

DAIRY MARKETING IN KERALA

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DOCTOR OF PHILOSOPHY IN COMMERCE

By

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I hereby declare that the work presented in the thesis entitled “**DAIRY MARKETING IN KERALA**” is based on the original work done by me under the guidance of **Prof. (Dr.) SAJI T G** and has not been included in any other thesis submitted previously for the award of any degree. The contents of the thesis are undergone plagiarism check using iThenticate software at C.H.M.K. Library, University of Calicut, and the similarity index found within the permissible limit. I also declare that the thesis is free from AI generated contents.

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LIST OF ABBREVIATIONS

AI	: Artificial Insemination
APCOS	: Anand Patten Cooperative Societies
CDS	: Cooperative Dairy Societies
DAHD	: Department of Animal Husbandry Development
DES	: Directorate of Economics and Statistics
FAO	: Food Agricultural Organisation
FAOSTATA	: Food and Agricultural Organisation Statistics
GDP	: Gross Domestic Product
GoI	: Government of India
GoK	: Government of Kerala
GSVA	: Gross State Value Added
GVA	: Gross Value Added
IAI	: International Animal Industry
IDF	: International Dairy Federation
KCMMF	: Kerala Cooperative Milk Marketing Federation
KgPD	: Kilogram Per Day
LKgPD	: Lakh Kilogram Per Day
LLPD	: Lakh Liter Per Day
MMT	: Million Metric Tonnes
MNREGP	: Mahatma Gandhi National Rural Employment Guarantee Programme
MT	: Metric tonnes
NAS	: National Accounts Statistics
NCDC	: National Cooperative Development Corporation
NDDB	: National Dairy Development Board
NSSO	: National Sample Survey Office
OECD	: Organisation of Economic Cooperation and Development
PDDP	: Peoples' Dairy Development Project
SMP	: Skimmed Milk Powder
USD	: US Dollar

ABSTRACT

This research investigates dairy marketing in Kerala from the perspectives of dairy farmers, focusing on their socioeconomic profile, challenges faced, and the ensuing impacts on farm profitability. Using a descriptive research design, the study collected data from 384 dairy farmers across three leading milk-producing districts in Kerala. Respondents in the cooperative system were chosen using a multistage random sampling technique, while those in the non-cooperative system were chosen using snowball sampling. The study adopts a non-parametric and non-linear approach for data analysis. The research looks into several key aspects, including the factors influencing profitability and channel selection, the satisfaction levels of dairy farmers, and their intentions to continue dairy farming. The study also explores the challenges faced by dairy farmers, which are categorized into supply, economic, demand, marketing, technical, and social factors. According to the findings, farmers who sell their produce through the non-cooperative sector are more profitable, mostly because of the higher prices that are offered there. Furthermore, the study finds that demand-related and economic constraints have a major impact on profitability. Profitability is found to be inversely related with farm size. With supply and financial factors having no discernible effect on profitability, the analysis also emphasizes the significance of price, procurement, demand, and other services in influencing the choice of marketing channels. Furthermore, the study indicates that dairy farmers in Kerala perceive a positive future for the industry, contingent upon adequate support for services related to herd management, market conditions, breeding, feeding, and infrastructure. Among these factors, feeding, breeding, and infrastructure were found to be the most significant determinants influencing farmers' intention to continue in dairy farming. A look at satisfaction levels in different marketing channels shows that dairy farmers who have opted both cooperative and non-cooperative systems have higher satisfaction with services. This is especially true for procurement facilities, demand, financial help, pricing, and incentives. These elements play a big role in their decision to stay in dairy farming. The study suggests that both cooperative and non-cooperative dairy

marketing channels need to focus on improving demand, pricing, supply, and procurement services. This will help increase farmer satisfaction and keep them in the industry. Such improvements are vital for boosting Kerala's milk production sector and supporting inclusive growth, making the state more independent in dairy production.

Key words: Dairy farmers, cooperatives, non-cooperatives, profitability, Farm size, channel choice, marketing channels

സാരാംശം

കേരളത്തിലെ ക്ഷീരവിപണന മേഖലയെ ക്ഷീരകർഷകരുടെ കാഴ്ചപ്പാടുകളിൽ നിന്ന് പരിശോധിക്കുന്നതാണ് ഈ ഗവേഷണ പ്രബന്ധം. അവരുടെ സാമൂഹിക-സാമ്പത്തിക സ്ഥിതികളെയും അവർ അഭിമുഖീകരിക്കുന്ന വെല്ലുവിളികളെയും ക്ഷീരോൽപാദന കേന്ദ്രങ്ങളിൽ നിന്നുള്ള ലാഭ സാധ്യതകൾക്ക് മേൽ ഉളവാകുന്ന ആഘാതങ്ങളെയും സംബന്ധിക്കുന്ന വിവരങ്ങളെ കേന്ദ്രീകരിച്ചുകൊണ്ടാണ് ഈ ഗവേഷണ പഠനം സാധ്യമാക്കിയിട്ടുള്ളത്. വിവരണാത്മകമായ ഒരു ഗവേഷണ മാതൃക ഉപയോഗിച്ചുകൊണ്ട് കേരളത്തിലെ ക്ഷീരോൽപാദന മേഖലയിൽ മുൻപന്തിയിൽ നിൽക്കുന്ന മൂന്ന് ജില്ലകളിൽ നിന്നുള്ള 384 ക്ഷീരകർഷകരിൽ നിന്നും വിവരങ്ങൾ ശേഖരിച്ചു കൊണ്ടാണ് പഠനം നടത്തിയിട്ടുള്ളത്. മൾട്ടിസ്റ്റേജ് റാൻഡം സാംപ്ലിങ് ടെക്നീക് ഉപയോഗിച്ചുകൊണ്ടാണ് സഹകരണ സംവിധാനത്തിൽ ഇടപെടുന്നവരിൽ നിന്ന് പ്രതിവാദകരെ പഠനത്തിനായി തിരഞ്ഞെടുത്തത്. അതേസമയം സഹകരണേതര സംവിധാനങ്ങളെ ആശ്രയിക്കുന്നവരെ പഠനത്തിൽ ഉൾപ്പെടുത്തിയിരിക്കുന്നത് സ്റ്റോബോൾ സാംപ്ലിങ് ഉപയോഗിച്ചുകൊണ്ടാണ്. നോൺ-പാരാമെട്രിക് സമീപനവും നോൺ- ലീനിയർ സമീപനവുമാണ് ദത്തങ്ങളുടെ വിശകലനത്തിനായി ഈ പഠനത്തിൽ സ്വീകരിച്ചിട്ടുള്ളത്. അനേകം താക്കോൽ തലങ്ങളിലേക്ക് ഗവേഷണം ശ്രദ്ധ ചെലുത്തിയിട്ടുണ്ട്. അതിൽ, വിതരണമാർഗങ്ങളുടെ തെരഞ്ഞെടുപ്പിനെ സ്വാധീനിക്കുന്ന ഘടകങ്ങൾ, ക്ഷീര കർഷകരുടെ സംതൃപ്തിയുടെ തോത്, ക്ഷീര കാർഷിക വൃത്തിയിൽ തുടരാനുള്ള അവരുടെ താൽപര്യം എന്നിവ ഉൾപ്പെടുന്നു, ക്ഷീരകർഷകർ അഭിമുഖീകരിക്കുന്ന വെല്ലുവിളികളെയും ഈ പഠനം സമഗ്ര പഠനത്തിന് വിധേയമാക്കിയിട്ടുണ്ട്- വിതരണം, സാമ്പത്തികത, ആവശ്യകത, വിപണനം, സാങ്കേതികത, സാമൂഹിക ഘടകങ്ങൾ എന്നീ മേഖലകളിൽ ഊന്നി കൊണ്ടാണ് വെല്ലുവിളികളെ ഈ പഠനം ഇനം തിരിച്ചിട്ടുള്ളത്. ലഭ്യമായ വിവരങ്ങളുടെ അടിസ്ഥാനത്തിൽ സഹകരണേതര മേഖലകളിൽ വിൽപന നടത്തുന്ന കർഷകർക്കാണ് കൂടുതൽ ലാഭം ലഭിക്കുന്നത്. അതിനു പ്രധാന കാരണം അവിടെ ലഭ്യമാകുന്ന ഉയർന്ന വിലയാണ്. അതുകൂടാതെ, ആവശ്യസംബന്ധമായതും സാമ്പത്തിക പരാധീനതാപരമായതുമായ ഘടകങ്ങൾക്ക് ലാഭസാധ്യതകൾക്കുമേൽ വലിയതോതിൽ സ്വാധീനങ്ങൾ ചെലുത്താൻ സാധിക്കുന്നുണ്ടെന്ന് പഠനം കണ്ടെത്തുന്നുണ്ട്. ക്ഷീരോൽപാദന കേന്ദ്രങ്ങളുടെ വലുപ്പത്തോട് വിപരീത അനുപാതത്തിലാണ് ലാഭസാധ്യത നിലനിൽക്കുന്നത് എന്ന കണ്ടെത്തലും പഠനം മുന്നോട്ടുവയ്ക്കുന്നുണ്ട്. വിതരണത്തിനും സാമ്പത്തിക ഘടകങ്ങൾക്കും ലാഭസാധ്യതയുടെമേൽ പ്രത്യക്ഷമായി ഏതെങ്കിലും തരത്തിലുള്ള സ്വാധീനങ്ങൾ ഇല്ലാത്തതിനാൽ, വിലയുടെയും സമ്പാദനത്തിന്റെയും

ആവശ്യകതയുടെയും വിപണനമാർഗങ്ങളുടെ തെരഞ്ഞെടുപ്പിനെ സ്വാധീനിക്കുന്ന മറ്റ് സേവനങ്ങളുടെയും പ്രാധാന്യത്തിൽ ഊന്നിക്കൊണ്ടുള്ളതാണ് വിശകലനം. ആരോഗ്യ പരിപാലനം, വിപണി സാഹചര്യങ്ങൾ, തീറ്റ, ഭൗതിക സാഹചര്യങ്ങൾ എന്നിവയുമായി ബന്ധപ്പെട്ട സേവനങ്ങൾക്ക് വേണ്ടത്ര പിന്തുണ ലഭിക്കുകയാണെങ്കിൽ ക്ഷീരവ്യവസായ മേഖലയ്ക്ക് അനുകൂലാത്മകമായ ഭാവിയാണ് ഉണ്ടാവുകയെന്ന് കേരളത്തിലെ ക്ഷീരകർഷകർ മനസ്സിലാക്കുന്നത് പഠനം വ്യക്തമാക്കുന്നുണ്ട്.

ഇത്തരം ഘടകങ്ങളിൽ, തീറ്റ, പ്രജനനം, അടിസ്ഥാന സൗകര്യങ്ങൾ എന്നിവയാണ് ക്ഷീര കാർഷിക മേഖലയിൽ തുടരുന്നതിന് കർഷകരുടെ താൽപ്പര്യത്തെ സ്വാധീനിക്കുന്ന ഏറ്റവും പ്രധാനമായ ഘടകങ്ങൾ എന്നും പഠനം കണ്ടെത്തുന്നു. വിപണനത്തിന്റെ വ്യത്യസ്ത മാർഗ്ഗങ്ങളുമായി ബന്ധപ്പെട്ട സംതൃപ്തിയുടെ തോതുകളെ പരിശോധിച്ചാൽ, സഹകരണ സംവിധാനങ്ങളിലും സഹകരണേതര സംവിധാനങ്ങളിലും ഒരുപോലെ ഇടപെടുന്ന ക്ഷീര കർഷകർ ലഭ്യമാകുന്ന സേവനങ്ങളിൽ വലിയ തോതിൽ തൃപ്തിയുള്ളവരായി അനുഭവപ്പെടുന്നു. സമ്പാദന സൗകര്യങ്ങൾ, ആവശ്യകത, സാമ്പത്തിക സഹായങ്ങൾ, വിലനിർണ്ണയനങ്ങൾ, ഇൻസെന്റീവുകൾ തുടങ്ങിയവയുമായി ബന്ധപ്പെട്ട് ഇക്കാര്യം യഥാർത്ഥമാണ്. ക്ഷീര കാർഷിക മേഖലയിൽ നിലനിൽക്കാനുള്ള അവരുടെ തീരുമാനത്തെ വലിയതോതിൽ സ്വാധീനിക്കുന്നവയാണ് ഈ ഘടകങ്ങൾ.

ആവശ്യകത, വിലനിർണ്ണയനം, വിതരണം, സമ്പാദന സേവനങ്ങൾ തുടങ്ങിയവയുടെ തലങ്ങൾ സഹകരണ- സഹകരണേതര ക്ഷീര വിപണന മാർഗങ്ങളിൽ കൂടുതൽ മെച്ചപ്പെടുത്തേണ്ടതുണ്ട് എന്ന് പഠനം നിർദ്ദേശിക്കുന്നു.. ഇത് കർഷകരുടെ സംതൃപ്തിയെ വർദ്ധിപ്പിക്കുകയും അവരെ ഈ വ്യവസായ മേഖലയിൽ നിലനിർത്തുകയും ചെയ്യും. കേരളത്തിലെ ക്ഷീരോൽപാദന മേഖലയെ അഭിവൃദ്ധിപ്പെടുത്തുന്നതിനും ഈ മേഖലയുടെ സമഗ്രമായ വളർച്ചയെ പിന്തുണയ്ക്കുന്നതിനും അത്തരം പരിഷ്കാരങ്ങൾ അത്യന്താപേക്ഷിതമാണ്. ഇത് സംസ്ഥാനത്തെ ക്ഷീരോൽപാദനത്തിന്റെ മേഖലയിൽ കൂടുതൽ സ്വതന്ത്രമാക്കും.

സൂചകപദങ്ങൾ: ക്ഷീരകർഷകർ, സഹകരണ സംഘങ്ങൾ, സഹകരണേതരം, ലാഭ സാധ്യത, ക്ഷീരോൽപാദനകേന്ദ്രത്തിന്റെ വലുപ്പം, വിതരണംമാർഗ്ഗത്തിന്റെ തെരഞ്ഞെടുപ്പ്, വിപണി മാർഗ്ഗങ്ങൾ

CHAPTER I

DESIGN OF THE STUDY

1.1: Introduction

India has a prominent vegetarian population and milk and milk products have a significant place in the people's diet. Indian dairy sector with an annual production of 230.58 million tons during the year 2022-23 is the largest in the world (www.nddb.org). Milk has been regarded as a highly nutritious or wholesome or balanced food, which has been given a high place in the diet of all people in general and sick people in particular. The dairy industry contributes the most important off-farm activity and provides vast opportunities for a gainful employment and income generation to weaker sections. Livestock is the second largest economic activity of rural India as about 20.5 million people depend upon livestock for their livelihoods (Sethumadhavan, 2017).

National commission on Agriculture observed that next to the crops, animal husbandry programme has got the largest employment potential. It provides secondary job, offer lucrative service at the place of living itself and make better use of female labor. Dairying is suitable for raising the income of rural households, particularly weaker segments of rural people and has a redistribution impact on the income of the rural people. Over 90% of the milk production come from small farmers, who are located in rural area. The dairy sector stretches its hands to 150 million farm households by providing nutritive food, supplementary income and productive employment for family labour, mainly for women (Payal et al,2018). 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).

Consuming nearly all of its own milk production, it is the biggest consumer of dairy products worldwide. Dairy products are considered as cheap and nutritious food to millions of people in India and is the only acceptable source of animal

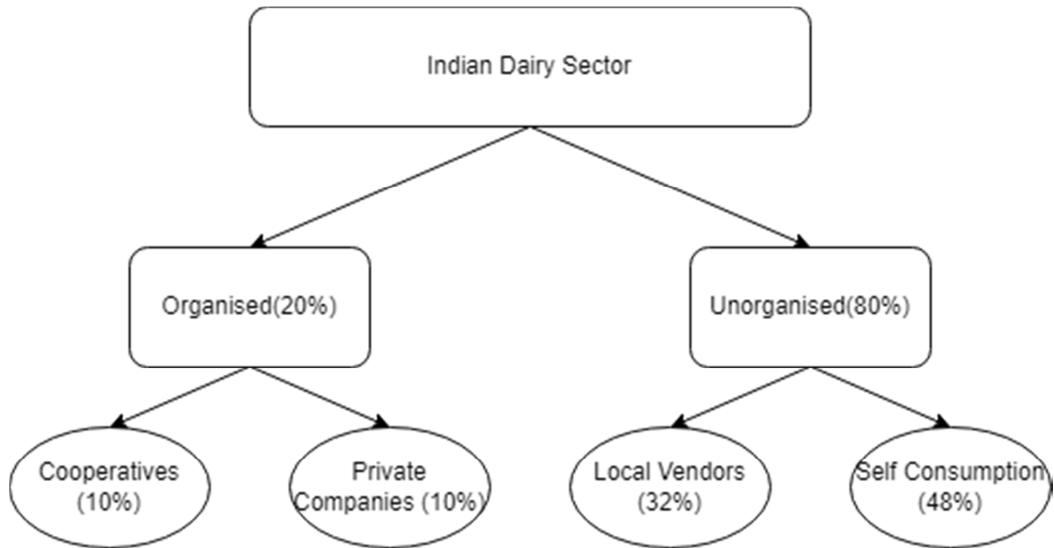
protein for the large vegetarian segment of Indian population (Amit and Monojit, 2015). Livestock sector provides employment to 18 million people and nearly 70% of them are women (Ramesh et al,2018). Furthermore, for an estimated 27.6 million people, the dairy industry is their main source of income. Among these, 65 to 70% are small, marginal farmers and landless labourers (Satish and Soumyakant,2016).

Since 2014-15, the Indian milk market sector has grown at a rate of 6.08%, compared to the global dairy production growth of 1.1% in 2022. The sector has played important role in improving the per capita availability of milk in India to 459 grams per day in 2022-23, whereas the global average of milk availability is around 322 grams per day (NDDDB Annual Report, 2022-23). The output of milk has grown by 3.83%, from 222.07 million tonnes in 2021–2022 to 230.58 million tonnes in 2022–2023. Milk production of India is estimated to reach 236.35 million tons in 2023-24 registering a growth of 2.5% over the last year beating the world average growth rate. (FAO Dairy Market Review,2023).

The organized and unorganized sectors make up the Indian dairy industry. Traditional milkmen, vendors, and domestic self-consumption make up the unorganized sector; cooperatives and private dairies make up the organized sector. Cooperatives and private dairies still only purchase around 20% of the nation's milk production, with 32% going to the unorganized market and 48% being consumed locally, according to the Department of Animal Husbandry, Dairying & Fisheries' Annual Report for FY19, Ministry of Agriculture & Farmers Welfare, GOI. The organized sector handles around 40% of the milk that is sold, while the unorganized sector handles the remaining 60%.

Figure 1.1

Birds eye view of Indian dairy industry



About 22% of the 35% of milk processed in India is handled by the unorganized sector. The unorganized processors, comprising of small dairies and halwais, mainly deal with the production of traditional Indian dairy products and sweets (IAI,2011). The unorganized dairy processors lack investment, equipment and technology necessary for producing high quality dairy product meeting international safety, packaging and transparency standards (Gupta 2007; IAI 2011).

Dairying is regarded as a secondary occupation for small and marginal farmers and agricultural labourers in Kerala (www.keralaagriculture.gov.in). There are plenty of cattle, both native and crossbred, in practically every region of Kerala. Kerala has a very favourable climate for the development of dairy products because of small holdings, a large percentage of the population living in rural areas, low family income and employment, more room for the fuller use of farm and family labour, active participation of cooperative institutions, and the government's supportive policies. The small sector is the main source of milk in Kerala, and seasonal variables ultimately determine its availability (stjosephs.edu.in).

According to National Accounts Statistics (NAS) 2022 forecasts, livestock's share of the GVA of the entire agriculture and related sector (at constant prices) climbed from 29.33% in 2019–20 to 30.13 percent in 2020–21. In 2020–21, the cattle industry contributed 4.90 percent of the total GVA (dairydevelopment.kerala.gov.in). According to quick estimates, the cattle sector contributed 26.44 percent of the entire agriculture and allied sector GSVA (constant prices 2011–12) (DES, 2021–22). In 2021–2022, the percentage was 2.35 percent of the State's total GSVA. At constant prices (2011–12), the livestock sector's GSVA climbed slightly from ₹11,701.86 crore in 2020–21 to ₹11,714.01 crore in 2021–22 (dairydevelopment.kerala.gov.in).

In contrast to the Indian average of 4.16 percent, Kerala's dairy sector managed to maintain a growth rate of 4.24 percent in the 1990s despite a declining fodder base. But it dropped to 3.78 percent during the Ninth Plan period (kerala.gov.in). A negative growth rate of 4.86 per cent has been recorded in the milk production of Kerala in the 10th plan period compared to 9th plan period and this trend continues up to the year 2021-22, but at diminishing rate. During 2021-22 the growth rate was negative 0.08 per cent. This situation has emerged due to many factors including increasing cost of production, non-availability of fodder, low price compared to cost, job opportunities in service and other sectors. However, the year 2022-23 experienced a positive growth rate of 1.89 in the milk production of Kerala (Department of Animal Husbandry).

Kerala's total milk consumption in 2022–2023 was 33.51 lakh metric tons. However, only 25.79 lakh metric tonnes were produced annually, meaning that more over 2.5 lakh litres of milk were purchased outside each day on average (spb.kerala.gov.in). Out of 25.79 lakh MT of milk produced in the State, a major share was produced by cross bred cattle (93.56 per cent) (Department of Animal Husbandry).

For a long time in the past the milk marketing in Kerala had been under the control of unorganized sector, more specifically non-cooperative sector. Then, Milma made its entry and occupied a significant share in milk market of Kerala.

Later, many players, from organized and unorganized sector have been entered in to the system which made a drastic farmer shift in the milk market of Kerala.

1.2: Research Problem

Dairying in India, similar to other agricultural enterprises, primarily relies on small-scale individual units. The majority of farmers fall into the small or marginal category, typically owning two to three cattle and less than two hectares of land. For these individuals, dairying serves as a supplementary occupation, providing additional income at minimal expense. These farmers, like other agricultural producers, are dispersed throughout the country and are susceptible to various challenges specific to the dairy industry. These challenges include market uncertainties characterized by fluctuating prices, inadequate veterinary care facilities, and limited access to feed. Additionally, climate change significantly impacts milk production and exacerbates the vulnerable socioeconomic conditions faced by farmers. A comprehensive understanding of the constraints they encounter is crucial for addressing these issues at both the farmer and policy levels.

In Kerala, milk producers, predominantly from rural areas, rely on either the cooperative or non-cooperative sectors, or a combination of both, for the sale of their milk. The cooperative segment is primarily composed of dairy cooperatives established through government initiatives (such as Milma) or independent milk marketing cooperatives. Conversely, the non-cooperative segment includes individual buyers, vendors, and private institutions. The choice of sales channels by dairy farmers is significantly influenced by various factors unique to the dairy sector. Despite an increase in milk consumption within the state, the cooperative sector has not experienced a corresponding growth rate. Approximately 82 percent of the milk produced in Kerala is marketed directly by producers or through vendors (Divakaran,2010). In the 2011-12 period, dairy cooperatives accounted for only about 15-16% of the estimated production. Consequently, farmers who previously relied on the cooperative sector for marketing their products are now transitioning to the non-cooperative segment. Therefore, it is essential to explore the factors that drive dairy farmers to shift away from the cooperative sector.

The recent decline in the dairy farming sector, similar to other agricultural industries, can largely be attributed to low profitability associated with this activity. Such low profitability adversely affects both the sustainability of the sector and the overall satisfaction of farmers. Dairy farmers are currently receiving higher prices for their products from the non-cooperative sector compared to those from dairy cooperatives. In addition to better pricing, various services related to supply and demand, as well as financial and technical support—including health care—play a crucial role in influencing profitability and the satisfaction levels of dairy farmers about the services of their channels. The current satisfaction of these farmers, along with their views on the future of dairy farming, can significantly impact their willingness to continue in this field. Therefore, a comprehensive approach that addresses the various dimensions of dairy farming is essential for assessing the sustainable performance of the sector.

1.3: Research Questions

The research focus on the following questions:

1. Is dairy farming in Kerala a profitable venture? What factors contribute to its profitability?
2. What factors influence the choice of marketing channel for dairy farmers in Kerala?
3. Are there any challenges faced by dairy farmers in Kerala? If so, what are these challenges?
4. What are the future prospects for dairy farming in Kerala? Do these prospects affect farmers intention to continue in the dairy farming?
5. How satisfied are dairy farmers with various services of their channels? Does their level of satisfaction influence their decisions to remain in dairy farming?

1.4: Objectives of the Study

The important objectives of this research are as follows.

1. To identify the main factors that influence the profitability of dairy farming in Kerala
2. To examine the various factors that discriminate the selection of marketing channels for dairy products among farmers in Kerala.
3. To investigate the major constraints faced by dairy farmers and their impact on the profitability of farming activities in Kerala
4. To identify the strategic factors that shape the future of dairy farming and their effect on intention of farmers to stay in dairy farming.
5. To assess the level of satisfaction among farmers regarding different aspects of channel services and its effects on their intention to continue in dairy farming.

1.5: Hypotheses

1. Multiple factors that include demand, price, supply, finance, procurement and other services contribute positively to the profitability of dairy farming in Kerala.
2. Multiple factors, including demand, price, supply, finance, procurement and other services influence the selection of marketing channel by dairy farmers.
3. Dairy farmers in Kerala face various challenges/constraints relate to supply, demand, marketing, economic, technical and social factors each at different levels.
4. The challenges/constraints faced by farmers concerning supply, demand, marketing, economic, technical and social factors adversely impact their profitability.

5. Dairy farming in Kerala has good future prospects that influence the intention of the farmers to remain in dairying.
6. The level of satisfaction among dairy farmers regarding various aspects of their operations place a significant role in their decision to continue in dairy farming.

1.6: Scope of the Study

The research focuses exclusively on the dairy marketing practices of farmers in Kerala. The results are derived from the responses of selected respondents across three districts in the state. Within a comprehensive framework, the study examines the socioeconomic profile of dairy farmers in Kerala, identifies the challenges they face and their effects on farm profitability, evaluates the factors influencing channel selection, assesses the satisfaction levels of dairy farmers along with their determinants, and explores the future of dairy farming as well as the farmers' intentions to continue in this occupation.

1.7: Methodology

1.7.1: Research Design

The nature of this research is both descriptive and analytical. It aims to empirically assess the different constraints that dairy farmers face and how these constraints affect their profitability. Furthermore, the study delves into the determinants of profitability for farmers, their channel choices, the factors influencing these decisions, and evaluates farmers' satisfaction levels alongside their intentions to continue in the dairy industry.

1.7.2: Data

The research used both primary and secondary sources for the needed information inputs.

1.7.2.1: Primary Sources

The study mainly uses primary data that are collected through administering a survey among the selected dairy farmers in Kerala for drawing the necessary inferences.

1.7.2.2: Secondary Data and their Sources

The secondary data collected from published sources like journals, books, reports, working papers, monographs and web pages help the study to acquaint more with the existing literature and to select the variables measuring the profitability and future prospects of the dairy farmers in Kerala.

1.7.3: Population and Sample

1.7.3.1: Universe or Population:

Population of the study comprises of dairy farmers in Kerala, who have been rearing cows and buffaloes for milk production.

1.7.3.2: Sample

Sample Unit

The sample units for the research includes the small, medium and large farmers. Farmers rearing less than five cattle are treated as small farmers, more than five but less than ten as medium farmers and farmers rearing more than ten cattle as large farmers for the study. The entire conclusions are made from the perspective of the individual milk producers.

Sample Sources and Sample Size

The sample for the research has been chosen from two sources, cooperative sector and non-cooperative sector. While the sample from the non-cooperative sector depending solely on that sector for marketing their produces, there are significant number of dairy farmers from cooperative sector are also depending on

non-cooperatives for selling their produces. Hence, a greater number of dairy farmers are needed to choose from the cooperatives.

The sample size for this research was fixed in accordance with the guidelines provided by Cochran (1963) and Krejcie & Morgan (1970). Thus, a total sample size of 384 was established. In addition, the research specifically included 282 farmers from cooperatives and 102 farmers from non-cooperatives to get sufficient number of farmers who depends both the sectors for marketing their produces.

