the participation of farmers in formal milk markets, some of the suggestions have been put forth. These are as follows;

- 1. Establishment of More Than One Milk Collection Centres in Geographically Large Villages:** Most of the farmers in case of all the three formal markets were not selling milk to formal milk markets due to the longer distance between farmers' residence to formal milk markets' milk collection centres established in various villages. As, in most of the villages, there was only one milk collection centre to procure the milk in morning as well as evening; therefore, farmers residing at a distance from milk collection centres found it difficult to sell milk there twice a day. Therefore, by taking into consideration farmers' convenience level, the establishment of more than one milk collection centres in especially geographically large villages may boost the working of the formal milk markets so that farmers can easily sell milk to formal milk markets at their nearest one centre.
- 2. Access to Credit Facility:** Formal milk markets in India should provide the credit facility to farmers at cheap rates of interest so that they are not moved to informal milk markets and exploited by the middlemen of informal milk market.
- 3. Subsidy on Technical Inputs, Veterinary and Breeding Services:** The provision of various technical input services such as cattle feed, green fodder seed; veterinary services at subsidised rate may increase the number of farmers associated with formal milk markets. Moreover, the provision of quality inputs and timely veterinary services may expand the per day quantity of milk procurement and number of farmers associated with formal milk markets.
- 4. Advance payment facility:** Moreover, the provision of advance payment facility may also be helpful in fetching the buyers towards formal milk markets

as most of the landless, marginal and small farmers mainly rely upon advance payment so as to meet their daily requirements.

5. Fixation of Higher Price of Milk: As most of the farmers were facing the problem of low price of milk. Moreover, the price of milk of crossbred cow and local cow in case of both the formal and informal markets was found to be almost similar. Therefore, for expanding operations in Punjab, offering higher price may fulfil the target.

6. Improvement in Breeding Facilities: As of now, BMPCL does not provide any kind of veterinary and breed development facilities. Moreover, veterinary facilities provided by Milkfed are expensive and there are very less AI centre and semen stations in Punjab. In this context, formal milk markets should provide these services at farmers' doorsteps. Besides, formal milk should also provide health insurance services in case of dairy animals.

7. Training and Extension Programmes: As of now, Milkfed is not giving any kind of training and extension services. In Punjab, the largest network of milk procurement is covered by Milkfed under formal milk markets. Therefore, launching of these services in various villages may tend to more efficient milk producing enterprise and this may also reduce their cost of milk production.

9.10 Policy Implications

1. Rise in formal milk markets may play an important role in reducing the agrarian crisis in Punjab and may helpful in generating additional income for the farmers. In this way, it may also lead to reducing indebtedness of the farmers.

2. Expansion of formal milk markets may lead to rise in the exports of dairy products and in this way, India may earn foreign exchange earnings.

3. Along with generating employment opportunities for the rural masses, growth of dairy sector may lead to create employment opportunities for the skilled and educated youth in dairy processing industries as well. This may also correct the educated unemployment problem.

4. An increase in the share of formal milk markets may also check the problem of adulteration in food market such as manufacturing of synthetic milk. Therefore,

provision of unadulterated food may also provide nutrient dairy products and hence better health conditions.

9.11 Scope for Further Research

1. The research work may further extend to more formal milk markets emerging in the state.
2. The role of formal milk markets in reducing indebtedness among farmers also needs to be analysed.
3. The role of formal milk markets in reducing asset inequalities among farmers may also be explored for future research.
4. Since, the women play an important role in employment generation of the farmers. Hence, the study may also be extended to find out that whether the participation of women in formal milk market has improved the socio-economic conditions of women or not.

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