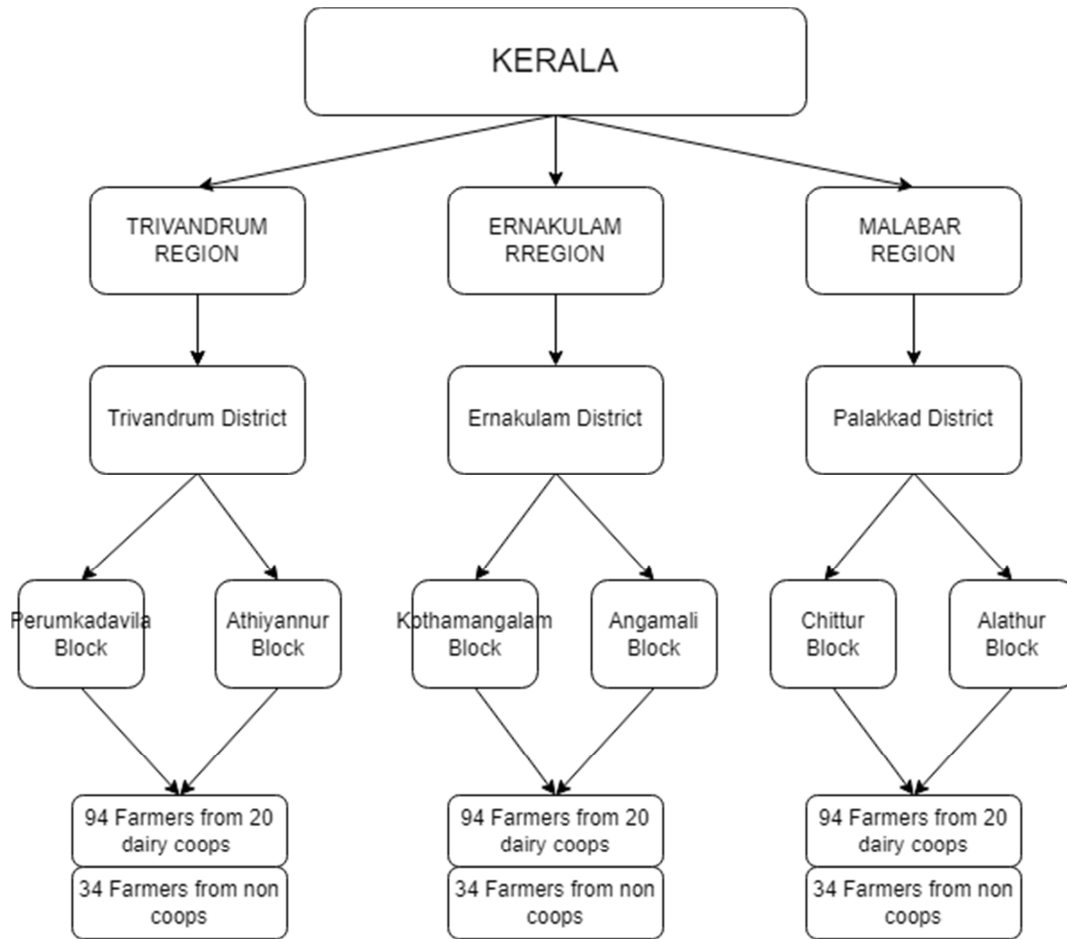
Sampling Design

Multistage random sampling techniques are employed to select respondents from the cooperative system. Initially, the milk market in Kerala is categorized into three regions based on the classification made by MILMA, the largest dairy cooperative in the state: Thiruvananthapuram Region, Ernakulam Region, and Malabar Region. For the study, the district with the highest number of dairy cooperatives is chosen from each region as the sample district. Consequently, Thiruvananthapuram is selected from the Thiruvananthapuram Region, Ernakulam from the Ernakulam Region, and Palakkad from the Malabar Region for the selection of farmer respondents. Subsequently, two blocks are chosen from each selected district based on the highest number of cooperatives operating within those blocks. From each of the selected blocks, ten dairy cooperatives are randomly chosen. Ultimately, a total of 282 respondents (94 each from three districts) are proportionately selected from the list of dairy farmers associated with the chosen cooperatives.

The dairy farmers from non-cooperatives are also selected from selected blocks. As the source list is not available for farmers solely depending on non-cooperatives, the research used snowball sampling technique to select respondents, with 34 farmers chosen from each of the three districts.

Figure: 1.2.

Chart showing sampling technique



1.7.4: Survey Instrument

A pre-tested structured questionnaire is used for the collection of the responses. The final design of the survey instrument is based on the criterion of standard reliability tests stipulated for the purpose.

1.7.5: Test of Reliability

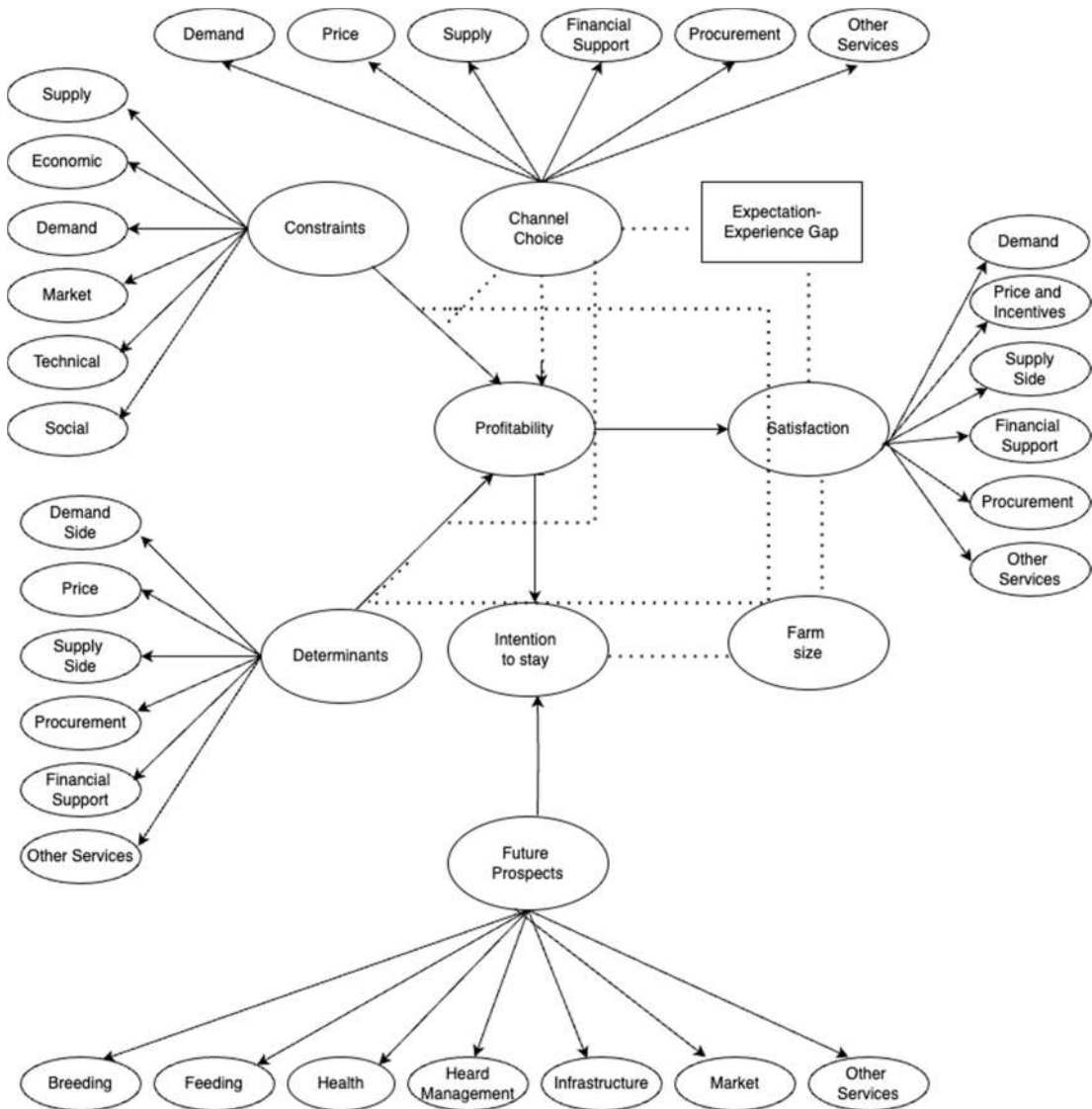
The study conducted a pilot survey among 25 dairy farmers selected from three districts. The purpose of this survey is to determine the reliability of the scale used to measure data that will be used in this research. The statistic which is used in a reliability test is Cronbach’s alpha, and the study applies the test on different sets of the construct. In order to consider a scale is reliable, the Cronbach alpha value

should be between 0.60 to 0.8 (Shi et al. 2012). The computed Cronbach's alpha coefficients for all constructs are higher than this minimum threshold; hence the scales measuring the perception and satisfaction of farmers are highly reliable.

1.7.6: Test of Normality

The purpose of normality diagnostics is to determine which approach, parametric or non-parametric, that we should follow in our data analysis. In fact, normality tests of different constructs produce mixed results. Hence, the study mainly followed non parametric/nonlinear approach for analysis.

1.7.7: Model Framework



1.7.8: Tools of Analysis

Since the responses that are revealed through this study are more qualitative, appropriate scaling is essential to quantify the responses. Accordingly, the study mainly used a five-point Likert type scaling technique to measure responses. However, the data in the categorical and ordinal form is also in denoted specific responses.

As mentioned earlier our analytical design primarily rests on the nonlinear approach, the details of which are given below.

Socioeconomic profile of dairy farmers	Descriptive Analysis
Profitability Analysis	Descriptive Analysis, Repeated ANOVA,
Constraints faced by dairy farmers and their impact on the profitability of farming activities	Mean score analysis, Sign Test, Mann Whitney U test, Kruskal Wallis H test, OLS Regression Analysis and Cross-sectional Quantile Regression (CSQR) Analysis
Factors that influence or discriminate the selection of marketing channels	Discriminant Analysis
Determinants of profitability in dairy farming	OLS Regression Analysis, Cross sectional Quantile Regression (CSQR) Analysis, Kendall's tau
Factors that shape the future of dairy farming and their effect on intention of farmers intention to continue in dairy farming	Exploratory Factor Analysis (EFA), Binary Logistic Regression
Level of satisfaction among farmers regarding different aspects of farming and its effects on their intention to remain in dairy farming	Mean score analysis, Binary Logistic Regression

1.7.9: Period of the Survey

The survey has administered during the period from January 2023 to September 2023.

1.8: Limitations

The study was not free from limitations. The research took inputs from the responses through primary survey among dairy farmers in Kerala. Hence, the biased

responses might affect the outcomes of the research. Moreover, there might be the chance of omitted bias in the model.

1.9: Design of the Report

The study intends to have six chapters.

Chapter I is an introductory chapter, covering research problem objectives and significance of the study, data and methodology followed by its scope and limitations.

Chapter II reviews both theoretical and empirical literature in the related field of research with an intention to identify the research gap.

Chapter III, describes the theoretical background of the research covering dairy farming, dairy markets and marketing strategies.

Chapter IV describes demographic profile of dairy farmers along with various dimensions dairying.

Chapter V makes a profitability analysis of dairy farming for various dairy farmer groups. It separately assesses profitability of dairy farming based on marketing channel choice and farm size.

Chapter VI analyses strategic factors and its impact on profitability and marketing channel choice. It also examines various constraints faced dairy farmers and their impact on profitability of dairy farming.

Chapter VII discuss the factors that shapes the future prospects of dairy farming. This chapter also assess the satisfaction of dairy farmers and its impact on the intention to stay in dairying.

Chapter VIII will conclude the research with a summary of findings and suggestions thereafter.

CHAPTER II

REVIEW OF LITERATURE

This literature review explores diverse studies on the Indian dairy industry, examining the operational, financial, and marketing dynamics that influence both organized and unorganized sectors. An all-inclusive review of the past studies is a requisite for proper understanding of the concepts, research design and method of analysis for any research. This chapter looks at the available, existing and accessible literatures which is related to this study. Seminal Papers, Journal articles, Book Chapters, Doctoral and Master thesis are collected and condensed to arrive at the relevant concepts and to draft the research gap. Hence, a review of studies related to the objectives of the study is presented in this chapter. For the purpose of convenience and clarity, this chapter is divided into two segments. Under each segment, investigative procedure is being done to understand the studies pertaining to the marketing structure, marketing channel, constraints, factors, expectation and dairy cooperatives.

2.1: International Scenario

Perekhozhuk, et al., (2013) centered on creating a different model that may be used to plant-level data in order to test for oligopsony market power. The authors have created a model that may serve as a helpful benchmark for an econometric test of market power in the dairy industry by taking into consideration empirical research and particular changes in the Hungarian dairy sector. The econometric analysis's findings indicate the exercise of oligopsony market power in the Hungarian dairy industry and demonstrate the statistical significance of the legislative changes in Hungary as well as plant-specific concerns.

Dai and Wang (2014) tried to understand the pricing mechanism of raw milk in China which is varying in hands of the farmers and the hands of final consumers, he further tries to assess whether the market structure of Chinese dairy industry is Oligopolistic or oligopsony based on the price variations, for doing so the author has

made use of Primal-Dual Solow Residual model and suggests that the market power is concentrated and is more towards that of oligopsony in nature.

Akhter and Ullah (2014) reported that 80 percent of the milk consumed in the developing countries was handled by informal traders. In Pakistan, 98 percent of the milk supply chain is handled by unlicensed vendors. According to him, information hurdles and informal channel bargaining power have made supply chain disruption a serious problem. India, China, and Pakistan are currently the top four milk-producing countries in the world. However, the informal dairy supply chain partners have been causing economic, social, and health consequences for both milk farmers and consumers.

Amentae et al., (2015) conducted a study in Ethiopia and found that the main chain actors in the identified milk chains were farmers, traders, cooperatives/unions, and catering establishments. Cooperatives and unions were the main players in this supply chain, as 73% of the milk sold by farmers went through them before reaching the following chain participants. The chain actors' marketing interactions were described as mostly transaction-based and on-the-spot, with little regard for the long-term market. Cooperatives and unions were determined to be the loss hotspot point in the system, accounting for 39% of all losses. In order of severity, the following issues were found to be significant contributors to milk losses in the research area: inadequate milk handling practices at the collecting locations, a lack of immediate acceptors, the usage of milk carrying tools, transportation methods, and poor communication with other chain partners.

Yasmin and Ikemoto (2015) (on the basis of responses of 50 rural women involved in dairy farming in two villages in the Mymensingh district of Bangladesh, reported that in Salakandi village, the personal factors most significantly influenced women to start farms, but in Binpara village social factors were a greater motivation)The findings showed that, in comparison to women in Binpara village, women in Salakandi village prioritized dairy farming activities and shown a bigger improvement in their financial well-being. They therefore proposed that women's involvement in dairy farming help lessen poverty in Bangladesh's rural areas.

Belhekar and Dash (2016) reported that studies have shown that dairying in rural areas has surpassed crop production in terms of profit in marginal, small and medium-sized holdings. Dairying and crop production together were more profitable than crop farming alone for small-scale farmers with irrigated land. Over time, dairying has also taken on the characteristics of a fully-fledged industry in the nation and, either directly or indirectly, has improved the lives of individuals involved, resulting in notable socioeconomic improvements.

Ishaq et al., (2016) attempted to calculate the financial advantages of milk marketing cooperatives operating in the southern Pakistani Punjab province's Vehari and Muzzafargrah areas. According to their study's findings, cooperative members outperform non-members in terms of farm revenue, milk output, rearing enhanced cattle of 16 breeds, access to veterinary care, and utilization of nutrient-dense silage. They noted that the creation of milk marketing cooperatives helps female dairy smallholders in rural development and gives them access to greater economic options.

Yilmaz et al., (2016) made a study in 2012 on dairy cattle farms in Turkey's east Mediterranean districts. Through surveys, primary data was gathered from 148 dairy cattle farms that were selected using the Neyman Stratified Sampling approach. Based on the quantity of cows, dairy farms were divided into four types. The primary component of variable costs (86.52%) was feed expenses, which accounted for 65.91% of total production costs. Group 1 farms paid USD 0.499 for milk, Group 2 farms paid USD 0.399, Group 3 farmers paid USD 0.272, and Group 4 farms paid USD 0.233 25. Only the farm in group 1 had a negative average gross margin value among the farms in the study; all other groups had positive averages. Only the farm in group 4 had a positive absolute profit value; all other farms had negative values. The farmers' average relative profit was 0.9067.

Baliyan & Gosalamang (2016) reported that despite the government's efforts, dairy sector in Botswana has not grown satisfactorily and therefore the local demand of milk and milk products is met by imports which increase the import bill of the country by millions per annum. The main obstacles to dairy production were

found to be the following: high feed costs, feed scarcity and unavailability, lack of technical support, lack of skilled labor, high pest and disease prevalence, and absence of dairy-related technologies.

Chandio et al., (2017) examined Pakistan's economic growth and the significance of the dairy industry between 1975 and 2015. All variables become stationary at first difference, according to the findings of the P-P unit root test with trend and intercept and the Augmented Dickey Fuller (ADF) unit root test. On the other hand, the co-integration test findings indicated that the variables did, in fact, have a long-term relationship. Additionally, the OLS method's results demonstrated that the dairy industry's output is clearly quite substantial and contributes to the growth of the agricultural GDP. Additionally, they stated that a 1% rise in dairy production output would result in a 0.36 percent gain in agricultural GDP.

Olsson (2017) made a study on Swedish dairy business by interviewing a total of fourteen dairy farmers on Gotland. The data was gathered and analysed using a grounded theory technique called coding, which divided the data into smaller units known as ideas. Success factors were the names given to the categories that were created from the principles. The importance of preventive work, the choice of source for new information, the awareness of the roughage percentage in the feed ratio, the drive to improve and recognize opportunities and challenges, and the attitude toward economy and profitability connected to the practical daily operation were the five success factors that were identified. He discovered a link between the success elements and the high profit group.

Tegegne et al., (2017) made a study on 100 randomly selected smallholder milk producer households and 69 milk traders in Dessie Zuria District of South Wollo Zone, Northern Ethiopia. According to their study). From 28% (in channel 3) to 100% (in channel 1), producers' benefit shares vary. With a gross marketing margin (GMM) share of 63.3% in channel 3, hotels and cafes gained the most from the milk market, followed by retailers in channel 2. Regarding net marketing margin (NMM), manufacturers received the largest profit share of consumers' prices in channels 1 (60.4%) and 2 (33.67%), while hotels and cafes received roughly 45.33%

in channel 3, and retailers received 24.6% and 20.13% in channels 2 and 4, respectively. Conversely, channel 5 and 6 retailers had the lowest proportion of NMM from consumer pricing (6%) and 6.07%, followed by channel 6 semi-wholesalers (6.93%) and channel 5 processors (7.8%).

Kiplangat and Vincent (2018) based on responses from 432 dairy farmers investigated the elements that influenced the choice of commercial milk marketing channel among dairy farmer households in Kenya's Kericho County. According to the results of the marginal impact, the likelihood of selling milk only to commercial milk buyers increased by one and 19 percentage points, respectively, for every unit change in the size of the household's pasture farm and for each collaboration in lobbying for a higher milk price. The likelihood of selling raw milk to commercial customers increased by 2.3 and 16.1 percentage points, respectively, depending on the number of cows milked each day and the storage/cooling of milk. Contracts with the houses of dairy milk sellers and reliable relationships provided the raw milk supply security that commercial milk buyers valued.

Bekuma et al., (2018) made a study in the Gimbi region in the West Wollega zone to identify and rank typical marketing restrictions for dairy products as well as to characterize dairy product marketing systems. Based on the ownership of dairy cows and the viability and marketing potential of dairy products, they chose 130 household respondents. Butter is the main dairy product that farmers sell, and it was found that whole milk, fermented whole milk, and traditionally processed butter are all viable dairy products. According to reports, there was only an unofficial structure in place for marketing dairy goods through various channels. The main 39 limitations of dairy product marketing systems in the study area were low milk quantity, market distance, high transportation costs, and spoiling. Since the market propels the growth of this industry, responsible players should focus on dairy marketing alternatives in addition to cow productivity and production.

Clay et al., (2019) studied Dairy intensification: Drivers, impacts and alternatives. The study revealed that, during the past few decades, dairy production techniques have substantially intensified. In many parts of the world, dairy farms are

bigger and owned by fewer people. Although increased productivity might boost overall economic advantages, there are social and environmental costs that are specific to a certain location. We advocate for research and policy strategies that can more effectively take into consideration trade-offs and synergies among the various aspects of dairy impacts. In particular, we recommend that (1) transitions in the dairy system be taken into account within more general processes of social-environmental change and (2) look at how specific framings and measures could result in unequal social-environmental outcomes.

Yuniati (2022) The study aimed to analyse the marketing channel and efficiency of milk distribution in Bogor Livestock Business Area. The B/C ratio, marketing margin, and farmer's share were the metrics employed in this investigation. In this study, 47 dairy farmers participated as responders. According to the study's findings, fresh dairy products were marketed through four different channels. The first channel (Dairy Farmer – Cooperative – Milk Processing Industry) was the most frequently used. Farmers and cooperatives have a crucial strategic role in preserving the quantity and quality of dairy cow milk that is delivered. Dairy producers who sold fresh milk directly to final consumers had the largest farmer's share.

2.2: National Scenario

Silpasree and Prabhu (2005) assessed the dairy industry's expansion and economic contributions to India. The study was descriptive in character and relied on secondary data gathered from a number of sources, including the Ministry of Finance, the Directorate of Animal & Veterinary Services, and the Economic Survey. From 2000–01 to 2016–17, there was a noticeable upward trend in the amount of milk available per person. Operation Flood, which linked rural production centers with urban consumption centers, and the liberalization policy, which opened the door for the private sector to enter the dairy industry, were the primary causes of the rise in milk production. Over 60% of the overall cattle production came from milk. The national and state governments implemented different dairy development

programs over the years in an effort to increase the productivity and milk production of dairy animals.

Krishnamurthy (2006) worked out the cost-benefit in dairying across different land size classes in Karnataka in general and Kolar district in particular. The study also assessed the employment potential created by the dairy industry and reviewed and explored the impact of dairying on the rural life of Kolar district. 286 households from all the eleven taluks were selected after grouping the households into five land holding categories. Progress Karnataka dairy development achieved in respect of number of Dairy cooperative societies, memberships and milk procurement were very impressive. The average milk yield per day of crossbred cows is considerably higher than that of buffaloes and the performance of crossbred cows had been significantly superior to that of buffaloes in the productivity of milk. Dairying was an instrument of changing the life style of rural households. The households in the study area were strongly believed that dairy cooperatives had a catalyst effect in improving their economic status.

Rajanna (2006) analysed the major issues of dairy development such as low production, lack of manpower training, overview of five-year plan experience on cooperative sector to manage dairy activity. The study also identified the growth of dairy farming with agro-industry and assessed the impact of dairy development on productivity of milk animals, employment opportunities and income generation. 150 dairy farmers from the selected five milk societies were taken as the sample respondents giving representation equally to landless, marginal, small and large farmers. The study revealed that the villages with dairy cooperatives were much better off than those without, and the households with milk animals are economically better than their counterparts. Women had better control of income from milk than men and moneys derived from milk act as a catalyst in transforming the socio-economic situations of the households in the rural economy

Das (2006) evaluated the nature, magnitude and dimensions of dairy development in India and found out to what extent the dairy farming has been instrumental of economic and social changes in the state. The sample consisted of

100 dairy households and 100 non-dairy households from eight villages of two coastal districts of Odisha. The data revealed that milk yield per milk animals among the dairy households in both districts was found higher in comparison with the non-dairy household due to better fodder practices followed by the dairy households. Due to the lack of on-farm and off-farm employment opportunities in rural area, most often landless people pursued dairying as a promising economic activity.

Bagade (2006) studied the growth and performance of Solapur District Milk producers Union and the affiliated primary milk cooperative societies in Solapur district. It studied the income and expenditure pattern of milk production, the role of women in dairy activity, the impact of dairy cooperatives on the income distribution and the present position and problems of dairy farming. 240 farmers from 40 primary milk producers' cooperative societies selected from two taluka of Solapur district using multistage random sampling. The findings of the study indicated that awareness about insurance was very low among all categories of milk producers. Dairying provided a subsidiary occupation to landless and other categories of households in the study area and it helped to reduce the poverty in rural area. Major problems faced by dairy cooperatives were unhygienic milk supply, lack of good transportation, untimely payment from milk union, competition, high cost of feed and fodder, multiple number of Primary Milk Producers Society in a village, problems of adulteration, improper milk testing and political interference.

Stall, et al., (2006) used information gathered from 797 households that were randomly chosen from 60 villagers in nine districts of Gujarat to examine the relationship between smallholder dairy producers and alternative traditional, private, and cooperative sector milk markets and service providers. According to estimates, 28% of the milk produced was kept for human use, while 72% was sold. The majority of sold milk (41.5%) was taken by dairy cooperative groups, whilst only 3.5% went to private processors. Thirteen percent went to private milk brokers, and fourteen percent was sold directly to customers by the producers.

Sinha (2007), through this study, seeking to draw lessons on how to support positive patterns of change leading to sustainable increases in farm incomes, and to

provide guidance to governments and donors on potential risks and responses. Dairy cooperatives addressed concerns of development and change in addition to organizing milk producers and keeping up with the modernization and commercialization process. Members, elected officials, and staff at all organizational, management, procurement, processing, quality control, monitoring, accounting/bookkeeping, and general supervision stages have all benefited from ongoing education and training, which has greatly increased their sense of belonging and raised their awareness of their roles. The dairy industry has great potential to be a stable source of income for the great majority of India's rural poor, despite all the issues it faces. India's dairy industry now has more export prospects and new problems have arisen as a result of the WTO's recent liberalization of global commerce in dairy products.

John (2007) found out whether private sector dairying units in Ernakulam district were instrumental in increasing the level of income, employment, saving habits and standard of living of its beneficiaries. For the study, 250 beneficiaries from four private sector dairies, 100 from PDDP beneficiaries 50 each from Nirmal Milk, Jeeva milk and Milgram milk, were selected in the proportion of 2:1 from beneficiaries taking dairying as main occupation and subsidiary occupation respectively by random sampling method. There was a common feeling among the beneficiaries that the general infrastructure for dairy development proved insufficient to improve the income and standard of living. The study revealed that profit from dairying was not limited to sale of milk alone, but it also included income from the use of dung, sale of calves, saving in medical expenses as a result of improved health maintained by consumption of milk and Gobar gas plant. Private sector dairying units brought advancement in socio-cultural field of beneficiaries in the form of development of leadership skill, skill to address public, to organize meetings and prepare and present reports etc. The study concluded that dairying could be considered as a family occupation in a rural setup by treating it as a subsidiary occupation.

Kannan (2007) measures the resource use efficiency and optimum herd size, identified the existing channel of distribution of milk and the reasons for the selection, revealed the various constraints faced by the owners of dairy farm and evaluated the performance of dairy farming and its correlates. To fulfill the purpose of study 585 sample farmers belonging to three categories of dairy farm, small, medium and large were selected from 13 selected blocks from the district of Madurai by using multistage sampling. Knowledge level in dairying, risk orientation, social orientation, market orientation, self-confidence, group activity, decision making pattern, entrepreneurial behavior etc. were more in large farm farmers compare to their counterparts. The average cost incurred per animal per day was greater in large and medium farm compared to small farm. Resource use efficiency was higher in large and medium farm compared to small farm. The important marketing channels among the farmers were milk vendors and wholesalers. The major problem of dairy farming among the respondents were exploitation by middlemen, non-availability of green fodder, social dogma, faulty system of weight and measurement, lack of credit facility and low level of literacy. Major factors influencing the performance of the dairy farms were level of education and family income.

Sharma, et al., (2007) analyzed the Uttarakhand Cooperative Dairy Federation Ltd.'s price spread, marketing channels, procurement patterns, and efficiency in enhancing milk output. Multistage sampling was used to choose 300 farmers from the Kumaun region's Nainital and Almora districts. It has been discovered that the Federation neglected to embrace product diversity, which was urgently needed, in favor of concentrating primarily on the marketing of liquid milk. Farmers were distancing themselves from Anchal due to the absence of business development services pertaining to the dairy industry. According to the study, inefficiencies could be eliminated by setting up animal feed, having veterinary professionals visit the village on a regular basis, developing breeds, switching from monthly to weekly milk payments, testing the quality of the milk, increasing local milk sales, installing milk vending machines, and other measures.

Rangasami and Dhaka (2008) compared the marketing on milk and milk products by dairy plants cooperatives and private sectors in Tamil Nadu. The data gathered for toned milk, standardized milk, full cream milk, butter, and ghee from a few chosen cooperative and private dairy factories in the Coimbatore district during the fiscal year 2001–02 served as the basis for the study. It was discovered that while the marketing costs for standardized milk were greater in the cooperative dairy plants, the marketing costs for toned milk were the same in both dairy plants. For goods like butter and ghee, the cooperative facility has been found to have lower marketing costs. With the exception of toned milk, all dairy products had higher marketing margins in private than cooperative dairy operations. According to the report, consumer-oriented marketing research and development should receive more attention, and value addition in dairy products should be carried out without compromising quality.

Parampath (2008) conducted a study to ascertain the current level of competitiveness of MRCMPU and to recommend measures to ensure its long-term competitiveness. The study also analyses retailer's performance and satisfaction and evaluated the customer service level of MRCMPU. A total of 50 retailers and 120 customers were selected from the selected districts. 10 non-users of Milma products were also selected from each district for the study. The study revealed that the major problem of MRCMPU were surplus milk and high procurement cost. From retailers' point of view there was decline in the sale of Milma milk products in the study area. Moreover, incremental value addition was very poor in MRCMPU. Even though, the consumers in the study area were of the opinion that the same quality milk was not available at this price from other supplies.

Sharma (2008) studied the marketing system and logistic system of milk and milk production through the medium of cooperatives. The study conducted to examine the promotion methods adopted by the dairy cooperatives, to identify the factors which were conducive and detrimental for the development of marketing of dairy products and to study the value delivering system and buying behavior of consumers with reference to milk and milk products. Samples selected for the study

included Dehradun district Milk producers Union, 50 milk producers' cooperative societies, 300 consumers, 50 retailers, distributors, and 10 transporters. The study revealed that the supply of milk and milk products through cooperative were very low compared to the demand. The major problems faced by the milk producers were low price of raw milk, dissatisfaction about testing of milk, disposal of sample milk, non-availability of AI facility and delay in payment. The study suggested various measures to solve the milk union such as cost reduction, minimization of losses in transportation and processing, access to professional management, dynamic enhancement of product mix, enforcement of stringent quality parameters, conservation of energy and development of new technology. The study concluded by saying that the key success of dairy cooperatives depended on how to handle the pricing gap between retail price and farm price.

Reddy (2008) examined the trends in milk procurement, product related marketing practices, the pricing objectives and practices, the promotion mix and the sale and distribution practices of dairy units in Kurnool districts of Andhra Pradesh. The study area for the study was Kurnool district of Andhra Pradesh. The data for a period of ten years from two dairies – Vijaya cooperative dairy and Nandi dairy in private sector- were taken for the study. The study revealed that the increase in annual procurement of milk in Vijaya cooperative dairy from 1998 to 2007 was three-fold, but in Nandi dairy it was eleven times. Sale of milk recorded two-fold increase in Vijaya dairy and three-fold in Nandi dairy in the study period. Dealer effected sale was the largest component of total sales followed by sale to institutional buyers in both dairies. Wide variation had shown in the milk procurement in flush and lean season.

Mohan (2008) analysed the existing pattern of dairy units such as the procurement process and strategies adopted by local dairy units in packaging, pricing, advertisement, distribution, product line as well as the existing milk processing methods used by the units. It also studied the cost –benefit viability of dairy marketing and the outline of consumer behavior and tendency of consumption of dairy products produced by village milk producers in Kamrup district which have

the highest milk production district in the state. 200 consumers from the study area, all the organized dairy units and various retail outlets and intermediaries were selected for the collection of primary data. The study revealed that more than 90 percent of the milk distributed in the district was by the traditional milk vendors who collected milk from producers in semi-urban and rural area. Consumers in the district felt that the processed milk produced outside the state have high quality compared to local pasteurized milk.

Birthal, et al., (2008) investigated how contract farming affected milk prices, profitability, production efficiency, and transportation expenses. According to the analysis, independent production was less profitable than contract farming. The primary advantage is lower transportation costs for milk disposal. Due primarily to economies of scale in the utilization of family labour in milk production and disposal, the benefits of contract farming were skewed towards large producers. The services and technical guidance provided by integrators, or companies that contract with farmers to ensure milk supplies, were also advantageous to dairy producers. The impact of expanding contract farming would extend beyond output because it would have a major multiplier effect on secondary and tertiary industries in terms of employment and revenue.

Raghukumar (2009) reviewed the progress of dairy industry in India and Andhra Pradesh and also assessed the development and drawbacks that were present in cooperative and private sector in Nellore district. The study assessed the functional performance of milk vendors of cooperative and private sectors and identified the problems of milk producers, vendors and dairy units of cooperative and private sector. For accomplishment of these objectives primary data were collected from 75 members of 15 selected dairy societies in Nellore district, 40 vendors of cooperative sector and 80 vendors from private sector during the period 2007-08. The study revealed that milk producers from private sector earned more income compared to producers from cooperative sector. Majority of milk producers in cooperative sector used traditional methods of dairying, but in private sector majority of farmers adopted non-traditional methods of dairying. More number of

producers from private sector have made sizeable amount of investment in fixed assets compared to the farmers in cooperative sector. Majority of milk producers gave milk to private dairies in the study area because of attractive price offered and the brand familiarity of the private dairies. Major problems faced by both cooperative and private sector dairies were outdated machinery, lack of storage and processing facilities, inadequate and fluctuating power, lack of knowhow and severe competition. Major problems faced by the milk vendors both in cooperative private sector were damaged milk packet, supply of milk at inconvenient time, inadequate remuneration and inadequate freezing facilities.

Raghukumar (2009) assessed the contribution of dairying to the livelihood of rural people of Kerala and found out the constraints faced by them in sustaining dairy farming. For this purpose, primary data were collected through personal interview from 300 dairy farmers in Trivandrum district by using two stage random sampling. The findings of the study indicated that dairying was a subsidiary occupation for many rural households in Kerala. Almost all farmers used Anand Pattern milk producers' cooperative societies as the channel for marketing their milk. The cooperative societies in the study area provided various services such as payment of bonus, veterinary services at subsidised rate, health care services and feed. Majority of the farmers used family labour for all the dairying activities like milking, cleaning, feeding, grazing, gathering grass and sale of milk. The major constraints faced by the dairy farmers were cost of feed, care, breeding, dry stage of animals, price for milk, health of the farmers and the animals and lack of extension work from Animal Husbandry department.

Shojarani (2009) conducted a study to understand the extent of dairy development in Kerala keeping the operation flood programme in view. It was to evaluate the financial performance of APCOS and to compare them with non-APCOS. It also examined its social and economic impact on the members of APCOS. 80 dairy cooperatives-62 Apcos and 18 non-Apcos- and 522 dairy farmers from three districts were selected for the purpose of collection of primary data. The study revealed that the memberships in all dairy societies were increased in the

entire regions during the study period. When comparing the performance of non-Apcos with Apcos capital including working capital, purchase and sale of milk, and profit were decreased in non- Apcos but these variables shown an increasing trend in Apcos during the study period. The members obtaining training from Apcos had better knowledge about advanced practices and methods, modern machines and equipment. Members of Apcos got fair price for their products. In addition, they got various benefits like bonus, pension, awards for the best dairy farmers, scholarship for children, and better variety of fodder, seed etc.

Siakia (2009) examined the operational characteristics, the output and employment structure and the capital and cost structure of informal milk producing units in Guwahati district. For fulfilling the objectives, primary data from 200 informal milk producing unit from Guwahati district for the year 2007 were collected by administering a schedule-cum-questionnaire through personal interview. Output, total turnover and gross profit of Informal milk producing units were significantly and positively correlated with education level and family size of the households. Lack of credit was the most important constraints faced by majority of informal milk producing units' entrepreneurs and they depended on their own sources of finance. With respect to labour productivity, capital requirement per unit and per employee, informal milk producing units showed better position compared with formal sector.

Singh (2009) studied the integrated agricultural business model adopted at instructional dairy farm and to document the key success drivers of commercial units of IDF. Case study method of research was adopted for the purpose of the study. Data were collected through personal interview of senior functionaries of the universities and other stakeholders using well-structured questionnaire. The study revealed that Instructional Dairy Farm model was found working very well and was worth replicating. The growing demand for organic products and animal feed, the university's strong brand image, product diversification, backward and forward integration, a committed workforce, robust research and development efforts, and

the JIT approach for some products were the main factors contributing to IDF's success.

Sharma, et al., (2009) highlighted the difficulties that primary producers and their economic organizations have while negotiating market access within the terms of modernization and liberalization, particularly the demands that small-scale farmers face in terms of technology, organization, and finances. 390 households from nine districts in the four top milk-producing states of India—Gujarat, Haryana, Punjab, and Uttar Pradesh—were chosen for data collection using stratified random sampling. The study found that the traditional sector remained dominant in the Indian dairy industry, despite the emergence of new marketing methods. Almost 85% of milk sold by farmers went through conventional routes. Though slowly, the contemporary organized sector's proportion was increasing. There was proof that the size of the herd had an impact on the farmers' decision to sell their produce through contemporary channels. Because they got price incentives for huge supplies, large farmers are leaving cooperatives and moving to the conventional or modern dairy private sector.

Kumar and Stall (2010) undertook a study to deliberate on some of the issues of milk marketing in Assam, where traditional milk market agents control more than 90 percent of the milk marketing. In-depth information was gathered from 590 unofficial milk market participants in the chosen districts, including 355 raw milk dealers, 222 milk processors, and 13 involved in both. Small traders controlled the majority of the state's traditional milk supply, with a sizable fraction handling very little milk. The informal milk and milk product markets were found to be rather efficient, which may be one of the factors contributing to the prevalence of informal milk trading in Assam. Concluding that these marketplaces, which were previously efficient and competitive, may suffer from the expanding middle class's increased focus on quality.

Heggade (2010) examined the importance of dairying in the rural context in Shimoga district. It also analysed the growth trend in milk production and productivity and evaluate the cost of production and the income generation capacity

of dairying in rural area. 150 households having different species of milk animals were selected from five taluk selected from Shimoga district. The percentage of net profit on total income from indigenous cows, cross bred cows and buffaloes was estimated as 27.6%, 41.10% and 44% respectively in the case of sample selected. Out of total dairy farmers in the study area 44% sold milk to dairy cooperative and 24% to local vendors. It was remarked that development of dairying in the study area helped to achieve progress in economic development.

Sonaware (2010) reviewed the working of cooperative dairy federation, Dairy societies and Private milk producers, and milk storage facilities and effective distribution and marketing system. The researcher studied the milk production, processing and packaging techniques adopted by milk producers, the infrastructure facilities for milk preservation and role of government and traced the problems of milk producers in production and marketing. Ten rural milk producers from one village selected from 11 taluks were selected as the sample respondents, the total sample being 110. Also selected one cooperative milk society and one private dairy from each taluk were selected for the study. The study revealed that the backward district such as Beed, dairying is promising economic activity for smallholders who constitute the majority of farming community. Milk flow via cooperative channel was very low i.e., mere five percent of the total marketed milk is the urban area. Direct sale to consumers or sale through vendors was preferred to sale through cooperatives.

Rajaram (2010) undertook a study to evaluate the financial performance of individual milk unions, the relationship between cost component and the selling price of milk, and cost efficiency and technical efficiency of the milk union under study. Thirteen Karnataka Milk Federation milk unions were the exclusive focus of the study. For the study, the chosen milk unions' annual reports covering the five years from 2002 to 2007 were collected. According to the analysis, procurement costs accounted for approximately 80% of Union's total production costs, making them the largest component. With the exception of Mandya, it was clear that every

union had a negative economic value added. Bangalore milk union was the most viable and valuable milk union under Karnataka Milk Federation.

Singh, et al., (2010) conducted a study focused on a temporal analysis of livestock scenario, dairy production, proposed livestock development activities in the state of Bihar. According to the study, the majority of farmers favoured buffaloes for milk production because to their ability to efficiently turn grain into milk, their increased resistance to disease, and their daily average milk yield, which was nearly equal to that of crossbred cows in Bihar. Over the past five years, Bihar's milk production has increased dramatically, from 2.63 million tons in 2002 to 5.45 million tons in 2007, a more than 100 percent increase. However, the daily milk availability per person was only 159 grams, which was less than the 245 grams nationwide.

Babu (2011) analysed the progress of dairy cooperatives and the role of its Union in Coimbatore district. It also evaluated the performance of Coimbatore District Milk Producers' Union and dairy cooperatives in the study area. 400 sample respondents were selected at the rate of 10 percent of total members of selected dairy cooperatives from the study area. The factors influencing the operational performance of Coimbatore district cooperative milk producers' union such as milk procurement, membership, share capital, sale and purchase of milk, gross profit, net profit and cattle feed supply have an increasing trend during the study period. The rate of return per rupee showed a better in lactation period. But higher cost of maintenance during dry period resulted in low rate of return.

Edhayavarman (2011) reviewed the structure and functions and the existing distribution and marketing system of Madurai Cooperative Milk Producers Union. For this purpose, from the districts of Madurai and Theni 215 farmers were selected from the list of members of the selected Milk producers' cooperative societies. The study revealed that the required man days for maintenance of buffaloes were more than that of cows because buffaloes required more attention in feeding watering, washing and cleaning. Gross return, rate of return per rupee and net return were higher for buffaloes than cows. The major reason for selling milk to the cooperative

was regular payment followed by availability of loans, regular uptake and conventional practice. Major constraints faced by the Milk Producers' Cooperative Societies were lack of cold storage facilities, lack of all-weather roads, private trading and local politics.

Kumar, et al., (2011) examined the relationship between small-scale dairy producers and alternate milk marketing channels, as well as the structure of milk production and marketing. Utilizing information gathered from 225 households in two Indian states—Punjab and Bihar—the degree of involvement of small dairy producers in contemporary milk marketing channels and its variables were investigated. Although it had to go a long way in Bihar, the survey of milk producers' marketing practices revealed that the modern milk marketing chain was widely accepted in both states. In a state with a strong agricultural economy like Punjab, the modern milk supply network was crucial, while in Bihar, the conventional milk marketing chain remained in place. Except in cases when producers sell milk directly to customers, there was no discernible difference in the pricing methods used by alternative marketing chains. Regardless of the marketing channels they used, the vast majority of farmers in both states adhered to the fundamental hygiene standards needed for safe milk production.

Imam, et al., (2011) presented marketing strategies that center on the steps the dairy sector must take to change the way the world perceives the dairy production system. The study concluded that efforts should be made to lower production costs in order to make the Indian dairy business more competitive. The cost of producing milk could be decreased by improving animal productivity, providing better health care and breeding facilities, and managing dairy animals. It is essential that we build appropriate production, processing, and marketing infrastructure that can satisfy global quality standards if India is to become an exporting nation. The introduction of cutting-edge technologies from other dairy majors worldwide could improve a number of sectors within the dairy business. concluding that, on the whole, government policy has surely contributed significantly to this outstanding achievement.

Joseph (2012) conducted a study to understand the present scenario of the village milk cooperative in Kerala with special reference to Anand Pattern Cooperative societies. The study examined the extent participation of dairy farmers in the activities of village milk cooperatives as well as the development activities of the village. 360 sample farmers were selected at the rate of ten farmers from each selected Apcos for the collection of data. Regarding training of dairy farming 69 percent of respondents had got training by way of attending seminars and training organized by various agencies. Majority of farmers preferred to rear jersey cows because of high fat content, easy adaptability to climate change, disease resistance capacity, and lower intake of feed and quiet nature. There was an apprehension among dairy farmers that the yield of cross breed cows is getting diminished over the productive years due to illness and changing climate conditions. There was significant difference in the average price of milk given by Apcos and price of milk in local sale. Even though, Apcos was the reliable option for the farmers to sell their produce because of guaranteed market. The major problems faced by the farmers were increasing cost of cattle feed, non-competitive price and lack of government support.

Amutha Rani (2012) studied the perception and constraints faced by the milk producers in the production and marketing of milk in Virudhunagar district, Tamil Nadu and the constraints faced by raw milk traders and packet milk sub traders and the consumption pattern and satisfaction level of consumers. 240 milk producers, 160 raw milk traders, 120 packet milk sub dealers and 300 consumers were selected from the study area for the study. The study revealed that majority of respondents were not insured their animals and were not attending any training program. Most of them depended on private dealers and agents for the sale of milk because of advance received from them. The major constraints faced the farmers were high charge of cattle insurance, high cost of cross breed cows, medical expenses, cost of fodder seeds, high emergency veterinary service cost, non-availability of cattle feed and fodder on credit, lack of training facilities, non-remunerative price for milk, inadequate transport etc. Major problems faced by milk traders were high competition, insufficient remuneration, wastage due to poor package, inadequate

transport etc. The major factors which influenced the customer satisfaction were preferred taste, regular supply of milk, good for health, required quantity available at right time, informed changes in price and satisfied quality.

Jagdish (2012) conducted a study to examine the processing activity relating to dairy industry, the performance of dairy industry in India and Andhra Pradesh and to undertake an economic and financial analysis of Guntur district milk producers mutually aided cooperative society. 300 sample farmers, 100 each from marginal, small and other categories, were selected from two villages each selected from ten blocks of Guntur district. The study revealed that the quantity of milk procured had wide fluctuation throughout the year, the excess milk collected during the flush season was processed and converted into milk products. The horizontal integration between different milk unions operating throughout the area would provide a siphoning effect to meet the installed capacity of the individual dairy unions. The large and small private dairy units were concentrated on liquid milk, whereas cooperative dairy union concentrated on various value-added products such as curd, SMP, butter, pedha, ghee, paneer and khova. Processing cost per unit was low in the case of cooperative dairy units compared to private dairy units.

Narayana (2012) studied the status of dairying and the factors affecting the milk production in Prakasam district in Andhra Pradesh. The study examined the productive and reproductive factors of milk yield of milch cattle. 460 sample respondents were selected from four villages of two mandals namely Martur and Cumbam of Prakasam district for collection of data. The study revealed that share of income from dairying was around 30 to 40% of total income of the households. SHG were playing a key role not only in providing timely debt at cheaper rate of interest but also promote savings habits among rural masses. Around 88% of the respondents have chosen dairy cooperative to sell their milk. An examination of feeding pattern had indicated that shortage of protein in the concentrates used by the dairy farmers was the major reason for the lesser milk yield.

Prasad (2012) examined the characteristics of respondents consuming dairy products, analysed the purchasing pattern of dairy products by the consumers and

measured the consumers' opinion towards marketing methods adopted by Madurai dairy. 350 respondents who consumed milk and milk products from Madurai dairy were selected equally from the five zones of Madurai city. The study revealed that there was no significant relationship between age, sex, family type and monthly income and the consumers' level of perceptions towards the tools of marketing used in selling milk products by Madurai dairy. But education had a significant relationship with consumers' attitude towards marketing methods. The study showed that the products such as milk, curd and mysorepa grown at 5 percent over the period of 10 years. But butter, ghee, skimmed milk powder and flavored milk hadn't shown any growth. Quantity of milk procured by the dairy was decreasing due to low procurement price which led to induce the producers to sell their produce to private players.

Singh, et al., (2012) highlighted the broader perspective of value addition in the Indian dairy sector and the potentials of various dairy products as well as the larger picture of value addition in the Indian dairy industry. Cooperative dairy societies' procurement costs were greater than those of private collection centers, according to a comparison of the costs of milk procurement, processing, manufacturing, and marketing in Bihar's private and cooperative dairy facilities. While the private dairy plant had an advantage in producing butter and skim milk powder, the cooperative dairy plants were more effective in producing toned milk, standardized milk, full cream milk, and ghee. By connecting with a modern milk supply chain, farmers can lower the cost of producing milk per unit and boost profitability. This can be ascribed to lower transportation costs, easier access to inputs and services, the adoption of superior breeds, and better management techniques.

Pillai (2012) studied the level, the distribution aspects, the expenditure involved and the cost benefit ratio of milk production and identified the problems involved in the process of milk production in Kanyakumari district. Majority of farmers sold milk to dairy cooperatives because they make advance payment and loan. It was found that all costs were declined with increase in size. In the case of

small farmers there was underutilization of factor inputs such as fodder and human labour, but there was optimum utilization in the case of medium and large size dairy units. The major problem faced by the farmers was marketing difficulties, followed by low price, low production, high cost of transport and long distance to market. Supporting facilities such as supply of feeds, processing and storage facilities have not developed to the extent needed.

Ibrahim (2012) examined the growth and structure of milk production in Madurai district. The study was undertaken to analyse the cost and return structure of milk production and to analyse the determinants of milk yield and resource use efficiency. 300 sample milk producers were selected proportionately from 39 villages of Madurai East block of Madurai district for the study. Also selected 200 milk agents and 200 consumers for the study. Average milk yield per days during lactation period and inter calving period for cow were 8.60 liter and 5.14 liter and for buffalo it was 6.98 liter and 4.22 liter. Profit per unit in lactation period and inter calving period for cow were Rs.6.61 and 3.65 and for buffalo it was Rs.6.99 and 4.11 respectively. The marginal value productivity has been found greater than unity for all input for cows and buffalo which indicated over utilization of inputs in the study area. Producers' price and the marketing margin was highest in Channel 1 and therefore it had the least price-spread.

John, et al., (2013) examined the impact of milk brand ratings and various milk brand attributes. 325 consumers from Tamil Nadu who were all using branded milk were included in the study. According to the survey, people were more aware of brand milk, could quickly recognize the company's name and emblem, and typically preferred branded milk. Consumers were loyal towards the branded milk and they had a positive feeling towards the branded milk. Concluding that the branded milk product should have good quality and was price effective and could satisfied the needs and wants of the consumer.

Santhi (2013) examined the operational performance and growth of Milk producers' cooperative society in Thirunelveli district. The study also discussed the role of milk producers' society on the economic status of the members, attitude of

members towards the performance of milk producers' cooperative society, and the factors influencing the performance of milk producers' cooperative society. 300 member respondents were selected from five blocks out of 19 blocks in the study area by using proportionate random sampling method. The study revealed that the factors influencing operational efficiency of dairy cooperatives such as milk procurement, membership, share capital, sales, gross profit, net profit and cattle feed supply showed an increasing trend in the study period. Various development indices such as family income, savings, asset position, housing conditions and amount of loan borrowed of the member households were increased after joining MPCS.

Ganeshan (2013) analysed the cost and return of milk production, break even output and magnitude of profitability and input output relationship in milk production of cows and buffaloes. To fulfill these objectives primary data were collected from Sivaganga district by using proportionate probability sampling. For selection of sample, 69 Artificial Insemination centers which were 50% of total center in the study area were selected and from the selected AI 300 sample house hold respondents were selected. The study found that out of total cost feed cost constituted 60.45% for cows and 63.93% for buffaloes. The result based on the cost indicated that buffalo showed better performance in the yield of milk than cows. Two major constraints faced by the dairy farmers in the study area were high cost of feed and lack of loan facilities irrespective of the type of animals. It was observed that as far as milk marketing was concerned, milk vendor occupied the first place followed by private milk agents and milk society. Price spread and marketing cost was higher in producer-milk society-milk union-consumer channel followed by producer-private milk agency-consumer channel and Producer-milk vendor-consumer channel.

Varma (2013) conducted a study to examine the resource structure of sample households and to work out cost and return of milk production and marketable and marketed surplus of milk and its determinants. 150 milk producers were selected proportionately from five villages selected from the two Blocks in Ambedkar Nagar districts of UP. The crucial challenges faced by the dairy farmers in the summer and

rainy season for rearing the hybridized cows was the increasing cost of concentrates. As there was no facility of Artificial Insemination majority of farmers preferred natural service. They got low price for their milk from diary cooperatives which fix price for the milk on the basis of fat content because milk of cross bred cows had low fat content. As the cost of cross bred heifers was more than that of local cows and buffaloes, producers were not in position to purchase them. The various input services provided through diary cooperatives by the Union such as milk testing equipment and chemicals, balanced feed, good quality seed for fodder crop, artificial insemination facility, veterinary service were not properly available to farmers. Society members turned vendors and middlemen generally harmed the interest of small farmers.

Dabhade (2013) undertook a study to present in an analytical form the relationship between dairy industries and economic development, to analyse the economic aspect and problems of dairy industry and study the impact of dairy industry on the socio-economic life of rural households in India with special reference to Maratwada especially Nanded district. For the study data were collected from 120 private milk producers, selected from various parts of the district by using personal visit and interview. There was overall development in the economic status of the dairy farmers in the study area i.e., increased standard of living of people and more employment opportunities. The major problems regarding milk production were low yield, scarcity of fodder, non-availability of skilled workers, problem of demand for raw milk, marketing problem, shortage capital, problems of milk price and transportation problem. Lack of efficient management was the major problem faced by the dairy farm.

Rao (2013) scanned the financial performance of select dairy units in Andhra Pradesh and also suggested suitable measures for their betterment. To fulfill these objectives, annual reports of seven selected dairy units were taken for a period of seven years from 2005-06 to 2011-12. By observing the behavior of funds, the investment in fixed assets and working capital was more in some selected dairy units which led to imbalance between liquidity and profitability. The average net working

capital level during the study period was high in the case of Vijaya dairy, Heritage foods, Thirumala milk products and Sangam dairy compared to other dairy units. The study concluded that the profitability of Indian dairy industry cannot be improved unless interlinked problems such as modernization, cost reduction and control and higher tax rates were solved.

Pal (2013) studied the growth and structure, the financial performance, the production and marketing policies, the perception of members towards the services provided and the consumer satisfaction with regards to milk and milk products of the Himachal Pradesh State Cooperative Milk Producers Federation Limited. 300 members of village dairy cooperatives were selected as sample. Respondents opined that Village dairy cooperatives have a positive impact in changing their standard of living. Majority of respondents were satisfied with the supply of cattle feed, procurement and marketing services and scientific approach of village dairy cooperative societies regarding feeding and breeding. But they are dissatisfied with the supply of green fodder seeds, price paid to them and timely payment. Majority of officials and staff of HP Milk Federation and Village dairy cooperatives are honest and friendly in attitude towards farmers and also, they provide timely and good services. Consumers agreed that the price of Him milk and milk products come under their budget level and they were satisfied with the quality, packing, freshness, awareness about the availability and overall performance.

Vanipriya (2013) assessed the working and performance of Dindigul dairy cooperative societies and identified the production and marketing aspects of milk in the study area. 400 sample active members of the selected dairy cooperative societies from the district of Dindigul comprising 250 cow and 150 buffalo owners. Milk secretion is more in second and third lactation period and majority of farmers preferred artificial insemination for breeding. The major problems faced by the farmer were belated payment followed by irregular procurement. Milk producers preferred to sell their produce in nearby places thereby they could reduce transport cost and time. The main reasons for selecting private dairies for selling milk were irregular visit of society milk man to collect milk followed by payment of advance.

Attitude of respondents to various services provided by dairy cooperative were positive. The study suggested that establishment of cold storage facilities, educative training programme, providing short-term loan with repayment-cum-saving scheme, encouraging membership in diary cooperatives, making value added products etc., would improve the performance of dairy cooperatives.

Surya Jothi (2014) studied and measured the performance of milk producers' cooperative societies in Theni district, Tamil Nadu. The study was undertaken to analyze the perception of respondents towards the performance of Milk Producers' Cooperative Societies and the expectation of respondents from the govt. for overall development of dairy business. The sample consists of 432 respondents who were the members from 4 blocks selected from the eight blocks of Theni district, which was 10 percent of total members in the selected area. The study revealed that during the period under study, there has been a constant and steady growth of number of the societies organized and registered. Among the various reasons for selecting the Dairy Co-operatives for selling milk, loan facility was attributed as the major cause followed by ready market, Incentives for supplying more and Remunerative price. The unethical practice of procurement by management was attributed as the major cause of marketing problem followed by Delayed payment, return of procured milk by the society and Irregularity in procurement.

Arunachalam (2014) in the study assessed the awareness of the members of milk cooperatives regarding the services rendered by milk cooperatives. The study also tried to examine the level of utilization and satisfaction of services rendered by the milk producers' cooperative society and to analyse the problems faced by them in using the services. 600 milk producers who were the members of milk producers' cooperative societies were selected from the study area for getting the primary data on the basis of which the study was done. The study indicated that the level of awareness about the services provided by the societies was more in the case of youngster than in the aged persons. The members having 2 to 4 years of membership have utilized the various services provided the cooperative societies than that of other members. The habit of attending meeting, usage of veterinary doctors' service,

availing first aid service, utilization of emergency treatment service was very low among the members.

Singh (2014) studied the management of village dairy cooperatives and their efficiency, various services provided by village dairy cooperatives, knowledge regarding dairy husbandry, employment creation and women empowerment through dairy cooperatives and status of migration for labour job among tribal milk producers. The most backward district of the nation, Dangs was selected as the study area for the study. 250 milk producers who poured milk to the Village cooperative diaries were selected for the purpose. The study revealed that all Village Dairy Cooperatives in the study area had followed a practice of paying the price difference to the milk producers at the end of each year. All milk producers accepted that milk payment and supply of cattle feed and mineral mixture were regular. Most of the respondents had information about veterinary treatment camps, fertility improvement camps and dairy husbandry seminar organised by VCDs. The study concluded that all the milk producers believed that the socio-economic conditions of the milk producers improved due to the functioning of dairy cooperatives.

Surya Prakash (2014) studied the growth and composition and cost and returns structure of milk production, evaluated the marketing cost, margin, price-spread of milk and their efficiency through different channels and analysed the determinants of milk yield and resources use efficiency. 283 milk producers were selected from ten villages of two blocks in Sivaganga district of Tamil Nadu during 2012-2013. Also selected 150 milk agents and 200 milk consumers by using proportionate sampling method. It is observed that the large category of herd size had the highest marketed surplus because of high production and low family consumption. The main reason for purchasing a particular brand of milk was quality followed by cheaper price, easy availability and density. The study concluded that the growth performance of milk production in Sivaganga district had been satisfactory as the growth of milk production in the district had increased above 4% during the study period.

Patel (2014) undertook a study to enquire the profit and loss of dairy industry through different dimensions, to analyse income and expenses, to enquire how the distribution of different segments of society was done through value added statement and to study the trend of profit in cooperative dairy industry in the last ten years. The study was based on secondary data derived from annual published report of North Gujarat cooperative dairy units. Personal visit and unstructured interview with officials of the dairies was done for the purpose. Procurement cost constituted about 90% of the total cost due to high price paid to milk producers and transportation cost. All dairy units under study showed profit during the years of study. Return on gross capital employed, net capital employed and shareholders fund showed a positive result. All turnover ratios showed a fluctuating trend in the study period.

Renuka Rani (2014) evaluated the extent and growth of dairy farming and identified the obstacles in the growth of dairy farming with a view to examine the future prospects of dairy farming in Punjab. The study also identified the constraints in availing and repaying of dairy loans. 150 samples were selected from three categories of farmers proportionately from six villages selected from three districts in the state of Punjab during the period 2011-12. The study revealed that young generation was more innovative in adopting dairy farming business on scientific guidelines as most of the large dairy farms were run by young generations. Per capita milk availability was the highest in the state as compared to the national average. All of the respondents cited the following as their main issues: a lack of good-quality breed animals; a high interest rate; poor milk prices; high feed and fodder costs; costly animals; difficulties finding financial guarantors; and exploitation by milk merchants and animal traders.

Sharma (2014) undertook a study to identify the major problems being faced by the cooperative dairy sector, to examine the impact of dairy cooperative, to analyse the growth of milk products of the dairy industry and to find out the reasons why some consumers were not buying Saras brand products. The study assessed the impact of changing economic environment on dairy industry in general and in Saras

products in particular. 200 consumers of Saras dairy booths were selected from Jaipur district for the study. Also selected 50 agents from the study area. The study opined that the most important factor motivating the customers to buy Saras brand products was the quality. In the opinion of the agents the product quality and brand image were the motivating factors for the sale of Saras products. The study suggested that the milk distribution should be so designed that were not only assured of an adequate availability of milk but also the supply of milk as per the customer's preference.

Shah (2014) studied the role of Gujarat Cooperative Milk Marketing Federation in dairy development, the cost structure and the profitability of selected district milk producers' cooperative union in Gujarat. The study depended on secondary data collected from seven selected district milk producers' cooperative union for a period of seven years from 2004-05 to 2010-11. The study revealed that the growth rate of milk procurement was 25 percent for the study period. The industry average net profit ratio of the selected district cooperative dairy union was 0.44 percent and the industry average operating profit ratio was 1.27 percent during the study period.

Kaur (2014) studied the impact of Haryana Dairy development on the alleviation of poverty, the potential and flexibility of Government policies and Government agencies regarding dairy development and the operation flood phase I, II and III to know the outcomes of the three operations on the milk growth and income of people in Haryana. A sample of 10 farmers from the selected 25 localities of the political region of the state of Haryana was selected for the collection of data. It was noticed that mixing of crop farming with livestock farming would result in the increase of income and employment level by 10 per cent in small holder dairy farm. Resource rich dairy farmers have benefitted more from dairy development projects compared to their resource-poor counterparts. Improving dairy production could help the under privileged households to come out of the clutches of poverty; however, they needed institutional and technological support. The major constraints faced by the resources poor farmers were feed resources and their efficient use,

animal health problem and non-accessibility of livestock service, credit and marketing service.

Silpasree and Prabhu (2014), in this paper attempted to understand the prevailing models of dairy supply chain management practices and develop a conceptual framework of Dairy Supply Chain Management with the identification of various constructs of dairy supply chain management through extensive literature review. According to the report, the dairy industry's use of ICT would provide its clients with a sophisticated, dependable, and quick supply of milk and milk products. Special cold chain facilities were required for the preservation of milk and milk products in order to preserve their quality and extend their shelf life. To ensure that milk and milk products were produced and stored in a safe and hygienic environment, the Indian dairy sector required good production practices. Concluding that the high degree of perishability associated with milk and milk products necessitates a completely different type of supply chain, known as the "cold chain," which can only be accomplished by effective dairy supply chain management techniques.

Samal and Pattanaik (2014) studied about the existing scenario and the future prospects of Indian Dairy. Because of the inexpensive feeding and maintenance costs relating to indigenous cow breeds, India had traditionally been recognized as a low-cost milk producer. The major constraints faced by the Indian dairy sector were environmental stress, low general potential of animals, questionable breeding policy, Inadequate nutrient supply, lack of sufficient landholding for cultivation of green fodder, Poor socio-economic status of dairy farmers, Lack of awareness, Unorganized marketing, Lack of cold chain facilities, Adulteration and food safety. The future prospects of the dairy industry in India were in the area of increased milk production, Export Potential, Employment opportunities, Nutrient supply, Low greenhouse gas potential of milk, AMUL type cooperatives and Public private partnerships.

Khan, et al., (2014) analyzed how dairy co-ops contribute to the socioeconomic advancement of dairy farmers. The district of Moradabad was the

place of the study. Based on a primary field survey, a community was chosen for in-depth investigation. The study found that the dairy cooperatives in the village under study were responsible for about 60% of the milk output. People who work in dairy farming have seen socioeconomic progress as a result of their regular compensation, the need for medical assistance, and the great demand for milk. According to the report, dairy cooperatives play a critical role in milk marketing and in giving dairy farmers the assistance they need to advance socioeconomically.

Sujatha, et al., (2015) studied on milk's market structure, price spread, marketing expenses, and marketing effectiveness in Andhra Pradesh's private and cooperative sectors. 120 milk vendors were chosen at random from the villages in four districts—Kuntur, Krishna, Nellore, and Prakasam—in the Andhra region in 2013–14 in order to accomplish the goal. It was discovered that channel I had the largest producer share of consumer rupees. Channel I had the smallest price spread, while Channel IV had the most. It was found that the private sector paid the producer a higher price across all channels than the cooperative sector. Additionally, it was discovered that the private sector had a smaller pricing spread, which in turn led to lower consumer prices. High feed costs, low milk prices, bad credit facilities, disease outbreaks, etc. were the main obstacles to milk marketing that were found.

Brinda (2015) evaluated the operational performance, studied the perception of employees towards human resources management practices and opinion of working and the perception of consumers towards the milk and milk products of Villupuram-Cuddalore district cooperative milk producers' union limited. For the study data were collected from the selected sample of employees, milk producers and consumers of the Union. The major reasons of the respondents to join as employees of the Union were compassion and repatriate basis, promotional opportunities, attractive salary and job security. Majority of respondent employees were dissatisfied with human resource planning, recruitment and selection policy, training and development, wages and salary administration, promotion and transfer, safety measures, statutory labour welfare measures, social security measures, workers' participation in management and employee's grievance handling

mechanism adopted by the Union. Majority of the sample milk producers were dissatisfied with the various dairy activities undertaken by the Union such as insurance schemes, supply of milch cattle and other input service, vaccination for animals, animal breeding service and managerial assistance. Adequate technical inputs and extensions, remunerative price to the milk producers, guidance and counseling, establishment of more chilling plants and manufacturing of different range of milk products were the suggestions of the respondent milk producers.

Pant, et al., (2015) presented a framework for information flow, transparency, and traceability in the administration of the network of supply chains for dairies. They examined the process and intrinsic and extrinsic elements that affect the underlying dairy supply chain network, as well as the complexity of dairy products. Focus group interviews with domain experts of the Indian dairy supply chain, including academics, officials, and those involved in the supply chain, including dairy farmers, milk collectors, processors, distributors, retailers, and consumers, served as the basis for the findings. Two frameworks have been offered for the investigation. In order to satisfy both domestic and international demand for dairy products, the first framework aimed to improve the quality, safety, transparency, traceability, and information flow in the Indian dairy supply chain. To improve the quality, safety, transparency, traceability, and information flow of traditional dairy products and sweets made by small dairies, the unorganized sector, and halwais, another framework was put out.

Sharma, et al., (2015) analysed the trends in dairy sector of India. The trend study showed that, mostly as a result of increased income levels, fast urbanization, and less proportionate growth in livestock product prices, this sector's expansion had greatly outpaced that of cereal output. The sector's expansion was expected to have a significant impact on rural India's poverty reduction and rural residents' health. In the coming decades, India may become a significant exporter of dairy products and technologies if it makes significant and sustained investments to increase milk output.

Kunte and Patankar (2015) conducted a study to understand the problems faced by the dairy sector units, the pros and cons of various issues. The study was based on available literature extracted from different database. A random selection of 24 research publications including data for various Indian states was made available for the study. Primary data gathered from dairy farmers served as the basis for 14 of the 24 publications. Lack of concentrates and feed, limited veterinary and diagnostic facilities, and a lack of knowledge and technology awareness were the main problems identified. The largest portion of total expenses was determined to be procurement costs, which were followed by processing costs. The livestock services were either provided for free or at a very reduced cost to cooperative members. Owning a buffalo resulted in negative income even if the price of purchasing buffalo milk was greater.

Vikram and Goyal (2015) attempted to examine the different marketing channels applied by small-scale milk producers in the study area. The study was carried out in Uttar Pradesh's Azamgarh area. A sample of 100 houses representing different socioeconomic classes was chosen through the use of multistage random selection. It was shown that the majority of milk producers (56%) sold their milk directly to customers or neighbours since they had very little marketable excess; in contrast, 21% of milk producers claimed to utilize middlemen or dudhiya to sell their milk. The hotel/restaurant (9 percent) and private dairies (6 percent) used to be the outlets for milk producers with more marketable milk. However, 8% of milk farmers preferred to sell their milk through cooperative channels in order to secure a steady income.

Mugundan (2015) tried to know the operating cost and performance of dairy products in Kanchipuram district, Tamil Nadu. The study also tried to assess the demand and supply environment for dairy products and to examine the comparison between milk and other dairy products in the study area. It revealed that there were high procurement costs- About 80% of SP was given by way of procurement price to farmers. The average operating ratio was 103.2%. Major portion of value addition was applied for meeting employment cost. Annual growth in procurement was

15.2% against 11.5% growth in sales which result in imbalance between milk procurement and milk sales. There is decline in the counter sales. Incremental value addition was unsatisfactory in the study area.

Balaji (2015) studied about the existing milk distribution system, the expectation and satisfaction level of intermediaries and their opinion about customers' expectation and satisfaction level and the infrastructural and promotional support for the effective distribution of milk in Salem district. The sample consisted of 587 respondents who were milk distributors in the study area. The study revealed that pasteurized toned milk was sold in large quantity compared to others in the study area. Advance payment for the consignment was the major problem faced by the wholesalers followed by non-replacement of damaged milk. The most preferred milk brand in the study area was Aavin followed by Arokya. If the preferred brand of milk was not available in the market customers were not ready to buy the available brand. Promotional efforts and product quality were the major factors influenced the customers' satisfaction.

Selvakumar (2015) studied the problems and practices of milk production and the expectation and level of satisfaction of Aavin milk producers in Salem district. The sample consisted of 380 respondents who were selected from the registered Aavin milk producers in Salem district. The major reasons for involvement in production of milk were rise in demand for milk followed by Known Business and availability of agricultural land. The major factors affecting milk productivity were rise in the cost of feeds, low profit margin, decrease in agriculture activity, shortage of labor, rise in daily expenses, Loan facilities, high investment, lack of medical aids and guidance. The study concluded that to meet the growing need of milk government should take steps to address the grievances of dairy farmers.

Ahamed (2015) conducted a study to identify the potential risks in varying degrees of the value chain and to study the impact of various risks and uncertainties on the various aspects of the value chain and to identify drives which would enhance effectiveness of supply chain of Aavin cooperative societies. A sample of 404

respondents who were the members of Aavin registered cooperative societies were selected from each taluk of the study area using judgment sampling. The study showed that the major problems faced were perishability during transport, lack of adequate space and lack of technology. The major reason behind dairy farmers registering in Aavin was instant payment (26%) and Government enterprise status (21%). The major risk factors causing risk and uncertainty were Quality, Price, Lifestyle and consumer preference, Seasonal and demand factors and Administrative and operative hurdles.

Rathod (2015) examined the profitability, liquidity and financial efficiency of selected district cooperative dairy units for a period of 10 years from 2003-04 to 2012-13. Seven district cooperative dairy units out of nineteen from the state of Gujarat were selected for the study. Annual reports of the selected district dairy cooperatives were used as data for analysis. The study found that the average net profitability of Sabar, Gopal and Amul dairy was better than those of other dairies. Return of Equity share capital is good in the case of all dairy units except Vasudhara dairy was good. EPS of all dairies were satisfactory during the study period. Solvency positions of all dairy units are not good during the study period except Dudhsagar dairy. As far as asset management was concerned all dairy units showed a good result in the study period.

Mallah (2015) studied the general consumer behavior of people towards milk, people perception towards marketing parameter for branded and non-branded milk and the performance cooperative dairies in Mumbai- Metro Region. The study also examined the status of physical parameters and asses the marketing and financial performance of Mahanand dairy. 702 sample respondents consisting 88 distributors and 614 consumers were selected from eight municipal corporations by using separate questionnaire for distributors and consumers. The study revealed that the major milk cooperative players in Mumbai metro region market were Amul, Gokul, Mahanand and Warna who had more than percent market share. The major reason for not using Mahanand milk products were poor reference value followed by unawareness, poor quality and non-availability. Concluding that the huge base of

membership, good net worth and support from the Government made Mahanand dairy a strong dairy unit.

Basha (2016) assessed the cost, return and profitability of milk production by the Vijaya and Heritage dairies farmers in the study area. Also, the study tried to evaluate the cost-volume-profit of the selected dairy units and marketing problems of the farmers with reference to different channels of distribution and price aspects. 400 farmers were selected as sample respondents at the rate of 100 from the two villages each selected from the selected districts. The study found that dairy cooperative (Vijaya Dairy) was paying comparatively higher price than the private dairy (Heritage Dairy). The main reason for selecting Heritage dairy was financial assistance and selecting Vijaya dairy was prompt payment. In the study area majority of dairy farmers were reducing the herd size during the study period and many of them desired to dispense with this occupation. The researcher concluded that educating, imparting training about hygiene in milk production will improve quality of milk.

Birthal and Chand (2016) examined the efficiency, inclusiveness and financing of dairy value chain in the Indian state of Punjab. Survey was conducted for collecting data from 612 farm households. There was hardly any significant difference in the milk price across value chain, indicating that milk market is competitive. Small dairy farmers were more associated with informal value chain while the larger dairy farmers preferred selling milk to formal value chain, driven by cooperative, multinational companies and private and domestic processors. In addition to being more involved with the formal value chain, farmers who were aware of food safety requirements also made more money than those who were not. Concluding that because they lacked tangible assets to pledge as security for loans, smallholder farmers and those from socially disadvantaged backgrounds were frequently overlooked by institutional lenders.

Kumar and Ansari (2016) in this paper tried to examine the issues regarding Export Performance of Dairy Industry of India: Trends, Challenges and suggestions for improving the trade situation and found out the reasons for the low per unit

production, Imports and negligible exports. With an emphasis on dairy production techniques, the literature on exports was examined by separating out previous research on various aspects. The field of exporting dairy products was discovered to have many untapped aspects, making it a viable topic for further research. Given the high production, low exports, and rising consumption of dairy products, it is critical to comprehend and evaluate the most recent import and export trends in the dairy industry as well as identify strategies to boost dairy product exports.

Kaur (2016) examined the district wise women dairy cooperatives and their membership, milk procurement and milk marketing in Malwa region of Punjab state. Primary data were collected from 428 milk producers who were the members of the selected women dairy cooperative through questionnaire by direct interview. The study revealed that due to increased income of family from dairy cooperatives, attitude of majority of women farmers towards the dairy cooperatives were good. Only a limited number of women farmers were free to take decisions and free to travel alone and save themselves. Suggested that to improve women's dairy farms' efficiency the authorities should train and educate women, provide veterinary services and guidance, provide credit facilities, fodder facilities, help to erect biogas plant, giving remunerative price and supplying high yield breed. By providing more employment opportunities and generating income, it helped in eradication of poverty and empowerment of women in Punjab.

Malsawmdawngliana and Rahman (2016) undertaken a study in the State's districts of Aizawl and Kolasib with the aim of investigating the management techniques being employed by the dairy producers in the region. A systematic interview schedule was used to conduct in-person interviews with 100 randomly chosen farmers from these two districts. According to the study, the dairy farmers used an intense strategy to raise cross-bred cattle. For breeding, they used artificial insemination. Most dairy farmers (95%) used a combination of concentrate feeding and green fodder. The farmers did not conduct vaccination or deworming, and they were unaware of the importance of routine animal examinations and disease prevention procedures. Every respondent engaged in colostrum feeding. Forty-two

percent of the respondents insured their cattle. Among dairy producers, the Co-operative Union purchased milk from the majority (49%) of them.

Thunga (2016) analyzed growth and development of cooperative dairy industry in Andhra Pradesh. For the purpose three district Milk Producers' Cooperative dairy Union such as Guntur District Milk Producers Cooperative Union Limited (Guntur Dairy), Krishna District Milk Producers Cooperative Union Limited (Krishna Dairy) and Prakasam District Milk Producers Cooperative Union Limited (Prakasam Dairy) were selected as the sample unit. The study was conducted by using secondary data. The annual reports of the selected district Milk Producers' Cooperative Union for a period of ten years from 2004-05 to 2013-14 was taken as the secondary data. The findings of the study indicated that the financial performance of the three-district cooperative dairy union was good irrespective of the size. Efficiency in asset utilization of these three unions was good. As far long term and short-term solvency was concerned Krishna and Guntur dairy union have satisfactory position. But Prakasam dairy have below average performance as far as solvency was concerned.

Ishaq, et al., (2017) identified the main explanatory factors that could affect dairy farmers' choices of conventional and contemporary milk marketing channels when it comes to market involvement. 320 dairy farmers who were chosen at random from each of the four districts in Pakistan's Punjab province provided the data. Eight factors were found to be significant predictors that influenced milk producers to look at traditional channels for the sale of their milk produce. These factors included gender, elderly farmers, the distance between dairy farms and urban markets, the ease of selling milk at doorsteps, cash payment in advance, the lack of quality inspection, a strong relationship with milk collectors, and higher milk prices. On the other hand, four factors—the size of the herd, the availability of extension services, the high level of education of the dairy farmers, and the procurement of evening milk—were encouraging them to sell milk through contemporary channels. The majority of milk producers chose traditional milk channels; however, these channels did not adequately supply customers with high-quality milk.

Parwez (2017) tried to understand the cooperative model of contract farming in the broadest sense of input supply, information transfer and improved marketing channels at all levels. Kaira District Cooperative Milk Producer Union Ltd. was utilized in the study as an example of the perfect dairy cooperative model to advance the idea of cooperative-based contract farming. When compared to non-contract farmers, cooperative-led contract farming was an institutional arrangement that was economically feasible in reducing the costs to the contract farmers. It promised a guaranteed market and steady financial return; the backward linking reduced marketing and transaction expenses, increasing farmers' profits. Farmers are more vulnerable because there was no written contract to protect their interests, despite the fact that they are guaranteed market transactions on produce of sufficient quality. Contract farming, on the other hand, may spur the development of much-needed extension services like marketing, information sharing with farmers, improved technology use, and the development of farmers' knowledge, skills, and capabilities, all of which could improve farmers' quality of life.

Sethumadhavan (2017) concluded that the productivity of Indian cows and buffaloes are very low. Local cows, buffaloes, and crossbreed cows typically produce 3 to 3.5 Liters of milk per day, 3.96 to 5.39 Liters, and 5.82 to 7.80 Liters, respectively. In developed nations, the output of milch is found to be substantially lower than that of cattle. In developed nations, feed conversion efficiency is high. For every kilogram of feed, the world's best-run farms yield 1.6 kilograms of milk, which is less than one kilogram in India. To increase productivity, scientific dairy methods such as appropriate breeding, feeding, and hygienic management are needed, in addition to high-quality inputs and extended support services.

Brar et al., (2018) Studied the variables influencing Punjabi dairy farmers' choice of milk marketing channels. Using Garrett's Ranking Technique, the study uncovered the significance of several factors influencing the state's small and medium dairy producers' selection of milk marketing channels. The findings showed that, for both small and medium dairy producers, the most significant element was higher milk prices, which were followed by doorstep collection. A preview of the

relative profitability of the milk marketing channels was also given by the study. The most lucrative and effective of the different milk marketing routes was Channel-II (Producer-Cooperative milk plant-Consumer).

Singh (2018) conducted a study to map out the channels for milk through which farmers dispose of their milk. It also tries to identify the factors that influence the dairy farmers' choice of market channels. 240 households from twelve villages from the selected districts of Bihar were selected for the purpose of collection of data. The study revealed that cooperatives comprised the most important market channel in Samastipur district but other two districts' farmers depended solely on informal markets. Dairy producers were more price sensitive and preferred selling milk directly to consumers because of high price from there. Those with larger scale of production preferred formal channels because of the assured off take of milk. Concluding that improvement of formal market might create competition among buyers, that might encourage farmers produce more and realize better price.

More, et al., (2018) reviewed the relevant available literature concerning supply chain management practices in the dairy industry. The target population was the articles published recently in various database. According to the thorough literature review, the main issues that set the dairy supply chain apart from others are its perishable nature, seasonality, traceability, small-scale production, and fluctuating demand, even though supply chain management is a general term used to describe all of its components. In order to fulfil the criteria of the export market, the dairy business presently requires food safety and security in addition to an efficient and competitive supply chain strategy. The dairy industry's competence might be greatly increased by using an integrated supply chain approach and making excellent decisions.

Bera, et al., (2018) identified the constraints perceived by the farmers in the adoption of animal husbandry and dairy technology and found the area where training was needed as per the dairy farmers. The study area covered three villages of Bardhaman district, West Bengal. A total of 80 respondents were interviewed as per structured interview schedule. Farmers of the study area undertook dairying as

secondary source of income to support the maintenance of their livelihood. Social constraints like religion and caste created problems for selling milk products in the local market, while it did not affect the whole sale market. The major socio-economic constraint was the non-availability of pasture land followed by high initial costs, poor infrastructure, poverty and size of land holding. Major fodder constraints were increasing price of feeding material, ignorance about balance feeding and method of feeding. As far as livestock management was concerned construction of cattle shed was the main constraints followed by calf care, cleaning of cattle shed and time of milking. The major health care constraint was lack of knowledge about the symptoms of diseases followed by high cost of veterinary service, lack of knowledge about vaccination. Major market related constraints were distress sale, non-remunerative milk price, absence of storage facilities, delay in payment, exploitation by milk vendors and lack of loan facilities. The major areas where training to farmers needed were using of modern technologies and improved management system, identifying preliminary symptoms of animal diseases etc.

Jaiswal, et al., (2018) analysed how and to what degree dairying contributes to rural agricultural households' increased employment and food security. According to the study, dairying gave rural agricultural households—particularly the poor and marginalized farmers—a good and considerable boost in employment and income, enabling them to support themselves. By promoting fair employment and income distribution among rural agricultural households, dairying helped to lessen the imbalance in resource ownership among rural communities.

Kumar and Mohan (2018) attempted to find out the factors leading to customer satisfaction in Indian dairy industry. 10 Milk and milk products consumers were picked randomly from 100 selected retail outlet for the collection of the data. Five factors—customer services, customer problem solving abilities, value for money offers, product quality, and product & service reliability—rose to prominence in the factor analysis conducted on the customer questionnaire's agreement continuum. Customer service was shown to be the most important aspect,

followed by customer problem-solving skills, value for money offers, product quality, and, finally, product and service reliability.

Saravanadurai and Muthuaraj (2018) examined performance of dairy cooperative farmers in Akkarapalayam Panchayat. Dairy farming was disclosed as the secondary occupation of every farmer who was chosen for the study. The chosen responders owned a variety of milch animals, including crossbreeds, high breeds, and local breeds. Sixty-seven percent of the 60 respondents sold their milk to cooperative societies. Every dairy farmer has taken out a loan to buy cows and buffaloes.

Muwal (2018) explored the milk distribution practices of dairy vendors in India. It also studied the consumers' milk consumption pattern and milk choice behavior. For marketing-oriented study 5 private milk processors and 5 dairy cooperatives from organized sector and 100 milkmen and 50 local dairies from unorganized sector was selected. For consumer-oriented study, 720 respondents were selected @ 90 from 8 selected areas from Delhi, Punjab and Haryana. The study revealed that predominance of intermediaries in the supply chain in the organized dairy sector as observed in the study enhanced the cost and reduced the penetration into different markets. The organized dairy vendors might consider reducing the number of intermediaries in the distribution channel and focusing more on door-to-door delivery. Unorganized dairy sector on the other hand used none or least possible number of intermediaries and favored direct connection with consumer. Raw milk was popular for some consumers as it was believed to be high on sensory appeal, nutritional value and richness. Consumers of pasteurized milk on the other hand valued its convenience (packaging to carry and store), safety (guarantee of quality) and processing properties (long shelf life).

Sankaran (2018) studied the general features of dairy sector and standard of living of dairy farmers in Tirunelveli district. The study also tried to examine the factors influencing milk production and income dairy farming, the knowledge of good marketing and strategy of dairy farmers, and to find out the problems faced by dairy farmers. By using multistage sampling, 288 sample dairy farmers were

selected from three villages selected from nineteen blocks of the study area. The study revealed that the factors which influenced the farmers to undergo dairy farming as a prospective business were regular employment. Convenience and income generation. The major problems faced by dairy farmers were exploitation by middlemen, non-availability of green fodder, inadequate knowledge in cattle management, delay in payment, lack of Artificial Insemination facility, social dogma, faulty system of weight and measurement, high cost of veterinary services, repeated breeding problems and lack of transportation. The study concluded by saying that dairying was more suitable for women in the rural area as most of them were housewives and was not able to go for other works outside the home.

Muthuraj (2018) tried to identify the functions of dairy cooperatives in Sri Villupuram block of Virudhunagar district. The study also examined the milk production, marketing, income generation and the problems faced by the dairy farmers in the study area. 20 members from each 15 selected societies were taken as the sample. According to the study, the main issue facing the farmers in the study area was non-remunerative prices. The main advantages of belonging to a society included the ability to gather any amount of milk, access to healthcare, bonuses, dividends, artificial insemination, loans, advances, and more. In order to ensure the success of milk cooperatives in rural India and contribute to inclusive growth in the Indian economy, we need to give more attention to the needs of dairy farmers in dairy cooperatives. This includes scientific management, value addition for the dairy farmers' customer services, managing the financial sustainability, and preserving the welfare of the farmers, among other things.

Singh (2019) studied the Marketing Efficiency of Camel Milk under Different Supply Chains in Rajasthan. Additionally, it examined consumer awareness of the advantages of camel milk and calculated the marketing margin and cost for camel milk across several supply chains. Four supply chains have been used to study camel milk marketing: I: Camel farmers → Camel milk trader → Consumer; II: Camel farmers → Collection Centre (cost of collection borne by the centre) → Consumer; III: Camel farmers → Collection Centre (cost of collection

borne by the farmers) → Consumer; and IV: Camel farmers → Consumer. Because supply chain IV's marketing efficiency was 12 compared to supply chain I's 0.29, supply chain II's 0.50, and supply chain III's 0.42, it was determined to be the most efficient. To increase the efficiency of camel milk marketing, market infrastructure must be constructed through a public-private collaboration. According to Acharya's Modified Formula for Marketing Efficiency for a Marketing Channel, the most effective marketing channel is one in which camel farmers directly provide the milk to the consumer directly.

Chaudhary et al., (2019) studied the strengths and weakness of milk and milk products marketing in cooperative and private sector. 60 farmers were selected from the selected villages of Udham Nagar district of Uttarakhand and data were collected from them through personal interview method. The study revealed that the strength of cooperative sector was surety of price followed by payment in lump sum amount, transportation of milk and milk products and assured market round the year. The major weakness of cooperative sectors was lack of quality control measures at collection centers followed by lack of new advanced machinery, spoilage of milk and milk products, lack of advertisement, lack of fund and negligence and dishonesty of employees. Major strength of private sector was current payment facility and high price of milk, but the weakness was highly personal competitive market condition, localized distribution of dairy products and high packaging costs.

Sharma (2019) undertook a study to work out economies of dairy farming on different size category basis. Jaipur district was selected purposively as the study area for the study. 30 commercial farms comprising different size were selected by using multistage random sampling. Commercial dairy farming is a very capital-intensive industry, as seen by the average capital investment of Rs. 14.97 lacs per farm chosen. Dairy animals accounted for 61.15 percent of the total investment, with cattle sheds, machinery, and equipment coming in second and third. Small dairy farms were found to generate a net profit of Rs. 267180 annually, while medium-sized farms made Rs. 412085 and large dairy farms made Rs. 946445.

Kaur (2019) Investigated the elements and barriers influencing the milk producers' engagement in formal dairy channels and looked at the labour utilization in dairy farming for both producers under formal and informal milk markets. In all three of the legitimate milk markets, farmers who participated saw an increase in their gross income because they received larger returns than those who participated in the unofficial milk markets. In addition, professional milk markets offered farmers a guaranteed market, and seasonal fluctuations in milk prices were significantly lower than those experienced by farmers selling their produce to Punjab's unofficial milk markets. Farmers' participation in Punjab's formal milk markets was found to be largely driven by factors such as timely payment, higher prices, a transparent system, positive interactions with officials, and prices based on fat and SNF. Even though Punjab's regular milk markets have many advantages, the informal milk market was also thought to be significant for a number of reasons.

Anusha (2019) conducted a study on the performance analysis of milk producer's co-operative societies in Kanyakumari to reveal the perception of Dairy Farmers towards Dairy Co-operatives and to study its overall performance. Sample farmers are taken from six taluks on the basis of the magnitude of the number of families engaged in dairy farming. It is concluded that the sample dairy farmers are very committed with the dairy cooperatives in keeping the image of the society. The majority of dairy farms use cutting-edge technology to preserve milk production and herd health. These days, farmers may use computers and smartphone apps to control livestock health and production.

Jebasta (2019) studied the performance of dairy cooperatives by using both physical and financial indicators and analysed the milk production scenario of Thoothukudi district in term of vocational divisions, cooperative endeavors, operational constraints, vocational structure, materials and methods, administration and viability and survivability and future. 301 sample respondents, having representations from all stratum, were selected from all clusters of non-contiguous villages, semi-urban areas and urban locations of all taluks in the district. Data were collected with a preliminary convenience based unstructured survey. There had been

a steady increase in the milk production in the study area during the period. The collective power of cooperative mechanism and the institutional advantage of private mercantilism had led to better logistic of milk production but get blemished by price and procurement manipulation, which negatively impact the occupational value of vocational producers. The analysis of viability established that the occupational affinity is very high with the dairymen and women, and on optimal blend of this affinity with their hard labour make milk line viable even if it was non-viable.

Krishnan (2020) conducted a study on production practices of milk in Kerala with special reference to Kottayam district. The paper examines the progress of dairy industry in India in general and Kerala in particular and also highlights the various aspects of production of milk at Kottayam district in Kerala. For this, Primary data were collected from 60 dairy farmers from Kottayam district in Kerala under judgement sampling. There was a diminishing trend in the production of milk in the state. The per capita availability of the milk in Kerala was very low. Government should implement various measures for establishing a veterinary service center to enhance the competence of artificial insemination scheme and the veterinary services should be administered to the farmer door on all bases at an acceptable cost.

Choyal (2020) conducted a comparative analysis of the marketing strategies adopted by the Indian dairy industry and New Zealand's dairy industry. The study gave an overview of the dairy industry in both countries, including their production and export capabilities. It examined the marketing strategies adopted by the Indian dairy industry, including their focus on the domestic market, cooperative structure, and government support and that of New Zealand. Through this comparative analysis, it identified the strengths and weaknesses of the marketing strategies adopted by the Indian dairy industry and New Zealand's dairy industry.

Kaur (2020) conducted a study on Marketing Efficiency of Value-Added Milk Products Produced at Farm Level in Punjab State. The research study was carried out to determine marketing efficiency of milk products that would help the

farmers to choose the most efficient marketing channel for increasing their profitability. The study was conducted by selecting 50 farmers by random sampling method from 8 districts of Punjab state. The marketing of milk products was done through two channels; channel-I (Producer-Consumer) and Channel-II (Producer Sweetshops/Creameries-Consumers). The marketing efficiency was calculated by Acharya's method. The marketing efficiency for producing one kg of Ghee, Milk Cake and Paneer were 147.97, 72.14 and 65.56 respectively, in channel I whereas 38.75, 5.42 and 8.81 respectively, in channel-II. The marketing efficiency was highest for the products marketed through channel-I than channel-II.

Khongsai (2020) investigated the growth and development of the dairy industry in India and the status of milk production and consumption of the country. The study sought to determine the relationship between the nation's milk production and its international imports and exports, as well as to forecast the nation's milk output at the current trend of production. The study made use of secondary data. Correlation analysis showed that while milk production had a negative effect on imports, it had a favourable effect on exports of milk products. According to the report, there is a lot of space for the production, distribution, and promotion of liquid milk and its derivatives, which the dairy industry and policymakers can take advantage of.

Elmame (2020) examined the relationship between the distribution channels and marketing efficiency of milk products and analyzed the scope of technology in production and distribution of milk products of Nashik Milk Dairies. There is a close relationship between the distribution channels and marketing efficiency of milk dairies in Nashik district. The milk dairies in Nashik District need to engage themselves in market research, techno-trends, getting consistent customer feedback to changing behavioural patterns and incorporate changes in the marketing policies, activities.

Jacob (2020) estimated the Economic Efficiency (combination of Technical and Allocative Efficiency) of milk production among Kerala Dairy Farmers. The study also examined the factors determining the Economic Efficiency of milk

production and identified the major constraints faced by milk producers. The milk producers selected for the purpose comprised of Kerala milk producers, all of them are the registered members of the Dairy Co-Operative Societies. The study found that there is an excessive use of labor hours in the farm, which can be reduced through implementation of modern technologies to the farm. The large farmers are more economically efficient. There is a need to scale up the operation of the small and medium size farmers. The main benefit received by the farmers through participation in the dairy societies is the assured market for milk. More attractive schemes are needed to be introduced to sustain the farmers in this activity and thus the Dairy Co-operative Society. The high concentrate feed and veterinary cost are the major problem faced by the farmers. It has to be curtailed and solved by providing Government assistance in logistics to bring food feed raw material from outside the state and encourage the Dairy Co-Operative Societies to manufacture the feeds.

Rokade (2021) identified the marketing strategies adopted by the major players of organized dairy industry with particular emphasis on the place of Indore city. The three Brands Sanchi, Amul and Saurabh were chosen for the study. For the study total 450 Retailers of Indore District were selected. The findings stated that the marketing strategies promoted the growth of brands and keep consumers to stay for a long time. Managerial implications have been given to boost the efficiency of the dairy supply chain and accomplish their long-term company objectives. Despite the significant improvement in the production and consumption of milk we discovered that accepting technology in the form of improved hygiene, feed, and livestock was inconsistent, with poor adoption in particular locations and technologies.

Aalande (2021) studied the functioning and profitability of Dairy business firms, distributors and sub distributors. The study revealed that dairy firms earn more profit as compare the distributors, distributors are also getting more profit as compare to sub distributors. Distributors and sub-distributors profit are mainly depended on the commission earned from sales. Commission charged is at different rate under different brands. Maximum commission was derived from unbranded

milk and milk products. Therefore, dairy firm business is considered as a social business and government gives different grant to motivate the dairy business.

Namdevrao (2021) studied the marketing, feeding, breeding, health care and Veterinary services constraints faced by dairy farmer. Less knowledge of techniques of fodder preservation, Loss of fodder due to nonuse of chaffing machine are the prominent feeding constraint and unavailability of land for fodder production constraint is strongly rejected. Unavailability of pure breed/ improved bulls for breeding is also considered as a major breeding constraint faced by dairy farmers. Inadequate knowledge about metabolic diseases is prominent constraint and lack of knowledge about symptoms of various diseases constraint is strongly rejected. Less knowledge about integrated parasite control and inadequate facilities at veterinary clinics/dispensaries are also considered as a major veterinary service and health care constraints. Major Management practices constraints faced by the farmers were lack of knowledge of disinfectant and sanitizer usage and labour shortage. Pressure of production of quality milk continuously and payment of milk is irregular & delayed are prominent.

Deory (2021) studied the problems and prospects of dairy farming in Tinsukia district with special reference to Sadiya sub-division. The study revealed that all the farms were managed by males and none is landless. Dairying is found to be a reasonable source of income for all dairy farmers. The other related source of income comes from goats, as much as 70 per cent of the respondents have goats. The majority of the dairy farmers find middlemen influencing the selling price of milk. Most of the milk is sold to middlemen at low prices. Formal sectors are still unattractive sources for the farmers. It is observed that almost all the dairy owners never had support, during the last 12 months before the survey period ends, from Dairy Development officials or its extension service.

Priyanka and Harikumar (2021) analysed the marketing strategies adopted by the farmers in Ernakulam district, looked at the amount of milk sold to different agents and marketing channels, and investigated the reasons for their selection. Farmers use a variety of marketing techniques, such as direct marketing, human

contact marketing, and marketing through middlemen or intermediates. Even though farmers can sell more milk to dairy cooperatives, it has been discovered that the producer-to-consumer marketing channel is more lucrative and advantageous for producers than any other marketing route. It is evident that timely/regular payment (100%), large purchase quantities (98.44%), accessibility (97.81%), lack of a network capability for direct marketing/no home demand (92.19%), and traditional practice (80.00%) are the primary factors in the decision to choose a dairy cooperative. The study revealed that procurement prices are lower in the cooperative societies. Therefore, it is found that due to the higher price received, selling milk to consumers/households is more profitable and beneficial to farmers than any other marketing channels

Thomas (2021) done a case study of Kerala dairy industry -with special reference to Ernakulam regional cooperative milk producers union Ltd. Consumption of processed foods, especially dairy products, will rise as a result of changes in lifestyle and consumption patterns brought about by the middle class's growing spending power and the faster rate of urbanization. Infrastructure development and enhancing Milma's brand equity will be built through strategic planning, which will enable them sustain their market leadership.

Anugrah et al., (2021) studied the opinions and goals of smallholder farmers in Bandung District, West Java, regarding the growth of dairy farming. The purpose of this article was to examine how farmers view the development of dairy farming, its sustainability, and its limitations. Smallholder dairy farmers in the Bandung District's KPBS Pangalengan operating region confront two major obstacles that could impede the growth of the dairy farm industry there: the cost of concentrates and land availability. The majority of dairy producers were unable to grow their farms because of their small landholdings. The government should make it easier for smallholder dairy farmers to grow their operations by allowing them to temporarily and lawfully rent out abandoned plantation and forestry properties at reasonable prices.

Satashia and Pundir (2021) studied Marketing Efficiency of Milk Marketing Channels in Middle Gujarat and Scope for Its Improvement based mainly on primary data using tabular analysis. The findings showed that Channel-III had the largest pricing spread, followed by Channel-IV, Channel-II, and Channel-I, in that order. Out of all the marketing channels, Channel II had the highest marketing efficiency. When examined from the perspective of producers' share of customers' rupees, Channel I was determined to be the most effective. The study also made clear that the more price differences there are, the less effectively milk is marketed.

Saran, et al., (2022) Examine the selection of milk marketing channels and the variables that affect this selection. The study was undertaken in Bikaner district of Rajasthan. From a list of farmers rearing at least two mature milch cattle, 180 sample farmers were chosen at random. The majority of milk producers sold their milk to private middlemen on an informal basis (62.77 percent), followed by cooperatives (18.90 percent) and consumers directly (18.33 percent). Because informal channels offer greater prices than formal ones, the study demonstrates that the price of milk per liter is positive and significant when it comes to direct sales to consumers and informal marketing channels.

Quintoil and Varun (2022) examined the Challenges and Strategies for The Sustainable Dairy Farming in India. Despite the enormous increase in milk production over the past few decades, the productivity of dairy animals has remained relatively low, and dairy farmers in particular face a number of obstacles, including marketing, technical, nutritional, and infrastructure issues, that prevent the dairy industry from growing and developing further. Sustainable dairy farming in India can be achieved by enhancing the knowledge of dairy farmers, particularly in areas such as clean milk production, livestock insurance, hydroponic green fodder growth techniques, silage production, immunization, deworming, and early identification of subclinical mastitis. The most crucial tactics in dairy farming are uninterrupted feed supply and trustworthy veterinary care. These, combined with a steady market, resources, and more affordable prices, will help India overcome its obstacles to sustained dairy production.

Kele (2023) studied the perception of dairy stakeholders towards co-operative and non-co-operative dairy industries. The examination of Dairy Plants indicates a lack of significant disparities in responses based on the type of dairy. The investigation into Milk Producers reveals that factors such as the quantity of liquid milk produced and the providers of dairy extension services elicit higher responses from Cooperative Dairy. Nevertheless, certain aspects, including the mode of payment, the livestock associated with milk providers, and the destination of milk sales, exhibit variations between Private and Cooperative Dairies. Notably, Cooperative Dairy services show higher responses for weekly, bi-monthly, and monthly payments, as well as a more pronounced association with specific livestock types. Consumer purchasing patterns for liquid milk reveal a preference for smaller quantities, particularly below 1000 ML. The primary sources of liquid milk are farmers, Milk Cooperative Unions, and others, while the preferred mode of payment is mainly monthly.

Neha (2024) conducted a study on dairy products: consumer preference for dairy product line across selected retail organisations in Odisha. It concluded that consumers prefer to buy dairy product line from unorganised stores as dairy products (especially milk, curd) comes with short self-life. Out of 600 respondents, 448 given most preference to branded dairy products and 152 prefers unbranded dairy products. Among the selected product line, Milk is the most preferred product and most frequently bought product. Consumers prefer to buy OMFED brand from unorganised stores. The variables advertisement & business promotion, gift and schemes, service system, location of the shop and material of carry bags have a significant impact on retail format (online/ organised/ unorganised) and place of operation (Urban/ Rural).

Mishra (2024) conducted a study to evaluate the effectiveness of current marketing strategies for dairy products in Lucknow and analyse consumer preferences and behaviour regarding dairy products in the district. The findings of the research indicated that established brands such as AMUL, Mother Dairy, and Gyan were perceived as highly effective by a significant percentage of respondents.

However, local brands like Nadika also maintained a significant presence in the market, demonstrating the potential for competition between established and local brands. It highlighted the significance of local sourcing, efficiency in manufacturing practices, addressing supply chain challenges, leveraging digital and social media for marketing, catering to consumer preferences for organic and traditional products, and enhancing packaging design to attract consumers. Amul boasts a highly robust market presence, indicating widespread availability and recognition of its products.

Saurabh (2024) done Comparative Study on Marketing strategies of Amul India Ltd. and Mother Dairy to know awareness of people towards Amul and Mother Dairy products and to know the preference of Amul products with comparison to Mother Dairy and to know the factors which affects consumer's buying behaviour while purchasing its products. Amul brand maintains a highly active and engaging presence on various social media platforms, allowing for direct interaction with consumers. Amul places emphasis on consumer education, often providing information about the benefits of its products and the dairy industry as a whole. Amul's cooperative model is prominently highlighted in its marketing efforts, emphasizing community participation and mutual benefit. Mother Dairy actively utilizes digital marketing channels to engage with consumers, create brand awareness, and promote its products. The brand maintains a strong presence on various social media platforms, using them as tools for communication, customer interaction, and brand promotion.

To put it briefly, the current chapter has shed light on pertinent literature that has facilitated in realizing and comprehending the milk distribution/marketing strategies, marketing channels, problems and prospects of the dairy farmers, marketing efficiency and functioning of the dairy cooperatives. There was no concrete study regarding the impact of constraints and factors on profitability and channels selection and the reasons for continuing the dairy farming.

CHAPTER III

DAIRY MARKETING: A THEORETICAL FRAMEWORK

This chapter establishes the foundation for the research by connecting it to established theories, models, and concepts relevant to the study. It offers an overview of key theoretical perspectives, justifies the selection of specific theories, and explains how they guide the research questions, methodology, and analysis. This framework helps define the study's scope, contextualizes the research within existing knowledge, and identifies gaps that the research aims to address. Ultimately, it demonstrates how the study contributes to advancing or refining theoretical understanding in the field.

3.1: World Dairy Industry

3.1.1: Introduction

The dairy industry is one of the most important components in providing a regular income source that reduces poverty and improves living standards. According to the report of World Bank dairy sector of a country has a major impact on its public health, the long - term welfare of its society, on employment, family income, and even on the public infrastructures (Du et al., 2007). Furthermore, dairying plays a major role in many developing countries including India as it serves as a primary source of income and food for the majority of the rural poor (FAO, 2013; Ohlan, 2012).

The world dairy market has witnessed following noteworthy structural changes over the last few decades (Ohlan, 2014):

- (1) Milk production has expanded sizably: according to the reports of official agencies, OECD (Organization for Economic Co -operation and Development) and FAO (Food and Agriculture Organization), the milk production has expanded by an annual average compound growth rate of almost two per cent (OECD/FAO, 2016).

- (2) Milk consumption or demand of milk has grown rapidly: increasing population and income, together with the growing popularity of dairy products lead to a steep increase in the demand of the dairy products, especially milk. According to the OECD and FAO, this growth is expected to increase up to 12.5 per cent by 2025.
- (3) The share of developing countries contribution to the world's total milk production has advanced from 41 per cent in 1980 to 51 per cent in 2011 (Ohlan, 2014 a).
- (4) The trade orientation of the dairy sector has moved up considerably: according to International Dairy Federation (IDF, 2016), the equivalent of nearly nine per cent of global milk output is currently traded internationally.
- (5) Establishment of World Trade Organization (WTO) in the year 1995 has improved world dairy trading system by increasing the value of the world dairy trade and reducing its volatility (Ohlan, 2014 a).

Despite this improvement based structural changes, World dairy industry is facing and is projected to face numerous challenges in coming decades. For instance, Global milk production growth is predicted to decline over the next ten years, from 2.2% to 1.9% annually, according to an international report released by the OECD and FAO in 2022. reflecting the gradual adoption of contemporary dairy production methods and the constrained expansion of herds in underdeveloped nations as a result of water and suitable land shortages.

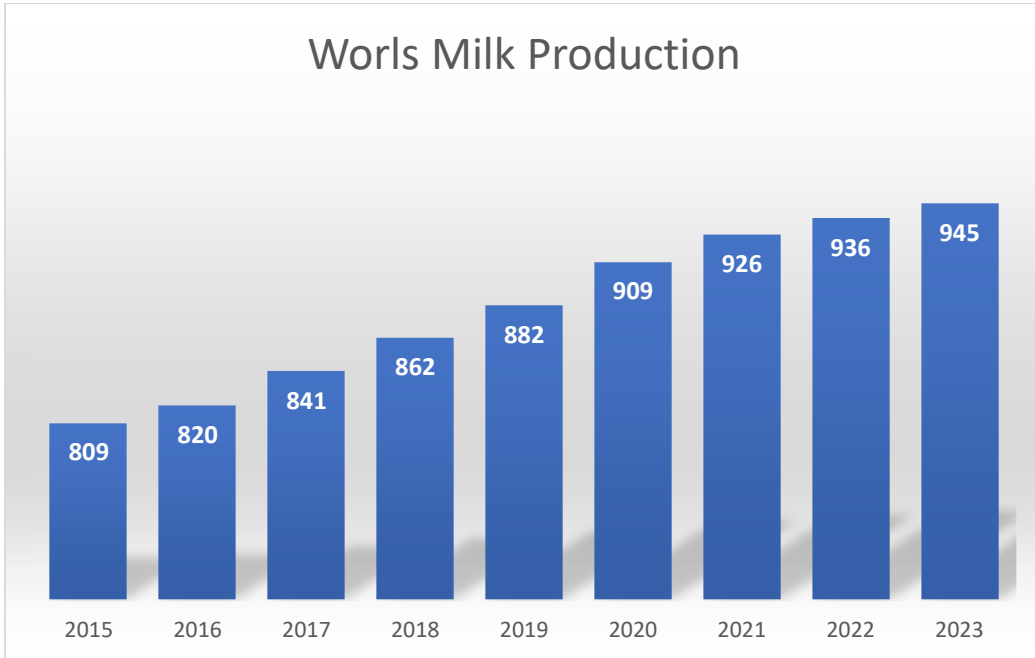
Further, the increasing consumption rates and decreasing production rates have led to an imbalance in dairy supply and demand. Dis-proportion between milk production and consumers demand has effect on nominal prices of milk and other dairy products that are expected to increase over the time.

3.1.2: World Dairy Situation at Glance

The current scenario of the world dairy can be seen in the following figures adapted from the recent report of IDF (2022-23).

Figure: 3.1

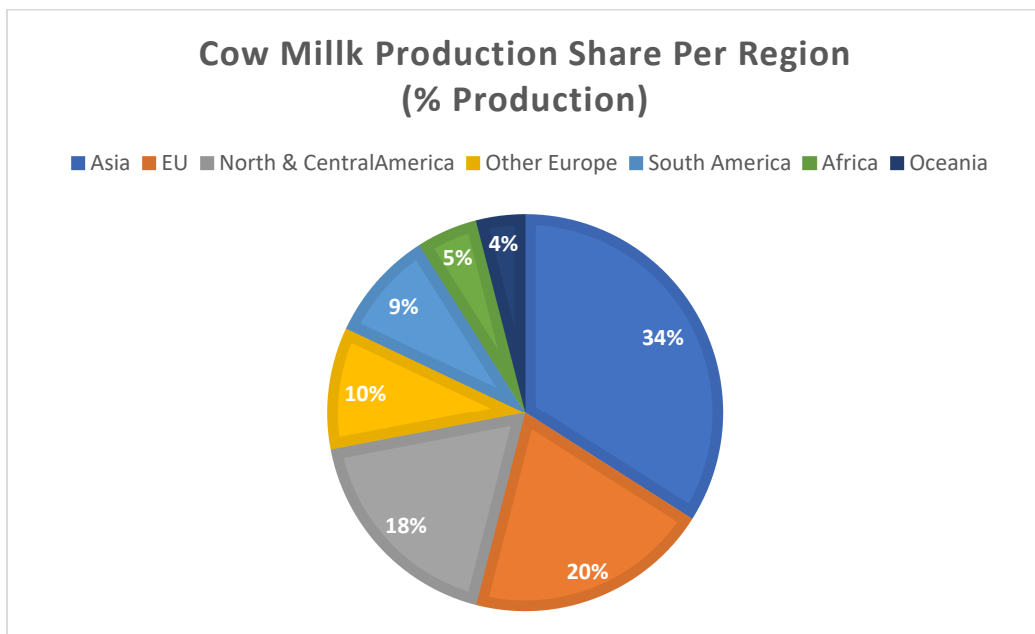
World milk production, adapted from IDF, 2023 report.



Source: Annual Report of International Dairy Federation, 2024

Figure: 3.2

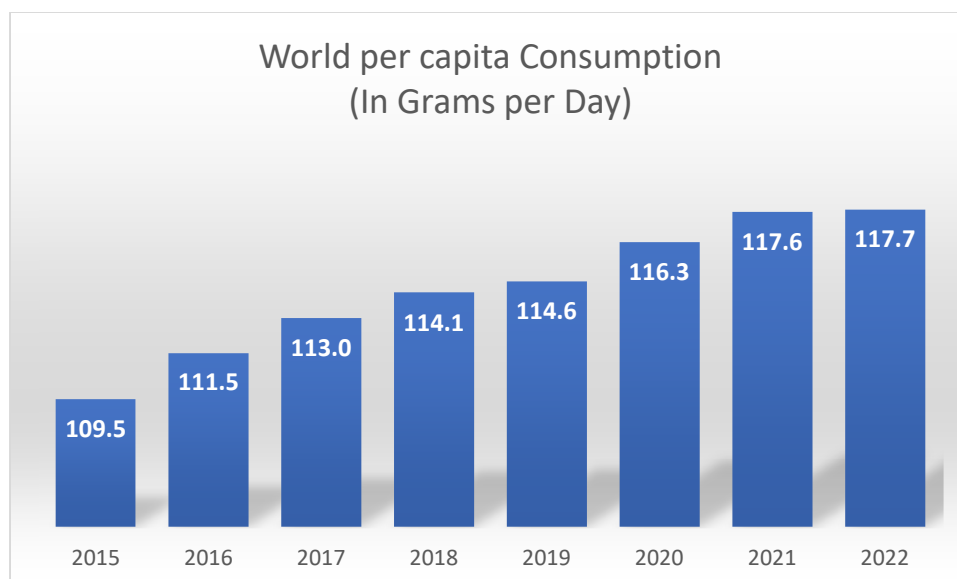
Region wise share of cow milk production



Source: Annual Report of International Dairy Federation, 2022-23

Figure: 3.3

World per capita milk consumption



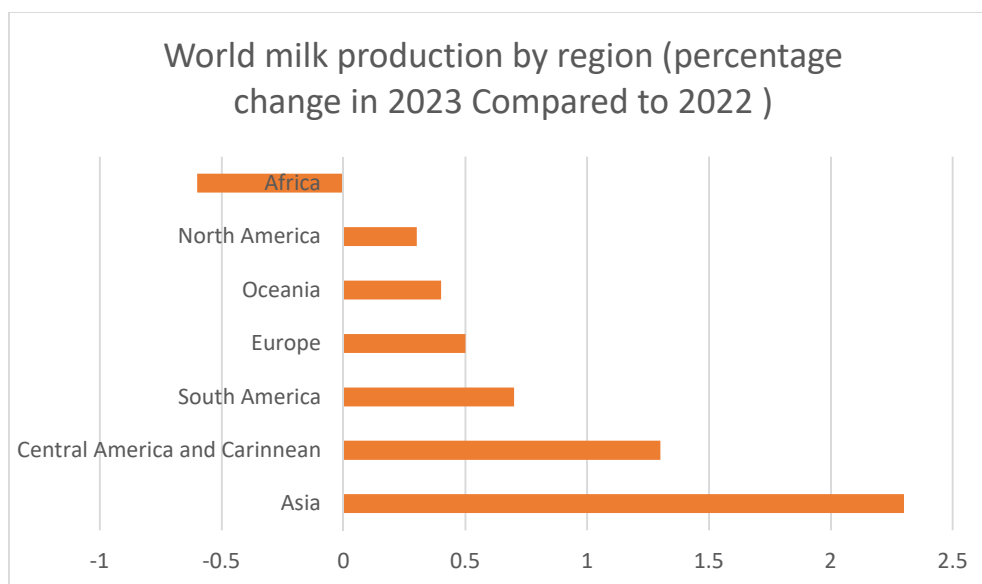
Source: Annual report of international dairy federation, 2022-23

The global dairy market has reached a value of \$944.7 billion in 2023 (Figure 3.1). The global dairy market is expected to grow at a compound annual growth (CGAR) of 6.40% from 2023 to 2030, reaching a value of \$ 1,374.37 billion by then, principally driven by volume growth in Asia, specifically in India and China, with moderate growth in the rest of the world and potentially lower production in Africa (Dairy Market Review 2023, FAO). The per capita availability of milk has reached a level of 459 grams per day during the year 2022-23 which is more than the world average of around 323 grams per day in 2022 (estimates) (Food Outlook Nov'23). As Region wise cow milk production is concerned, Asia is the largest producer followed by European Union and North and Central America (Figure 2).

Figure 3.4 shows the growth rate of world milk production in the different region in the year 2023 compared to 2022. This reveals that Asian region registered a higher growth rate followed by Central America and Caribbean. African region registered a negative growth.

Figure: 3.4

World milk production by region



Source: Dairy market review 2023, FAO

3.1.3: Asian Scenario

With output growth in several major countries, including China, India, Pakistan, Turkey, Uzbekistan, and Kazakhstan, milk production in Asia is predicted to reach 431 million tonnes in 2023, up 2.3% from 2022. However, significant production drops are anticipated in Japan, the Republic of Korea and Iraq, offsetting increases elsewhere (FAO,2023).

According to FAO (2023) statistics, the milk output in Asian countries (mainly India and Pakistan) increased due to the increase in the number of farms and milch animals and also due to the new improved milk collection processes established in these countries. These are in the form of automated milk testing equipment's and milk procurement payments made through banks.

3.1.4: Comparison of Global Dairy Sector

As stated in table 3.1, (Global Dairy Sector in 2018 compared with 2005) the items taken for the comparison with regard to milk production and yield has

increased while comparing it with the data of 2005. The reason behind this is that; the sector enables to reduce the income inequities in the global economy and results in balanced development of rural economy. The effects of globalisation, trade liberalisation and advancement in transportation and communication also gave rise to the market competition which led to more involvement in dairy farming (Bijla & Khalandar, 2019).

Table 3.1
Global dairy sector

Global Dairy Sector in 2018 compared with 2005					
Description	Unit of Measurement	Annual Value		%Change over 2005	
		2005	2018	Absolute	%
Milk Production	Million Tonnes	649	862	213	32.81
Number of Cows	In Thousand	4164	4101	-63	-1.51
Milk Yield	Tonnes/cow/year	6.9	8.1	1.2	17.39
Farm Number	In Thousand	108	62.8	-45.2	-41.85
Average Farm Size	Cow/farm	38.6	65.3	26.7	69.17

Source: IFCN Dairy Report, 2023

3.1.5: Major milk producing countries

A detailed explanation with regard to the global milk production among the major milk producing countries is much needed to get clear understanding about the increase in the production of milk. Table 3.2 (World's Milk Production (In Million Tonnes)) explains the statistics of the world milk production from 1970 to 2023. The world's milk production comprises of milk from cow, buffalo, goat and sheep. The major contenders in the global milk production are India, USA, Pakistan Brazil and China. Except China all other major milk producing nations showed a linear growth in the milk production. According to 2022 report of FAO, 54 per cent of milk and 46 per cent of milk products are being sold at the global markets.

Table: 3.2

Milk production of leading milk producing countries

World's Milk Production (In Million Tonnes)									
Country/Year	1970	1980	1990	2000	2010	2020	2021	2022	2023
World	391.95	465.82	542.53	579.31	724.45	909.00	926.00	936.00	965.7
India	20.80	31.56	53.68	79.66	121.85	198.00	210.00	222.00	230.58
USA	53.07	58.24	67.01	76.02	87.52	101.15	102.51	102.62	102.70
Pakistan	7.45	9.01	14.72	25.57	35.49	55.00	61.70	62.55	65.78
China	1.96	2.93	7.04	12.37	41.16	34.10	35.70	41.24	41.95
Brazil	7.42	12.06	15.08	20.53	30.96	23.50	27.80	28.10	36.60

Source: USDA Report, 2023

The efficiency improvements in the dairy farming system, increased yield per cattle and enhanced capacity utilisation made Turkey, European Union and United States of America to increase the milk production. But there is a decline in the milk output in China and Ukraine due to reduction of small-scale farmers and industrial restructuring process in China and the reduction in production margins in Ukraine.

3.1.6: World Cattle Population

Table 3.3 (Global Cattle Population (In Millions)) depicts the statistics of cattle population in a few leading dairy industry players. Pakistan and Brazil experience a continuous increase in the number of cattle up to the year 2021. From the year 1970 onwards, USA experienced a continuous decline in the number of cattle. The countries showed a decline in the number of cattle population due to structural changes that happened in the dairy sector. Many small dairy farm holders were pushed out of the market participation due to unfavourable economics of scale and quality standards. The big farms keep only high yielding breed for more productivity. As a result of this, all the low yielding breeds (indigenous cattle) got wiped out from the sector (FAO, 2023) The high growth in milk production and the growing demand makes the sector more sustainable.

Table: 3.3

Global cattle population in the major countries

Global Cattle Population (In Millions)									
Country/year	1970	1980	1990	2000	2010	2020	2021	2022	2023
Indian	177.40	186.50	202.50	191.92	194.18	195.90	197.45	198.65	199.5
USA	112.36	111.12	95.81	98.18	94.08	94.40	92.10	91.90	91.80
Pakistan	14.58	15.03	17.67	22.00	34.28	46.60	53.43	49.43	49.60
Brazil	75.44	118.9	147.10	169.87	209.54	218.20	224.60	234.40	194.36
China	57.61	52.49	77.90	104.55	68.87	80.04	98.17	100.20	101.50

3.1.7: International Dairy Product Trade 2023 will probably see a decline in the global dairy trade, albeit not as sharply as the year before. International dairy product commerce is expected to drop by 1.0 percent in 2023 to 84.0 million tonnes (in milk equivalent), which is a lesser rate of decline than the 4.2 percent recorded in 2022 (www.fao.org). The anticipated drop in world dairy trade in 2023 is primarily due to likely declines in imports by China, the Philippines, Indonesia, and Malaysia, partially compensated by higher imports by Brazil, Mexico, Algeria, Saudi Arabia, and Australia (FAO,2023)

The impact of lethargic global trade was reflected in the international prices of dairy commodities. Between April 2022 and March 2023, butter and SMP selling prices at the Global Dairy Trade (GDT) auction fell by 30% and 42%, respectively. SMP was priced at USD 2,650 per metric tonne (MT) at the end of March 2023, whilst butter was trading at USD 4,750 per MT (www.nddb.coop).

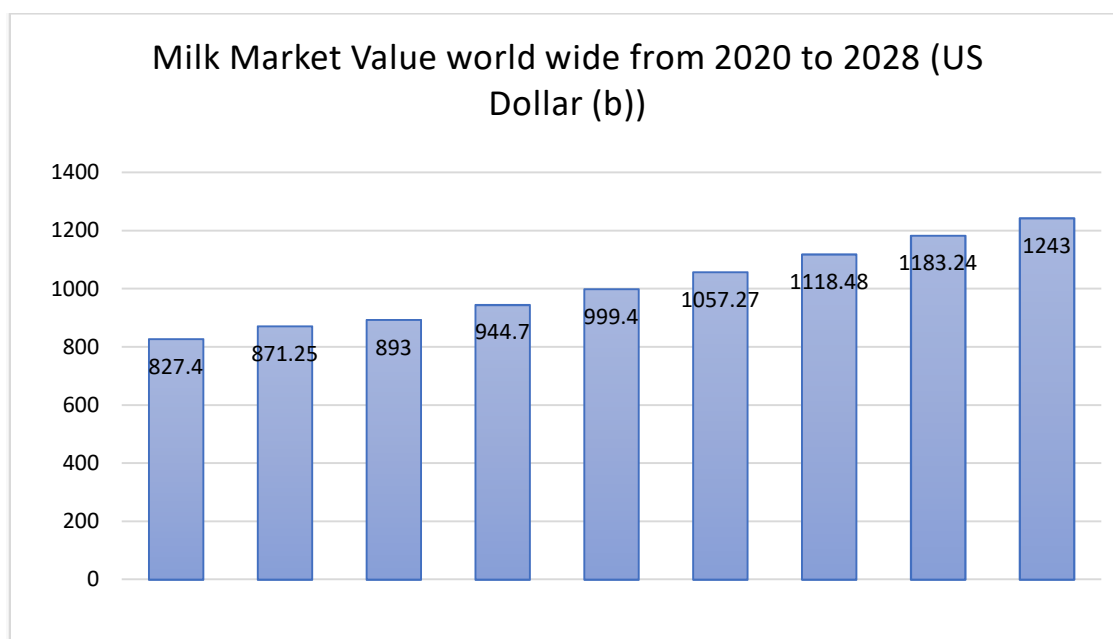
3.1.8: Global Dairy Market Value

The global dairy market was valued at 893 billion U.S. dollars in 2021 and was projected to grow to about 1243 billion U.S. dollars by 2028(Shahbandeh,2024).

The global dairy market value from 2020 to 2023 is depicted in Figure 5, along with a forecast for 2024 to 2028.

Figure: 3.5

Estimated international milk market value



Source: FAOSTATA, 2023

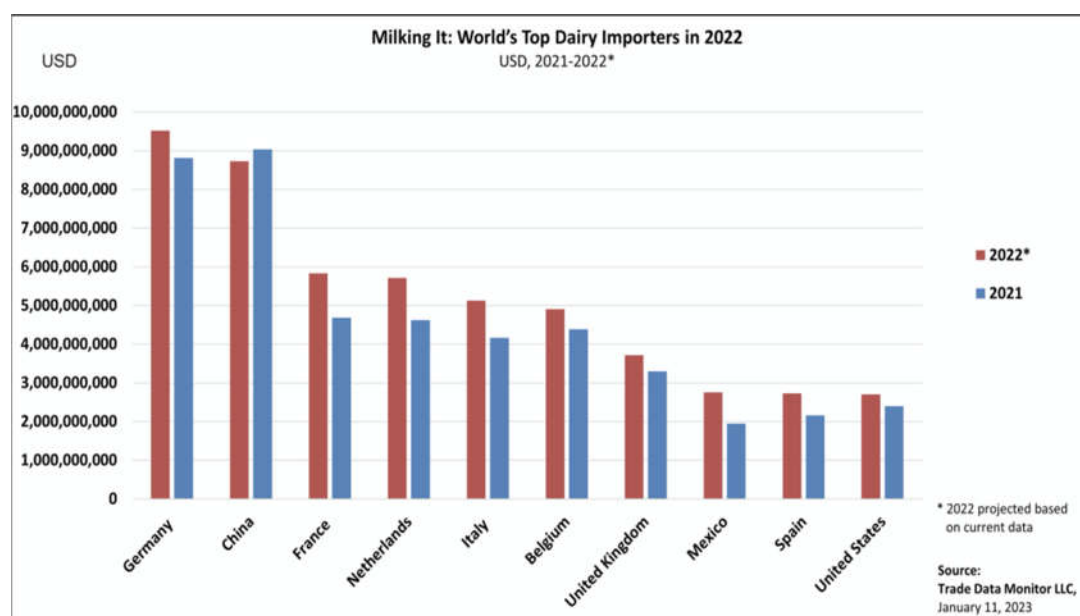
3.1.9: Major Players of International Trade

Over the first nine months of 2022, global dairy exports reached \$81.7 billion, up 11% from \$73.6 billion in 2021 and \$65.4 billion in 2020. Cheese accounts for somewhat more than one-third of that trade, while milk and cream make up slightly less than one-third. The remainder consists of honey, yoghurt, eggs, whey, and butter (www.trademonitor.com). When it comes to shipping, dairy is more costly and heavier than some other commodities. Cheese accounts for a fourth of the over \$800 billion global dairy business. With developed dairy markets, producers in the United States, the European Union, and dairy powerhouse New Zealand stand to gain the most from this growth in international commerce (www.trademonitor.com).

Figure 3.6 demonstrates that during the first nine months of 2022, Germany was the world's largest exporter, increasing 12.3% to \$9.8 billion. Cheese and curd were Germany's top exports, rising 14.9% to \$4.6 billion, followed by milk and cream, which increased 6% to \$2.6 billion. With \$9.4 billion in exports, up 11.5%, New Zealand came in second, followed by the United States, France, and the Netherlands. The latter's exports reached \$5.9 billion, up 21.7% from the previous year. Mexico, the Philippines, Canada, China, and South Korea were its top markets (www.trademonitor.com).

Figure: 3.6

World's top dairy exporters in 2022



3.2: Indian Scenario

3.2.1: A Brief History

India's agricultural history began with the Indus Valley Civilization, and there is evidence of it dating back much further in some regions of Southern India. Civilisation evolved as a result of agriculture, which began thousands of years ago. Seventy per cent of rural households in India still depend mainly on agriculture for their livelihoods. The share of agricultural and its allied sectors contribute to 17.7 per cent of national income in 2023-2024. It contributes to 33 per cent of world's cattle population and also contributes to 24.64 per cent of world's milk output. India

also has the world's largest buffalo population contributing 56.7% of the world's buffalo population.

Indian agriculture is basically divided into two ways, crop production and livestock production. The crop production in India is dependent on seasons and availability of facilities for irrigation. The income generation from crop production is also seasonal. On the other hand, there are clear benefits to milk production. First, the choice for using milk as food in the household that produces it. Second, milk sales guarantee consistent revenue each and every day. Furthermore, the dairy industry offers employment opportunities year-round, whereas crop cultivation only employs rural workers for 90 to 120 days in a year.

Indian dairy sector plays a pivot role in developing the socio-economic conditions of the rural population. Indian Dairy sector contributes 26.2 per cent of the overall agricultural economy of India. There are 76 million dairy farmers involved in milk production. Most of the farmers have households with dairying as a subsidiary occupation. Many scientific studies have conducted and it has been found out that, large majority of dairy farmers do not make profit out of this farming activity. Then the question is, "why do we produce milk"? The answer to the above question lies in the tradition, wisdom and culture deeply ingrained in every Indian.

As of 2024, Indian population is equivalent to 17.78 per cent of the total world population and the demand for milk and milk products in India are increasing rapidly, mainly due to the economic growth as well as the increase in population. The largest dairy development programme known as "White Revolution" or the "Operation Flood" programme was created to meet the growing demand of milk and milk products and to tackle the haunting evils of unemployment and under-employment in the nation. The prime and only focus of Operation Flood programme was upon the national production of milk through implementation of Dairy Co-Operative Society (DCS). Dr. Verghese Kurien developed a three-tier democratic co-operative structure in Anand and later on developed the same in all states of India. This made India's emergence from a Receipt of International Food Aid to the largest liquid milk producer in the world. It is a well-documented story which led to the

implementation of the co-operative structure in other parts of the globe. The Dairy Co-Operative Society now provides the largest employment scheme and doubles the farmer's income. It also marked an end to the caste hierarchy system in India, because the milk collection centres collected milk from the farmers irrespective of sex, religion and caste (The extracts were taken from the autobiography of Dr. Verghese Kurien, "I too had a dream").

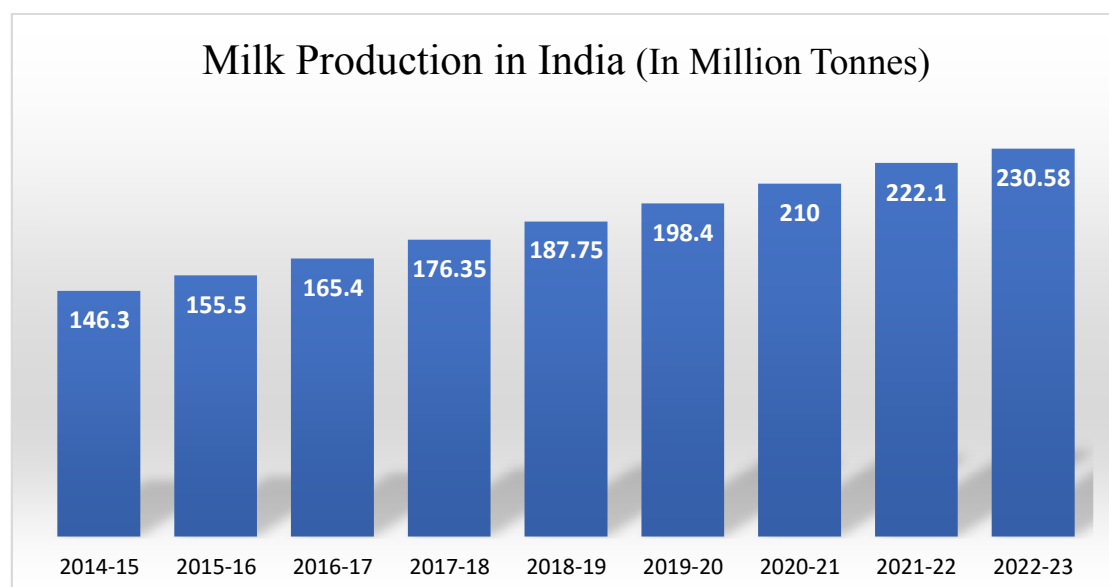
Dr. Verghese Kurien known as the father of White Revolution in India, implemented the "Billion –Litre" idea that propelled India to become a self-sufficient country in milk and milk products and thereby brought down all the imports and increased the milk production from 20 million tonnes per year in 1960 to 230.58 million tonnes in 2022-23.

3.2.2: Milk Production in India

With a quarter of the world's milk production, India is the world's top producer and number one. In the past nine years, specifically in 2014–15 and 2022–23, India's milk output has climbed by 58%, reaching 230.58 million tonnes in 2022–23. Over the last ten years, milk production has grown at a CAGR of 6%.

Figure: 3.7

Milk production in India



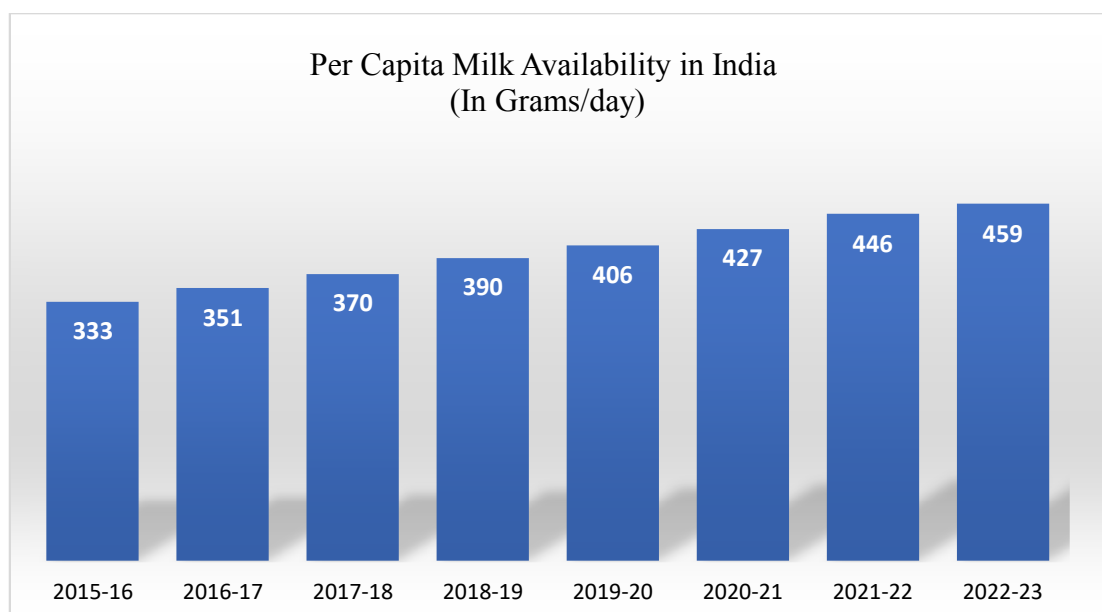
Source: Annual report 2023-24, department of animal husbandry and dairying

3.2.3: Per Capita Availability of Milk in India

Figure 3.8 reveals that the average per capita of milk consumption in India has also increased from 333 grams per day to 459 grams per day during the eight years i.e., from 2015-16 to 2022-23 with a growth rate of 37.83%.

Figure: 3.8

Per capita availability of milk in India during the period.



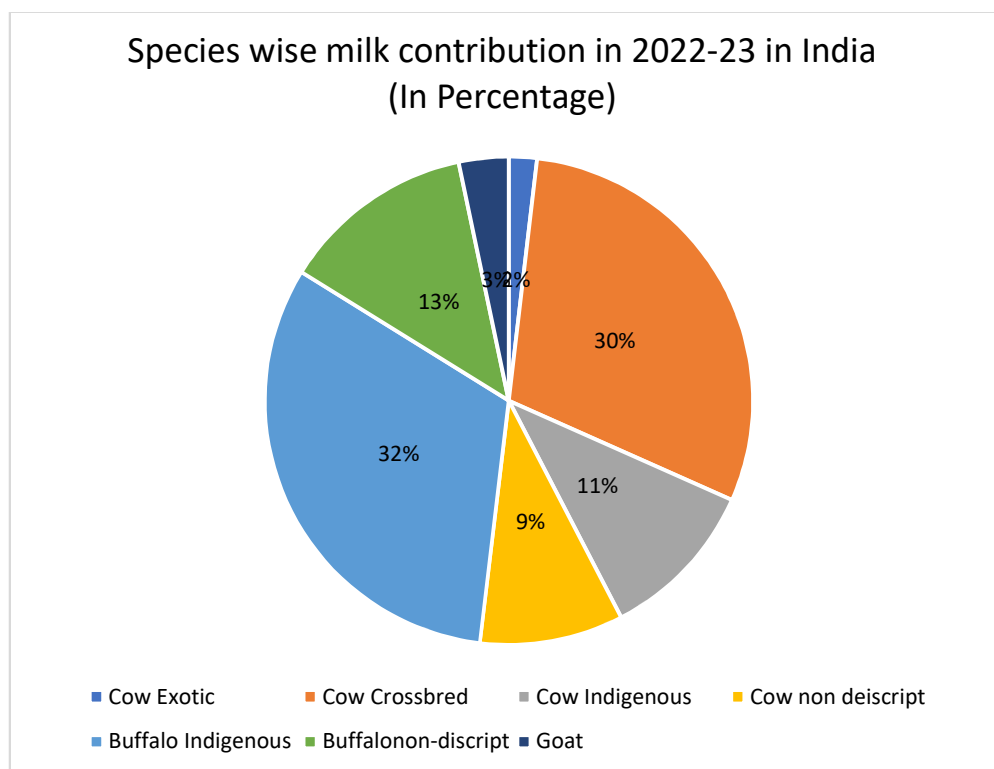
Source: Annual report 2023-24, department of animal husbandry and dairying

3.2.4: Species-wise Share of Milk Production of the Country

Figure: 3.9 shows the contribution of milk production by cattle, buffalo and goat. Native buffaloes account for over 31.58% of the nation's total milk production, with crossbred cattle coming in second at 29.91%. While non-descript buffaloes account up 13.49% of India's total milk production, native cattle make up 0.53%. The percentage of goat milk is 2.93%. A total of 1.92% of milk production comes from exotic cows (dairydevelopment.kerala.gov.in).

Figure: 3.9

Species wise share of milk in India



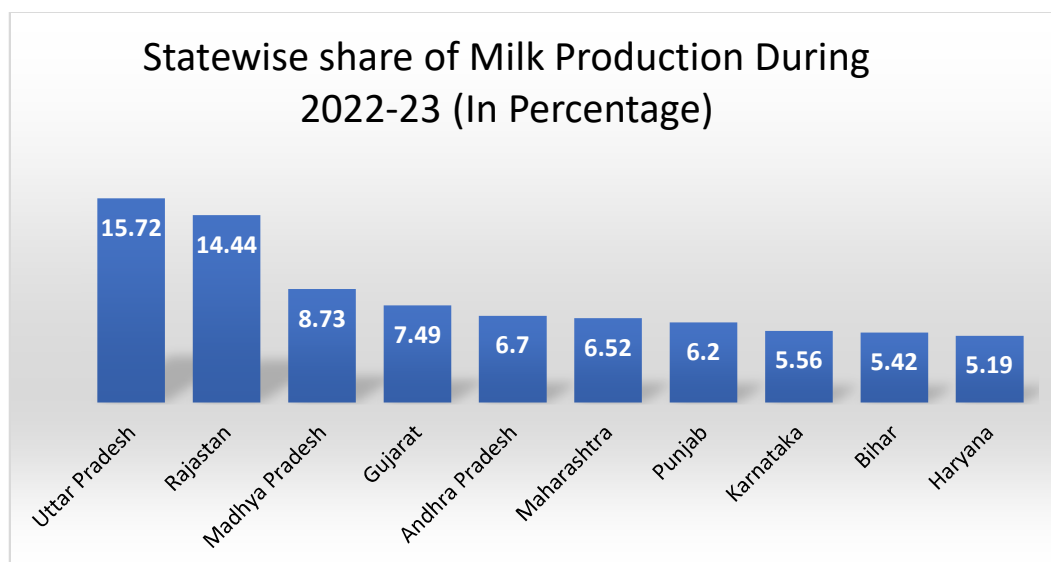
Source: Annual report 2023-24, department of animal husbandry and dairying

3.2.5: Leading Milk Producing States

Madhya Pradesh (8.6%), Gujarat (7.56%), Andhra Pradesh (6.97%), Uttar Pradesh (14.93%), and Rajasthan (15.05%) are the top five states in terms of milk production. Collectively, they account for 53.11% of the nation's total milk production (www.agriculturetoday.in). The top ten milk-producing states in the US are shown in Figure 3.10 (Annual Report, NDDB 2023).

Figure: 3.10

State-wise share of milk production



Source: Annual report of NDDB, 2023

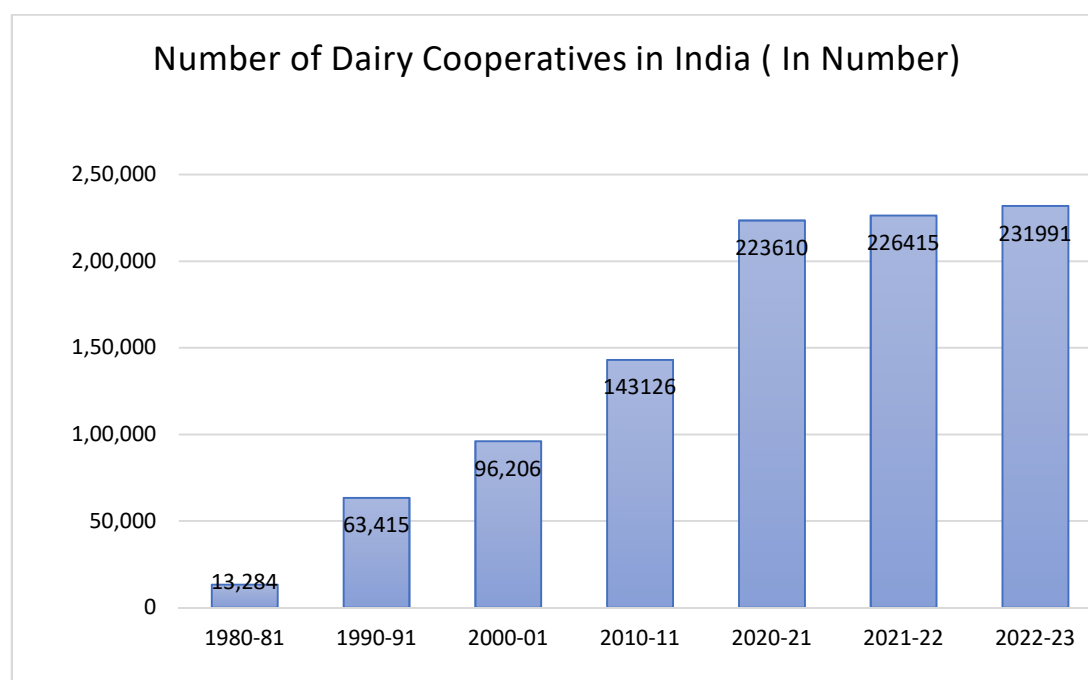
3.2.6: Dairy Cooperatives

With an average of 589 LK_gPD purchased in 2022–2023, dairy cooperatives' milk procurement efforts persevered in the face of difficulties (www.nddb.coop). By offering technical inputs and extension services such as veterinary care, artificial insemination (AI) services, vaccinations, balanced cattle feed, fodder seed, mineral combination, etc., dairy cooperatives have persisted in helping dairy producers (www.nddb.coop). The cost of purchasing milk went up by almost 15% in 2022–2023 (Annual Report, NDDB 2023). Dairy cooperatives took pre-emptive measures to meet the increased demand for liquid milk and value-added milk products after the epidemic. In comparison to 2021–2022, the average liquid milk sale increased by 9% to 427 Lakh Litres per day (LLPD) in 2022–2023. Throughout the year, the prices of conserved dairy products like butter and skimmed milk powder (SMP) stayed mostly constant on the domestic market. Butter prices ranged from about Rs. 400 to Rs. 440 per kg, while SMP prices varied from about Rs. 280 to about Rs. 320 per kg. Domestic SMP prices continued to be higher than global market rates for the most of the fiscal year 2022–2023. After initially trailing behind global market prices, the white butter prices finally came into near alignment in the second half of the fiscal year (Annual Report, NDDB 2023) (www.nddb.coop).

There are 2,31,991 Dairy Co-operative Societies functioning in India covering a cumulative membership of 17.44 million milk producers. The procurement by the co-operative societies in the country amounts to an average of 591.78 lakh kg of milk per day in the year 2021-22 with a registered growth of seven per cent. However, in the year 2022-23 procurement by the dairy cooperatives decreased to 589.04 lakh kg of milk per day registering a negative growth rate of 0.46 per cent. The liquid milk marketing through dairy cooperatives amounts to 42,673 thousand litres per day. (Annual Report, National Dairy Development Board,2023). Figures 3.11, 3.12, 3.13 and 3.14 shows the year-wise details of the information provided above.

Figure: 3.11

Number dairy cooperatives in India

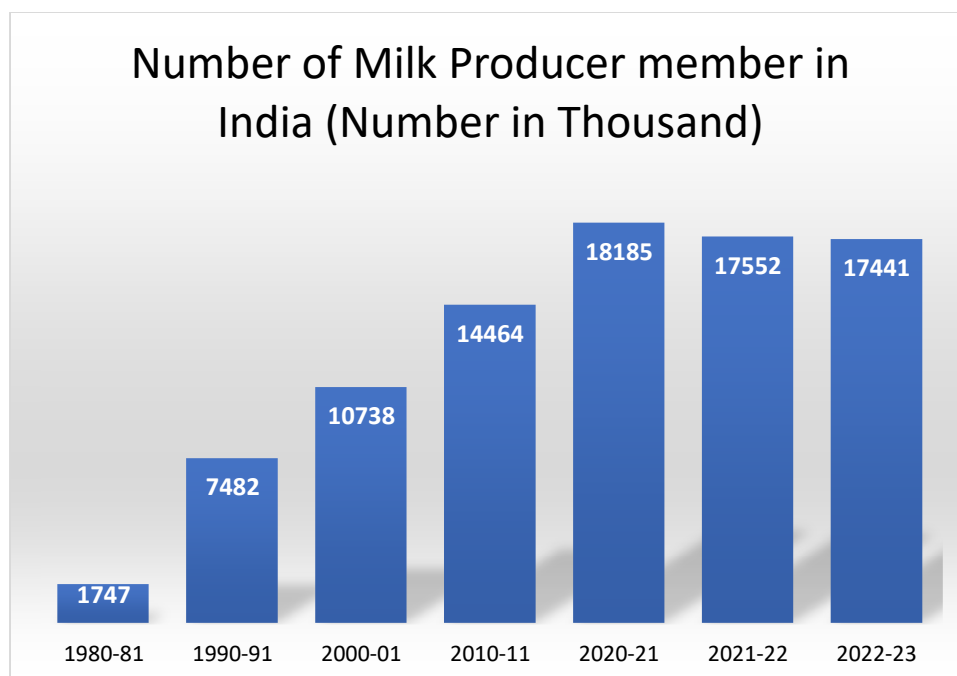


Source: NDDDB Report,2023

As per figure 3.12 the number of milks producing members are decreasing in recent years. This shows that small farmers are retreating from the dairy farming activity due to low profit earning capacity of this activity.

Figure: 3.12

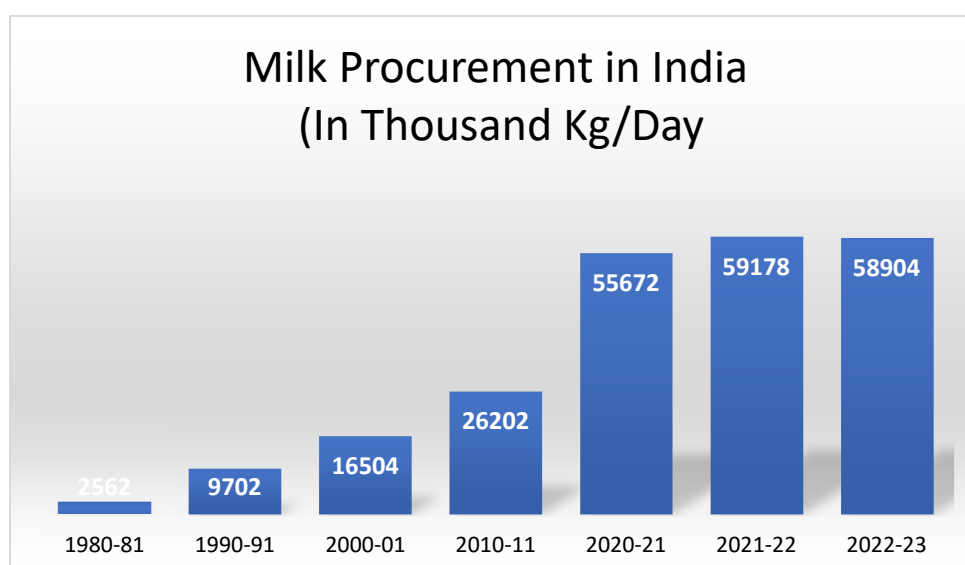
Number of milks producing members in India



Source: NDDB Report,2023

Figure: 3.13

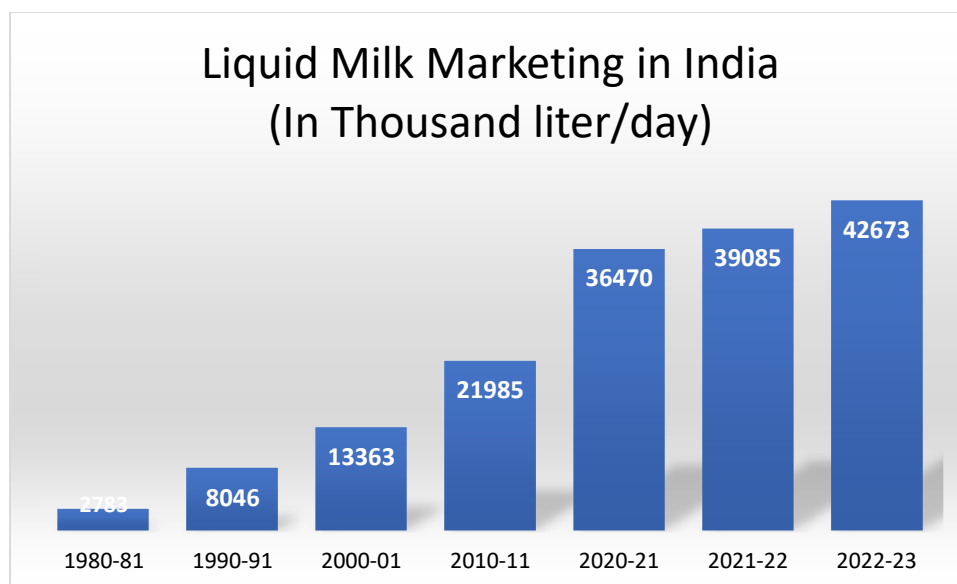
Milk procurement in India (In thousand kg per day)



Source: NDDB Report,2023

Figur:3.14

Liquid milk marketing in India (In thousand litre per day)



Source: NDDDB Report,2023

3.2.7: Evolution of Indian Dairy Industry

a) Traditional Dairying Practice in India: Pre-Colonialism Era

Since ancient times, India has been known as the ‘land flowing with milk and honey’. Bequeathed with beautiful tropical weather, fertile land masses, five perennial rivers flowing through its fertile land and mountains along with reasonably decent monsoons, India could proudly claim of being the world’s largest producer, contributor and consumer of the dairy products by volume.

Although gifted with some of the best breeds of cattle in the world with high yielding genetic stock cows like Sahiwal, Gir, Ongol, Kankrej and of buffalo breeds like Murrah, Mehsani, Banni India had lost its dairy advantage with the advent of the British era. From early days householders in India have revered their Cattles as auspicious assets and Cows were worshipped like Gods and termed as “Kamdhenu”, every householder tried maintaining 2 to 3 cows or buffalos in their house to meet out the daily dairy requirement and for self-consumption purpose. The majority of the extra milk was turned into butter, ghee, and butter milk, which were essential

dairy products for the family's sustenance. At this point, milk hardly had any commercial value.

b) The Colonial Era

During the entire colonial period there were some commercially sound places/cities which attracted the masses from various other locations. India witnessed a major rise in urbanization in the places like Mumbai, Cochin, Kolkata and New Delhi capital region with the advent of British rule, this directly meant the rise in demand and the consumption of the food items and dairy products. Milk had gained its commercial value in this period, soon formation of the “tabelas” or “commercial cattle sheds or enclosures” started happening where cows and buffalos in large numbers were reared for milk. The best of cattle mostly the buffalos along with their young calves were fetched from their natural rural habitat and were reared in these cattle sheds which would run for profits alone. Within a week of their coming to such shelters their calves would be weaned away and sent to the slaughter house, similarly these buffalo would be reared for few lactations cycle and then be sent to slaughter houses for leather and animal fat. The empty slots in these “tabelas” would soon be replaced with next best livestock and the cycles repeated itself year on year basis.

But, in this whole process every time the calf was slaughtered, India was losing the next best high yielding genetic stock because the ignorant and blinded “tabela” owners who forgot that the 'calf' in fact is a future cow. Every time a nice cow or buffalo calf was killed, the best cows or buffalo of the future were also killed.

This was the most horrific period of the Dairy segment. Where each time the weaning and slaughter cycle was repeated, the country was losing its best genetic pedigree year after year. This process continued unchecked for over a century, not only in India's major cities but also in its smaller towns, because of profound ignorance and greed. As a result, the country lost a significant amount of its high-yielding genetic stock, leaving it with only low-productive milch animals (dairynews.in). More so even after such horrific acts the production of milk was

unsatisfactory and India was still under the shortage of supply and per capita consumption remained below 35 kg per annum.

c) Post Independence: Early Days; the Onset of Cooperative Movement in India.

At the time of independence in 1947 milk was scarce and beyond means of vast segment of population. Compared to the global average of 125 kg, the per capita consumption in urban India was only 35 kg annually (dairynews.in). The situation was quite dismal. However, in the early years of independence, Government had recognized the levels of shortage in milk supply and had understood the economic significance of dairy. There was a need for an active role to be played by the policy makers in designing such government initiatives and schemes that would ensure effective usage of money spent to increase the milk productivity all over the country. The government wanted to supply the nation's expanding urban population with clean milk. To supply the demand for milk in the cities, India was commercially importing some 55,000 tons of milk powder per year in the early 1950s.

The milk production during the 1950s and 60s was more or less stagnant. Government during this time took widespread measures for dairy development in order to boost the production with modernization of the dairy process. To introduce dairy cooperatives was one such significant move in this direction.

Collective marketing helps milk producers meet their collective need of getting a fair price for their milk. One of the most delicate agricultural products is milk, which needs to be handled carefully and promptly. Cooperative dairy organizations can readily supply this care. Cooperatives can offer a variety of services in addition to milk collection and marketing, including dairy inputs, extension services, veterinary care, artificial insemination services, animal feed, fodder seed, planting materials, fertilizers, credit, training, and education. These would function as member-owned and run business associations. In rural areas, the farmer cooperative system has shown to be a successful means of developing dairy products in particular and animals in general (archive.org).

3.2.8: Transformation of Indian Dairy Industry:

a) White Revolution: The Great Operation Flood (From 1970's to 2000's)

“Operation Flood: one of the world's largest rural development programmes”
(World Bank).

Dr. Verghese Kurien, the then-NDDDB chairman and a founding member of Anand Milk Union Limited (Amul), was the driving force behind Operation Flood, which was started by the National Dairy Development Board (NDDDB) on March 4, 1970. In order to reduce seasonal and regional price variations and guarantee that the producer receives fair market prices in a transparent manner on a regular basis, Kurien envisioned a network of dairy cooperatives by establishing a national milk grid that connected milk producers across India with consumers in more than 700 towns and cities. Dairy producers were able to take charge of their own development and take charge of the resources they produce thanks to this (scert.kerala.gov.in).

Village milk producers' cooperatives served as the cornerstone of Operation Flood by actively sourcing milk and offering dairy farmers services and inputs, enabling affiliated members to access contemporary management and technology.

b) Key Objectives of Operation Flood Mission:

- Increase milk production ("a flood of milk") throughout the nation.
- Increasing incomes of rural householders as they actively get into dairy business by collaborating to the milk collection centers.
- Creating a stable and fair market for consumers and offering them milk and milk products at reasonable price across seasons.

Operation Flood Programme Implementation: The Three Phase Journey

➤ *Phase I (1970 -1980):*

During Phase I Through Operation Flood, NDDDB connected consumers in Delhi, Mumbai, Kolkata, and Chennai—India's four largest cities—with 18 of the

country's best milksheds. Through the World Food Programme, the European Union, then known as the EEC, donated butter oil and skim milk powder, which were sold to fund the entire program.

➤ ***Phase II (1981-85):***

Phase II focused on increasing the milksheds from 18 to 136; outlets of milk were increased with the expansion of urban markets to 290. By the end of 1985, 4.25 million milk producers were collaborated with the help of 43,000 village cooperatives. Dairies established as part of Operation Flood were responsible for the whole rise in domestic milk powder output, which rose from 22,000 tons in the year before the operation to 1,40,000 tons by 1989. In this sense, World Bank loans and EEC gifts supported the development of self-reliance. Producers' cooperatives concentrated on direct marketing, which increased milk delivery by several million liters each day.

➤ ***Phase III (1986-1996):***

Phase III allowed dairy cooperatives to fortify and enlarge the infrastructure needed to acquire and sell growing amounts of milk. In addition to increased member education, cooperative members now have access to feed, artificial insemination, and veterinary first-aid medical care services. The 42,000 dairy cooperatives that had already been established during Phase II were supplemented by 30,000 new cooperatives during this phase. As the number of women members and Women's Dairy Cooperative Societies increased dramatically, milksheds reached a peak of 173 in 1988–89. This stage saw the implementation of ground-breaking policies and concentrated on animal nutrition and health research and development. Innovations such as urea-molasses mineral blocks, bypass protein feed, and a vaccination against theileriosis all helped to increase the productivity of milch animals.

Operation Flood was designed and carried out as much more than a dairy program from the start, and as a result, India's milk production has increased by 4% to 5% annually. India became one of the world's top milk producers even though

farmers relied heavily on Agri-residual feeding which was greatly affected by productivity and frequent draughts. Another shocking development was that, during this time, milk consumption increased per capita and nearly caught up to the global norm (dairynews.in). India was surely making the right moves in production and marketing of the dairy products; especially liquid milk.

c) *Achievements of Operation Flood*

Dairy development has benefited from the White Revolution just as much as grain production has from the Green Revolution. Its results are predicated on the deployment of modern technology and better cattle breeding. The following are some of the White Revolution's significant accomplishments:

- The dairy cooperative movement is solely responsible for India's impressive milk production rise, which has increased from 20 million MT to 100 million MT in just 40 years. India is currently the world's largest producer of milk as a result of this. The 500 million cattle and buffalo that live in India are the largest in the world as a result of the dairy cooperative movement's encouragement of dairy producers to keep more animals.
- With more than 228374 villages scattered throughout 228 Districts in 28 States, the dairy cooperative movement has expanded throughout the entire nation.
- A strong procurement system and a helpful federal structure at the state and district levels have contributed to the movement's success.
- The White Revolution had a profound effect on the rural populace and inspired many to pursue dairying as a side job.
- India is currently the world's top producer of milk. Over 230 million tons of milk were produced in 2022–2023, up from roughly 17 million tons in 1950–1951. When compared to the pre-independence scenario, milk production has increased by more than thirteen times.

- Today, there are approximately 459 grams of milk available per person per day, compared to 100 grams prior to the White Revolution.
- There has been a significant decrease in the import of milk and milk output.
- The White Revolution has benefited landless laborers and small and marginal farmers the most.
- Research centers have been established at Anand, Mehsana, and Palanpur (Banaskantha) to guarantee the success of the Operation Flood Program. Additionally, there are three regional centers operating in Erode, Jalandhar, and Siliguri. In addition to 263 factories that can process more than one lakh liters of milk, there are currently metro dairies in ten of the nation's major cities.

3.2.9: Various Schemes & Initiatives by Government of India and NABARD for Expanding Milk Processing in the country

The Central Government has been putting several plans into action to build the infrastructure needed to improve the production of high-quality milk as well as the acquisition, processing, and marketing of milk and milk products. A few of the major plans and their effects have been briefly discussed:

a) The National programme for Dairy Development (NPDD)

NPDD is being implemented by the Department of Animal Husbandry & Dairying (DAHD) with the following goals in mind:

1. To build and improve the cold chain infrastructure that connects the farmer to the customer in order to produce high-quality milk.
2. To build and improve the infrastructure needed for milk marketing, processing, and procurement.
3. To establish training facilities for dairy producers.

4. To support village-level dairy producers' companies and cooperative societies.
 5. To boost milk production through the provision of technical input services, such as mineral mixtures and cattle feed.
 6. To support the revival of milk unions and federations that may be sustainable
- The primary goal of the NPDD is to help state agencies, such as the District Cooperative Milk Producers' Union and State Cooperative Dairy Federations, build and improve the infrastructure necessary for the production of high-quality milk as well as the acquisition, processing, and marketing of milk and milk products. As of 25.02.2020, 129 new projects totaling Rs 1535 crore (Rs 1249 crore in Central Assistance) had been authorized in 28 States and 2 UTs between 2014–15 and 2019–2020.

b) Phase I of the National Dairy Plan

In order to satisfy the anticipated 150 million tons of milk needed nationwide by 2016–17, the National Dairy Plan I (NDP-I) was adopted in 2012. With a total investment of Rs 2242 crore, NDP-I was authorized by NDDB to be implemented in 14 main milk-producing states during a six-year period, from 2011–12 to 2016–17. It was extended for an additional two years, till 2018–19, when Jharkhand, Chhattisgarh, and Uttarakhand were added. The plan was finished in November of 2019. The World Bank's International Development Association provides the majority of the funding for the NDP, while the NDDB appoints implementing agencies in each state. In order to fulfil the rapidly rising demand for milk, the program's main goal was to boost the productivity of milch animals in 18 key milk-producing states, including Uttar Pradesh. The majority of the program's objectives have been met, including raising milk production nationwide through the implementation of breed development and improvement initiatives. Over the last five years, milk production has increased by more than 6%. The goal of NDP-I was to expand the cooperative structure's reach and improve the breed by producing high-genetic bulls. An extra 55,000 communities were covered for milk collection under the program (www.ficci.in).

c) DEDS, or the Dairy Entrepreneurship Development Scheme

Established in 2010, the Dairy Entrepreneurship Development Scheme (DEDS) is administered by the National Bank for Agriculture and Rural Development (NABARD), which offers financial support to commercially bankable projects through loans from commercial, cooperative, urban, and rural banks. The back-end subsidy for the purchase of milch cattle with unit sizes ranging from two to ten per beneficiary is 25% of the project cost for beneficiaries in the "General" category and 33.33% of the project cost for those in the "Scheduled Caste" and "Scheduled Tribes" categories.

d) Dairy Processing and Infrastructure Development Fund (DIDF):

Operation Flood, which ended in 1996, saw the commissioning of numerous dairy processing facilities with India's Dairy Cooperatives. For decades, the majority of these plants have not been upgraded or expanded. The majority of these plants use antiquated technology, which may not be as energy-efficient as more recent models. It was imperative that these dairy factories be replaced and modernized in order to increase production of higher-value products and improve efficiency.

Dairy cooperatives take into account the interests of both producers and consumers by giving milk farmers the largest possible portion of sales realization, often between 75 and 80 percent, and by providing consumers with healthy milk at a reasonable cost. Due to very low profit margins, cooperatives lack the resources necessary to engage in the extension or upgrading of dairy processing facilities.

A dedicated Dairy Processing and Infrastructure Development Fund under the National Bank for Agriculture and Rural Development (NABARD) was announced in the Union Budget (2017-18) with a total corpus of Rs 8000 crore over three years (2017-18 to 2019-20) in order to ensure that dairy cooperatives remain competitive for the long-term benefit of farmers. The end borrower contributed Rs 2001 crore, and the DIDF included an interest subvention of Rs 864 crore.

The establishment of chilling infrastructure and electronic milk testing equipment at the village level, as well as the modernization and expansion of milk processing infrastructure and manufacturing facilities for value-added products, are the main components of the DIDF. The NDDDB is the organization responsible for implementing the DIDF.

Under DIDF, eligible borrowers include Cooperative Milk Unions, State Cooperative Dairy Federations, Multi-state Milk Cooperatives, Milk Producer Companies, and NDDDB subsidiaries. Loans with an annual interest rate of 6.5% are one way that the program offers assistance. With a revised expenditure of Rs 11,184 crore, the government had authorized an increase in interest subsidies under the DIDF from the present level of 2% to up to 2.5%. According to the plan, DAHD will contribute Rs 1167 crore towards the interest subvention component between 2018–19 and 2030–31, with a carryover into the first quarter of 2031–2022. Additionally, NABARD is required to provide Rs. 8004 crores towards the lending component of the scheme. Borrowers will provide Rs. 2001 crore, while NDDDB and the National Cooperative Development Corporation (NCDC) would jointly contribute Rs. 12 crores.

e) Additional Government Policy Interventions:

- i) Improved Cooperative Sector Governance* By creating an enabling environment through a number of acts and revisions to the current laws, the Indian government actively supports the cooperative sector. The Ministry of Agriculture and Farmers' Welfare, Department of Agriculture & Cooperation, has produced a National Policy on Cooperatives with the aim of promoting the cooperatives' overall growth throughout the nation. This policy states that cooperatives must receive the support, encouragement, and help they require in order to function as independent, self-sufficient, and democratically run organizations. Below are a some of the laws and reforms that the GOI has proposed to assist cooperatives:
- ii) The Act of 2002 (39 of 2002) Concerning Multi State Cooperative Societies:* The purpose of the Act was to update and consolidate the laws pertaining to

cooperative societies that serve the interests of members in multiple states and have goals that are not limited to any one state. In addition to allowing them to promote their economic and social advancement and offer functional autonomy without being constrained by state borders, it also facilitated the voluntary formation and democratic operation of co-ops as people's institutions founded on self-help and mutual aid.

- iii) *The 2011 Constitution (97th Amendments) Act:* The goal of the cooperatives Act is to promote cooperative economic activity, which will aid in the development of rural India. According to the constitutional amendment, states must guarantee cooperative autonomy, encourage voluntary creation, allow for independent decision-making, and allow democratic control and operation of the cooperatives. Additionally, it guarantees independent auditing, five-year terms for employees, and periodical elections overseen by independent bodies.

3.2.9.1: The Indian government also promotes the dairy industry through a number of initiatives. Numerous government initiatives pertaining to animal husbandry and dairy development are being carried out, as listed below:

- A. Phase I of the National Dairy Plan (NDP I)
- B. The National Program for Dairy Development and Bovine Breeding (NPBBDD)
- C. The NLM, or National Livestock Mission
- D. Livestock Health & Disease Control (LH&DC)
- E. DEES, or the Dairy Entrepreneurship Development Scheme
- F. The RKVY, or Rashtriya Krishi Vikas Yojana
- G. The NRLM, or National Rural Livelihood Mission
- H. Plan for Value-adding, Cold Chain, and Preservation Facilities

I. NABARD's Dairy Development Schemes, et al.

3.2.9.2: Vision 2021: Future Plans for the Dairy Industry

The Ministry of Agriculture and Farmers Welfare's Department of Animal Husbandry, Dairying and Fisheries (DAHD&F) has created a National Action Plan (NAP) for 2021–2022 and 2023–2024 that takes into consideration the current coverage of milk potential villages, farmer members, farmer income, growth in milk production, milk procurement, existing milk chilling, processing infrastructure with cooperatives and MPCs, consumption patterns, etc. The National Action Plan 3.2.9.3:

Vision 2022 has two main objectives:

- A) To raise the country's milk output from 163.7 million metric tons in 2016–17 to 254.55 million metric tons by 2021–22 and 300 million metric tons by 2023–24, which calls for a 9.2% annual growth rate. for both guaranteeing nutritional security at the family level and satisfying the growing demand for milk through domestic production. Average in-milk animal productivity would also need to increase yearly at a rate of 4.7% to 6.14 KgPD by 2021–2022 and 6.7 KgPD by 2023–2024 from the current 4.65 KgPD in 2015–2016 in order to meet the targeted milk production targets.
- B) By giving milk farmers more access to the organized milk processing industry, we hope to increase their revenue at the farm level by 2021–2022. At the moment, 48% of all milk produced is either sold to nonproducers in rural areas or consumed by producers. In metropolitan areas, customers can purchase the remaining 52% of the milk, or marketable excess. The organized sector now handles around 40% of the milk sold of this 52% (Dairy Cooperatives & Producer companies: 20% & Private Dairies: 19%), with the unorganized sector handling the remaining 60%. By expanding their coverage, it is crucial to give rural milk farmers more access to the organized milk processing industry for the sake of their lives and financial security. By the end of 2021–2022 and 2023–2024, it is anticipated that farmers will have 60% of the total milk produced, with the organized sector handling 52% and

8% of this surplus milk, respectively, for the organized and unorganized sectors.

3.2.9: Indian Dairy Market Structure:

The organized and unorganized sectors make up the Indian dairy industry. Cooperatives and private dairies make up the organized segment, while traditional milkmen, vendors, sweet shops, hotels, and self-consumption at home make up the disorganized segment (dairydevelopment.kerala.gov.in).

“The market structure of organized dairy sector is monopolistic in nature, and this is basically derived from the fact that the consumption and demand of liquid milk basically remains stable throughout the year, however in winter season the supply of milk is more which becomes surplus in market, the small milk producers are either forced to increase their own consumption or are bound to sell this surplus to big organized dairy players at whatever is the prevalent rate. The Organized dairy players have resources to hold this milk longer and further convert it into the value-added product thus giving them the opportunity to gain through monopolistic position. Oligopolistic in nature, there are few suppliers who are selling homogeneous products and they cannot exert too much pressure on each other” (Shah, T. (1987).

The overall dairy industry is close to worth \$ 116 bn, out of which about 54% i.e., \$ 63 bn is consumed by the farmers/ producers themselves. About 46% is available as marketable surplus which stands out to be \$ 53 bn. The Dairy industry in India is predominantly controlled by the unorganized sector, out of this 46 % available as marketable surplus around 70% is procured by the unorganized sector like local dairy shop keeper or dudhiyas or halwais as more commonly known. The remaining 30% is procured by the Organized dairy industry which is close to a size of \$15.9 bn. Cooperatives and private players play a significant role here and from this \$15.9 bn around 45% which is \$ 7.16bn is made available to the Dairy cooperatives and remaining 55 % i.e. \$8.74 bn is sold by the private players (Figure 3.15).

In India, there are currently 228 cooperative unions of milk producers that have merged into 27 state-level milk marketing federations. The whole idea of milk unions is to save the milk producers from unfair trade practices of middlemen, dudhiyas (milkmen in unorganized sector) and milk contractors thereby improving their economic condition tremendously (Mor et al., 2018).

Only around 30% of milk is currently handled by the organized sector; the unorganized component of the industry controls the remaining milk. Private companies, cooperative societies, milk unions, and cooperative dairies make up the organized structure of the Indian dairy industry. The main goal of the establishment of the milk unions was to give the milk producers a ready market for selling their milk in the villages via the coop and to supply urban customers with affordable, high-quality, healthy, and sanitary processed milk. By standardizing milk quality testing, increasing transparency in the calculation of the amount paid to farmers for their milk, and educating farmers on the best dairy and animal husbandry practices, the organized sector can significantly increase its market share of marketable milk from the unorganized sector. Additionally, this would fit in nicely with consumers' desire for organized markets over chaotic ones. In 2022–2023, organized milk handling is predicted to increase from 20% at present to 50%, according to the Department of Animal Husbandry, Dairying, and Fisheries.

3.2.10: Export of Dairy Products

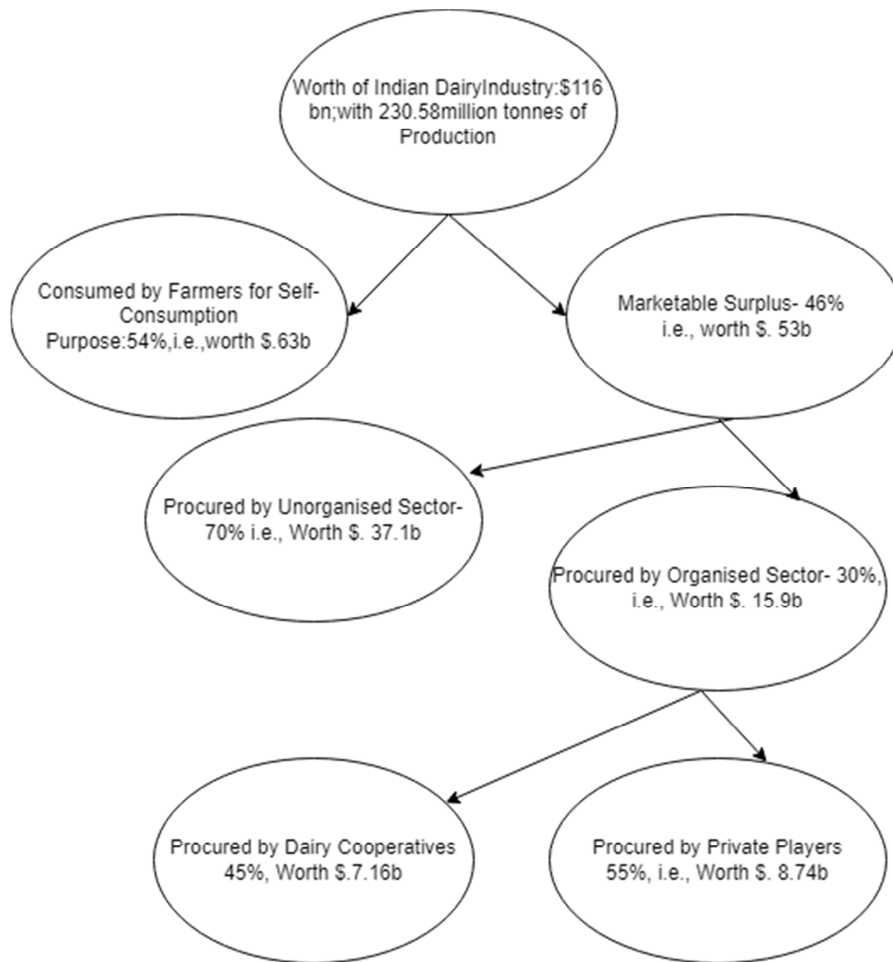
The dairy business in India has grown significantly, and as of 2023, its market value was INR 16,792.1 billion. With a predicted growth rate of 13% between 2024 and 2032, this trend is anticipated to continue. India's dairy industry has also become well-known abroad; in 2022–2023, the country exported 67,572.99 metric tons of dairy products worth more than 22 billion Indian rupees to the global market (www.citrusfreight.com). This shows the import and export of dairy products in India are growing at a rapid rate.

According to the FAS, India expects to export 0.020 MMT of fluid milk in 2024, up from 0.016 in 2023. Bangladesh, Bhutan, Sri Lanka, and the UAE are the major destinations for milk product export from India.

The dairy sector is booming globally, with a projected market value of approximately 893 billion US dollars in 2023. According to projections, this industry is expected to grow rapidly, reaching \$1,243 billion by 2028. In addition, it is projected that throughout the next ten years, the global per capita consumption of fresh dairy products will increase by 1.0% yearly (www.citrusfreight.com).

For Indian dairy product exporters, this changing environment offers a significant potential. Indian dairy producers should take advantage of this expanding worldwide market and support the global dairy trade by upholding quality, embracing innovation, and adhering to international norms (www.citrusfreight.com).

Figure: 3. 15 Quick views of Indian dairy industry:



3.2.11: The Significance of Milk Production in India

India's milk production is important for several reasons, including the country's economy, agriculture, culture, and eating habits. The following are the main ideas that emphasize the significance of milk production in India:

1. ***Economic Contribution:*** Over 80 million farmers in India are directly supported by the dairy business, which makes a substantial contribution to the country's economy. At 5% of the nation's GDP, it is the most important agricultural product. With a compound annual growth rate (CAGR) of 5.85% over the previous nine years, the sector grew at a pace of 6.2% from 146.31 million tonnes (MT) in 2014–15 to 230.58 MT in 2022–23. By 2030, the market is projected to be worth \$227.53 billion.
2. ***Global Leader in Milk Production:*** In terms of both milk production and consumption, India leads the globe. According to the 2019 census, India has the largest dairy herd in the world, with over 303.76 million cows. India employed 80 million people and supplied 25% of the world's milk production in 2021–2022. Production of milk increased from 222.1 million metric tons in fiscal year 2022 to 230.58 million metric tons in fiscal year 2023. From almost 5.76 percent in 2022 to nearly 3.81 percent in 2023, the nation's milk production growth rate declined somewhat.
3. ***Religious and Cultural Significance:*** In India, milk and dairy products have religious and cultural significance. They are essential to many regional recipes and are used extensively in Indian cooking. In North Indian cuisine, items like paneer (cottage cheese) are common, whereas in South Indian cuisine, items like yogurt and milk are common. Additionally, milk plays a crucial role in Hindu religious rites and customs.
4. ***Domestic Consumption:*** India's domestic market accounts for the majority of milk production. Over time, India's per capita milk supply has grown and is now higher than the global average. Milk and curd consumption is on the rise for both sexes, with 48.8% of the population reporting daily milk

drinking as of 2023. The demand for milk and milk products has increased as a result of population growth and rising disposable incomes. Farmers are motivated to increase their output capacity by this demand.

5. ***Higher milk outputs per animal*** are the outcome of improvements in animal husbandry procedures, such as improved feeding methods, greater veterinary care, and better breed selection. The increase in milk production has also been facilitated by the use of contemporary farming techniques and technologies.
6. In addition, ***the dairy industry's cooperative movement***, spearheaded by groups like Mother Dairy and Amul, has been crucial in helping farmers and guaranteeing that their milk is fairly priced. These cooperatives increase milk production by giving farmers access to the infrastructure, training, and marketing assistance they need.

3.2.12: Prospects in Dairy

For farmers, businesspeople, and legislators, the dairy industry offers a wealth of opportunities that can be used to increase rural incomes, employment, and food security. But in order to guarantee sustainable progress, there are also innate obstacles that must be addressed.

Growing Interest in Dairy Products and Milk

The demand for dairy products is rising as a result of both population growth and increased per capita income. Value-added dairy products like butter, spreads, and processed dairy products are also in high demand, in addition to more conventional dairy goods like liquid milk. For dairy farmers and processors, this is a great chance to grow their businesses and meet the demands of the market.

Creation of Jobs and Rural Development

Significant job opportunities could be created by dairying, especially in rural areas. Small-scale farmers can be empowered, jobs can be created, and rural development can be aided by the formation of dairy cooperatives and self-help

groups.

Diversification and Value Addition

As the demand for processed dairy products like cheese, butter, yogurt, and ice cream rises, the dairy industry is seeing an increasing trend of value addition. Dairy farmers and processors have the opportunity to diversify and increase their profitability because consumers are willing to pay more for these goods. This gives business owners the chance to enter new markets and make investments in dairy products with added value.

Potential for Exports

Given its enormous capability for milk production, India has enormous potential for dairy exports. Indian dairy products can have a competitive edge in the international market and boost export revenue with better infrastructure and quality control procedures. Dairy exports from India have increased significantly, with goods including butter, ghee, cheese, dairy spreads, and skim milk powder finding customers in the United Arab Emirates, the United States, Saudi Arabia, and Bangladesh.

Value of Nutrition

For millions of people in India, dairy products provide a significant source of affordable and wholesome food, particularly for women, small and marginal farmers, and those without land.

Developments in Technology

It is possible to improve milk output, quality, and processing efficiency by investing in technologies such as Bulk Milk Coolers (BMCs), sophisticated milk testing kits, and IT-enabled systems. Using sensors, automation, and data analytics, precision dairy farming can improve overall farm management, production, and animal health monitoring.

Development of Infrastructure

The dairy industry has a sizable infrastructure gap that offers investment potential in the establishment of accredited and organized farms, dairy processing facilities, and enhanced cold chain logistics.

Government Programs

To assist the dairy industry, the Indian government has put in place a number of programs and regulations. An important factor in raising milk output has been the dairy farming policy known as Operation Flood. To encourage the growth of the dairy industry, the government also formed the National Dairy Development Board. initiatives such the Pradhan Mantri Kisan Samman Nidhi Yojana, the Dairy Processing and Infrastructure Development Fund (DIDF), the Animal Husbandry Infrastructure Development Fund (AHIDF), the National Dairy Plan, the Dairy Entrepreneurship Development Scheme, and the Rashtriya Gokul Mission. Additionally, 100% FDI for animal husbandry may be made automatically.

3.3: Dairying In Kerala

3.3.1: Introduction

Dairying is considered as one of the most important subsidiary occupations for the Kerala farmers. It supports with providing employment opportunities and income generation particularly for women dairy farmers. The dairy sector in Kerala is dominated by small and marginal dairy farmers. 70 per cent of Kerala dairy farmers are landless and mostly owning one or two milch animals (Shoja Rani, 2009).

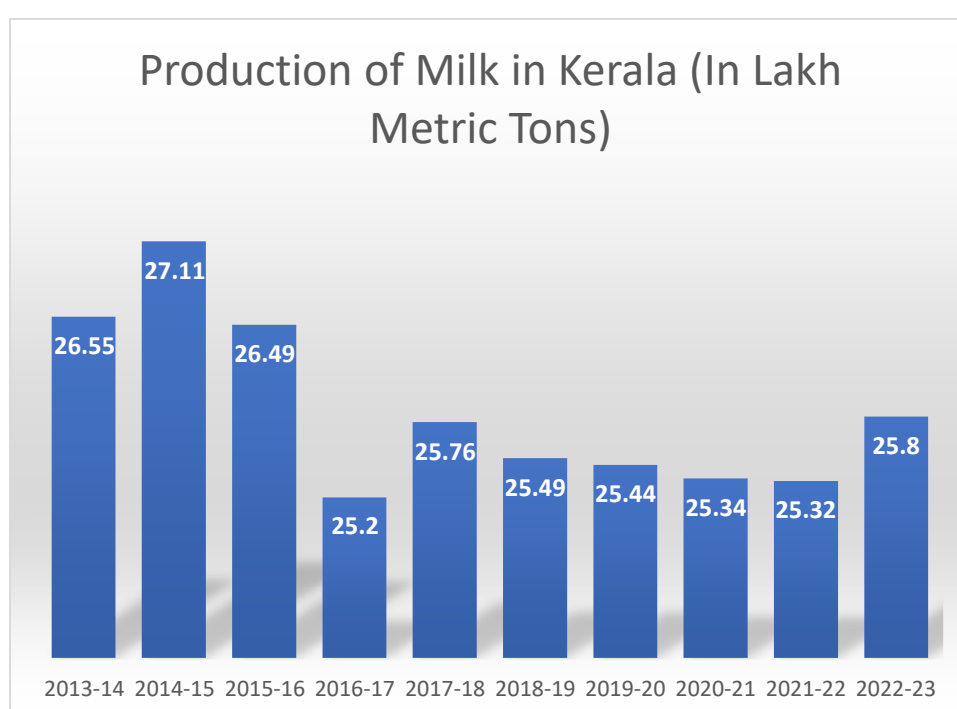
In Kerala, approximately 48% of the milk produced is consumed by the producers themselves, with the remaining 52% going to the market. Out of the marketed milk, only 40 per cent comes from the organised sector and the rest of 60 per cent from the unorganised sector (GoK,2020).

According to National Sample Survey Office (NSSO) the milk production in Kerala during 1975-1976 was at 3.5 lakh metric tonnes and now it has reached 25.8 lakh metric tonnes in 2022-23. While performing a close look at the trends in milk

production from 1975 to 2023, it is evident that there was an exponential progress in the production of milk. But, in the recent years, we experienced a reduction in the production of milk. Figure 3.16 shows the year-wise production of milk in Kerala for the past ten years. It reveals that milk production is decreasing from the year 2014-15 up to the year 2021-22. But the figure for the year 2022-23 exhibited a slow growth in the milk production.

Figure: 3.16

Year wise milk production of Kerala

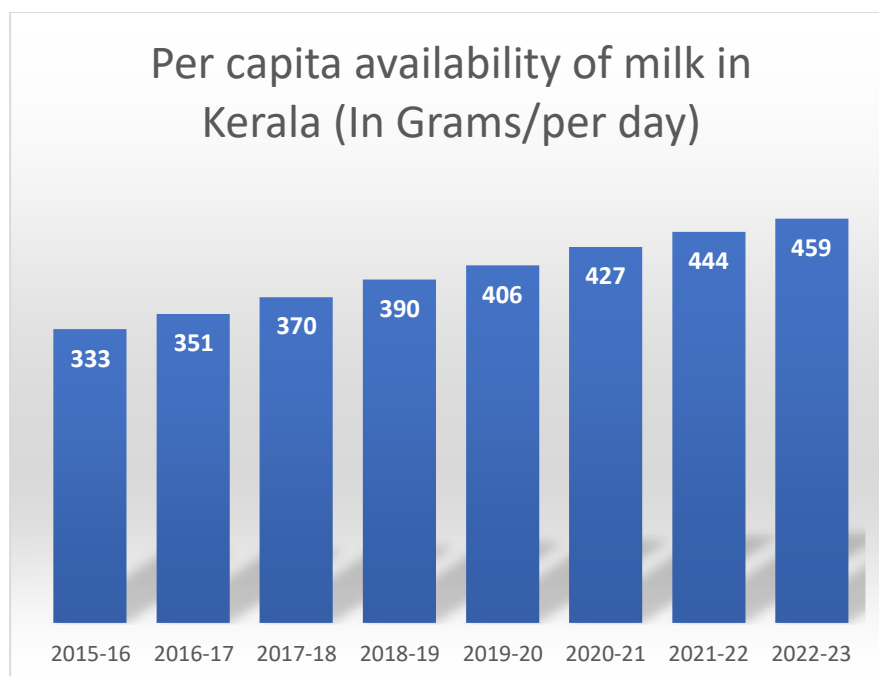


Source: Economic Review, 2023

Figure 3.17 shows the per capita availability of milk in Kerala over eight years. The amount of milk available per person increased from 333 grams per day in 2015–26 to 459 grams per day in 2022–2023 (www.nddb.coop).

Figure:3.17

Per capita availability of milk in Kerala



Source: Economic Review, 2023

Kerala was ranked 13th position in terms of milk production in 2017 and in 2022-23 the rank moved down to 14th position. But for the past few years, the growth is very slow and erratic. Unfortunately, Kerala's milk production costs are far higher than those of other states, which makes dairy farming an unprofitable endeavour. The cost of producing milk rises as a result of the binging of all the supplies needed for cattle rearing, including feed ingredients, from neighbouring states.

According to National Accounts Statistics (NAS) 2022 forecasts, livestock's share of the GVA of the entire agriculture and related sector (at constant prices) climbed from 29.33% in 2019–20 to 30.13 percent in 2020–21. In 2020–21, the cattle industry contributed 4.90 percent of the total GVA. One of the rural economy's fastest-growing sectors in Kerala is the cattle industry (NAS,2022), (dairydevelopment.kerala.gov.in).

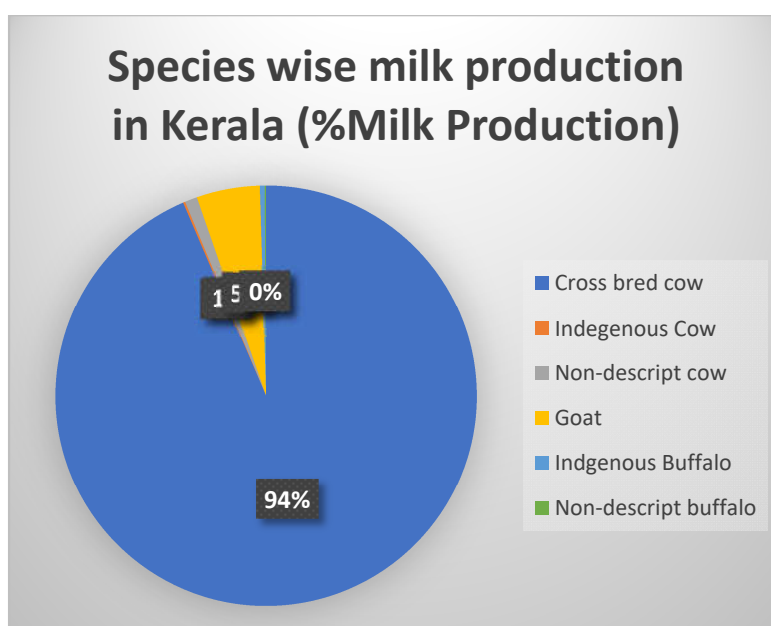
The contribution of livestock sector in total agriculture and allied sector GSVA (constant prices 2011-12), was 26.44 per cent (Quick estimates) (DES, 2021-22). In 2021–2022, the percentage was 2.35 percent of the State's total GSVA. At constant prices (2011–12), the livestock sector's GSVA climbed slightly from ₹11,701.86 crore in 2020–21 to ₹11,714.01 crore in 2021–22 (DES, 2021- 22), (dairydevelopment.kerala.gov.in).

3.3.2: Species-wise milk production in Kerala

Milk production in Kerala continued to be led predominantly by crossbred cows in the year 2021-22, which contributed more than 90 per cent of the total milk production of the state. Indigenous cows made a significantly smaller contribution and the contribution from non-descript cows and buffaloes remained minimal. Figure below explain the details of the total milk production of the State.

Figure.3.18

Species wise milk production in Kerala



Source: Economic Review, 2023

According to the above chart, the makeup of various milking animal breeds is: Cattle that are cross-bred (93.56%) Cattle that are native (0.16%) Unremarkable

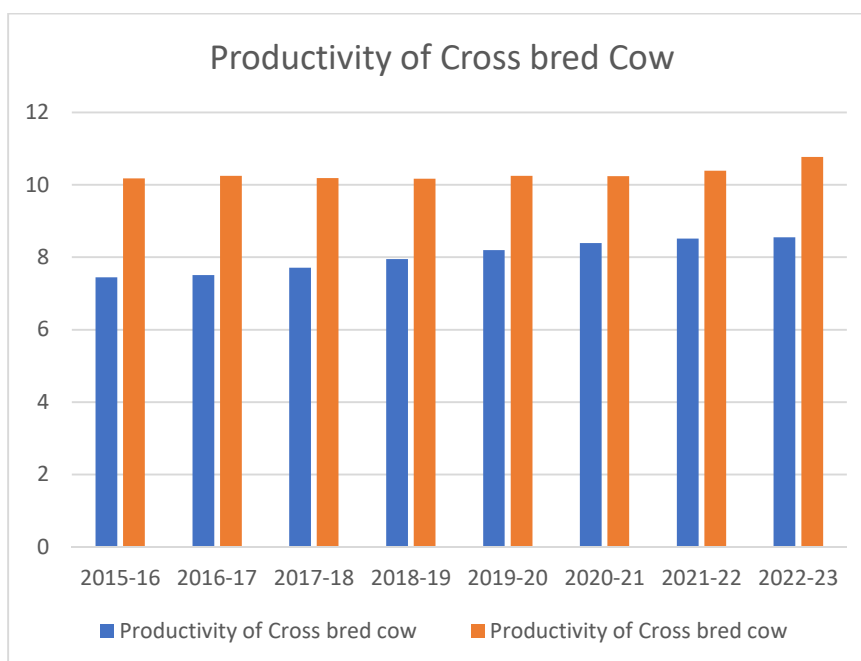
cattle (0.95%) Native Buffalo (0.36%) Unremarkable buffalo (0.12%) Goat (4.86%) (Economic Review,2022).

Kerala has higher cow productivity than the national average, despite having smaller herd sizes than the major milk-producing states (dairydevelopment.kerala.gov.in). In India, the average daily milk production for exotic and crossbred cattle in 2022–2023 is 11.42 kg and 8.41 kg, respectively (dairydevelopment.kerala.gov.in). It is 2.87 kg per day for non-descript cattle and 4.17 kg per day for indigenous cattle (indiastat.com). After Chandigarh (12.22 kg per day) and Punjab (13.49 kg per day), Kerala has the third-highest average daily production of crossbred cattle in India (10.77 kg) (dairydevelopment.kerala.gov.in). Compared to other states, Kerala benefited from a higher percentage of exotic and crossbred animals in its population (Economic Review,2022).

Figure 3.19 exhibits the year wise productivity of cross bred cows in Kerala in comparison with that of India.

Figure: 3.19

Productivity of cross bred cow in India and Kerala



Source: Economic Review, 2023

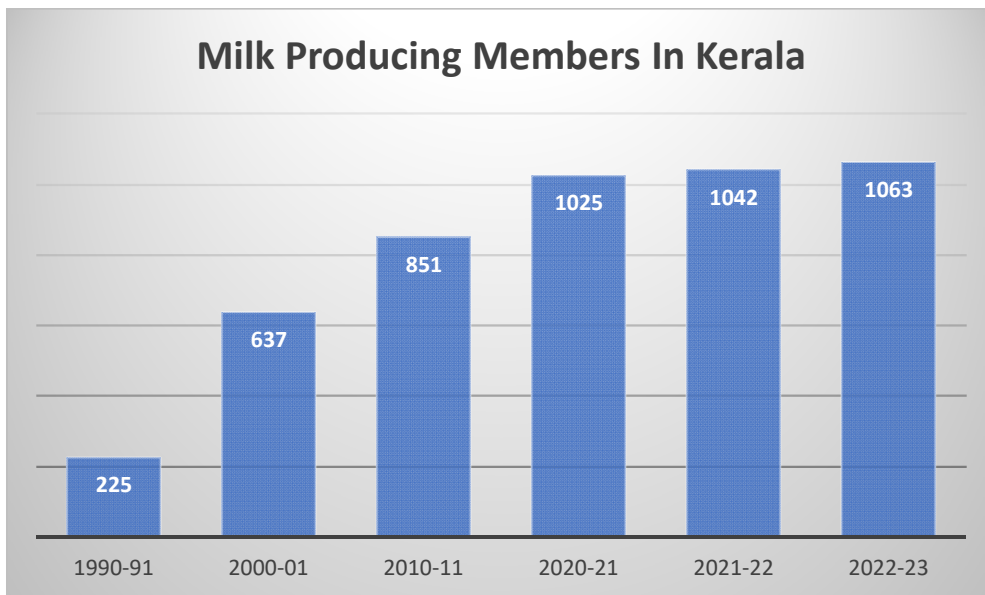
The co-operative dairying in Kerala received a push after the launch of Operation Flood project (Nair, 1990). As part of this project MILMA was formed at the state level, which helps the Kerala dairy farmers to market their milk in a hassle-free manner and by assuring a steady market to collect their excess milk. Since the Dairy Co-Operative Societies are not immune with many political pressures or any other special reservations, the farmers are much benefited with the implementation of this society. The milk producers receive less procurement price from the co-operative societies because the society acts as a middleman between C2C (Cow to Consumer) and C2B (Cow to Business). But the society members get many additional benefits in the form of subsidies and incentives through participation in Anand Pattern Co-Operative Society, which help the farmers in the long run to scale up their operations and income.

There are additional advantages for being in the dairy farming. Apart from producing the milk, the farmers get good quality manure for their agricultural activities. Therefore, the farmers engaging in the dairy farming is increasing. But the number of pouring farmers is on a declining trend. The main reason for the decline is the lesser procurement price received on per litre of milk when the farmer pours it at the society.

Kerala is one of the states in India which gives high milk procurement price for the farmers to cope up with the high cost of production, but it is not beneficial to the farmers. The number of farmers pouring at society is declining and in the year of 2022-23, but MILMA showed a slight increase in the milk procurement by 4599 lakh litres. At the same time, the sale of milk by MILMA in the period was 5934.9 lakh litres. The shortfall in this milk is usually met by purchasing the milk from other state milk federations mainly Karnataka and Tamil Nadu.

Even though there is an increase in the number of dairy cooperatives and producing dairy farmers yearly, annual milk production and the number of milks pouring member is reducing in Kerala (Figure 20 and 21). The reason is due to the inefficiency in milk production, this has to be studied properly by analysing various factors and constraints which affect the milk production in Kerala.

Figure:3.20
Milk producing members in Kerala



Source: NDDB Annual Report,2022-23

Figure: 3.21
Number of dairy cooperatives in Kerala



Source: NDDB annual report,2022-23

3.3.3: Marketing Practices in Kerala

In Kerala, dairy farmers depend on both organized and unorganized sector for the purpose of selling their produce. Vast majority of the farmers sell their produce in raw form. Negligible number of farmers sell value added produces either in the form of curd or Ghee. Common trend shown among the dairy farmers in Kerala is to depend dairy cooperatives and direct sale simultaneously to get the benefit of high price from direct sale and to get the benefit of various input services offered by the government through dairy cooperatives. However, there are certain number of farmers who solely depend on dairy cooperatives for selling their produce simply because of the loyalty towards the cooperative sector and the easiness and transparency in dealing they experience in selling through cooperatives.

3.3.4: Marketing Channels in Kerala

The state of Kerala has the presence of various marketing channel in the organized and unorganized sector. Anand Pattern Dairy cooperatives, Traditional Milk Vyvasaya Cooperatives, Private Dairies such as KS, PDDP etc., are the important marketing channel collecting milk from dairy farmers under organized sector. Neighboring consumers, Local vendors, Direct home sale, Shops and Hotels etc., are the important dairy marketing channels available to the dairy farmers to sell their milk produces in Kerala. Most of the dairy farmers in Kerala use dairy cooperatives either solely or conjointly with other channel for marketing their produce.

3.3.5: Milk Marketing in Kerala through Dairy Cooperatives

The dairy farmers in Kerala receives a high rate for their product. The state's Operation Flood program is carried out by the Kerala Co-operative Milk Marketing Federation (KCMMF), which is the highest authority among the three-tier dairy co-ops (spb.kerala.gov.in) According to data from the Dairy Development Department, the dairy co-operative societies in the State purchased 7392.206 lakh litres of milk each day in 2022–2023, of which 5073.94 lakh litres were given to the dairies and 2200.23 lakh litres were sold locally by the society. Out of the entire procurement,

just 117.97 lakh litres were used for various product preparations. In 2022–2023, APCOS acquired 1404.00 MT of milk per day on average, compared to 1565.84 MT the year before. In 2022–2023, the procurement/day/society was 442.60 lifters. In 2022–2023, the Kerala Co-operative Milk Marketing Federation (KCMMF) purchased 4232.39 lakh litres of milk and sold 5103.23 million litres of milk. Milk sales outpaced purchases in all districts but Ernakulam, Palakkad, Kozhikode, Kasaragod, and Wayanad have surplus purchase. The purchase of skim milk powder and the arrangement of milk, mostly from the State Milk Federations of Tamil Nadu and Karnataka, helped to bridge the gap between milk sales and procurement. MILMA produces and markets a variety of goods, including ghee, butter, curd, ice cream, paneer, yogurt, chocolates, flavoured milk, Gulab jamun, lassi, Palada mix, Peda, tetra pack items, dairy whitener, mango juice, bread, and packaged water (www.niyamasabha.org).

3.4: Constraints or Challenges faced by dairy farmers in Kerala

Annual milk production and the number of milks pouring member is reducing in Kerala even though there is an increase in the number of dairy cooperatives and producing dairy farmers yearly. There is tendency among the member farmers quitting this as their livelihood because of the various constraints faced by them. The constraints faced may grouped in the following manner.

a) Supply side Constraints- Insufficient and irregular availability of cow feed, Lack of emergency veterinary care and infrequent veterinary service visits, Non-availability of vaccine, Shortage of Semen at the AI center, Limited Training facilities, Non availability of Green fodder throughout the year, Low supply of high milk yield animals, Non availability of Cattle feed on credit, Very high mortality of milk animals, Low availability of any season immune animals etc., are the important constraints/challenges generally faced by the dairy farmers in Kerala.

b) Economic Constraints- Delayed Payment of milk price, Very low price of milk offered by the marketer, Very high Cost of fodder, cross bred cow, veterinary service, cattle feed, mineral mixture, premium for cattle insurance and labour cost, Low incentive or bonus for supplying milk, Low facility to avail loan to purchase

milch animals and Low availability of high milk yield animals are the important economic constraints faced by the farmers.

c) Demand Constraints- irregular Procurement of milk, less provision for advance payment, practice of return of milk once procured, Low intake of milk During flush season, Faulty system of weighing and measurement and non-transparent testing procedure are the influencing constraints faced by the dairy farmers in Kerala.

d) Marketing Constraints- Insufficient time to market or sell the product, Lack of Knowledge about marketing practice, Limited risk-taking behavior of farmers, Lack of ability to market value added product, Ill treatment from the side of marketer and Unethical practice of procurement adopted by the marketer are the considerable marketing constraints faced by the farmers.

e) Technical Constraints- Absence of technical advice, Lack of a bull with great generic merit, low rate of conception using AI centre, inadequate understanding of nutrition and medical care, Lack of understanding regarding affordable and scientific animal housing, Inadequate space of keeping cattle and Low milk yield in summer season are the important technical constraints generally visible in the dairy market of Kerala.

f) Social Constraints- Very low socio-economic condition of farmers, Lack of time for scientific dairying due to busy domestic/agricultural work, Low purchasing or bargaining power of farmers, Lack of cooperation from family members, Poor acceptability of Milk of cross bred cows among the public, Work-life imbalance due to heavy work load and Low level of literacy/knowledge among dairy farmers are seen the society as the social constraints of dairy farmers.

3.5: Channel Choice

Statistics published by the various government agencies revealed that the number of pouring dairy farmers are decreasing in the recent years in spite of the marginal increase in the number of dairy cooperatives and member farmers. Low profitability, affected by various constraints faced by the farmers, is the main reason for this situation in the dairying business of Kerala. Most of the farmers use a

blended method of selling their product-using both dairy cooperatives and direct sale to consumers- which has balanced their profit by fetching high price from sale directly to consumers and securing all other input services from dairy cooperatives.

Even though, price is the ultimate factor that influence the channel choice selection, there are various other factors which will affect this decision which are grouped in to demand, price and incentives, supply, finance, procurement and other services.

3.5.1: Factors affecting Channel Choice selection

All of us know that price is the important factor which influence the farmers while they are selecting the marketing channel through which they will market their produce. In addition to price, there are a number of determinants that influence the dairy farmer in channel selection. These factors are grouped into different categories for the convenience of the study.

a) Demand Factors- Regular demand for the product, Facility to sell the entire milk produce even during flush season, Market for the value-added product, Favourable milk collection time and Friendly attitude from the marketer are some of the important factors normally influence the dairy farmers in selection of marketing channel.

b) Price or Incentive factors- Uniform price for the product in all season, Fair or reasonable price for the product, Quality based price fixation, Regular and at timely payment for milk, Provision for Advance payment at needed time, No underpricing during flush season, Higher price during summer season, Regular payment of bonus, Production/supply-based bonus or incentive system and Chance to win award for best performance etc., will be the price or incentive factors generally influence the marketing channel selection of dairy farmers.

c) Supply Factors- Regular supply of cattle feed on credit, Supply of green fodder and fodder (including seeds) at reasonable price, Free/subsidized veterinary medical service on demand, Free/subsidized Artificial Insemination, Free/subsidized vaccination facility, Provision of schemes like calf protection scheme and

Arrangement of free/subsidized insurance for cattle are considered as the important factors that influence the channel choice.

d) Finance Factors- Financial assistance/support for cattle purchase, Facilitation of loans /credit schemes of other financiers on easy terms, Scholarships and awards to children/dependents from the agencies, Assistance to get financial help on cattle mortality, Provision of subsidies/ other benefits like government assistance, MNREGP etc., and Provision for dairy farmer pension scheme are taken in to account for the studying the influence on dairy farmers channel selection decision.

e) Procurement Factors- Minimum distance to the place of procurement, Correct weighing and measurement, Mechanized/digitalized mechanism for procurement and Collection of milk at door steps are the important procurement factors that have impact on the decision to dairy farmers relating to channel choice.

f) Other Services- Existence of good conflict management system, Provisions for group insurance for dairy farmers, Friendly treatment from the staff of agency, Getting Up-to-date information about the government schemes, Opportunity to have good liaison with other government departments, Hope to get more benefits in future and Opportunity to enjoy participation in management are also influence the dairy farmers in the selection of marketing channel.

3.6: Farm size

Dairying is considered as one of the most important secondary occupations for the Kerala farmers. The milk is being produced by animals reared by small, marginal and landless farmers in Kerala. There is rare chance of having big sized firm to get the economies of large scale. For the convenience of research, the dairy farms in Kerala are divided into three categories on the basis of number of cattle reared by the farmers. Farmers having five or less than five heads of cattle is treated as small farmers, farmers rearing more than five but less than ten are treated here as medium farmers and those have more than ten heads of cattle are treated as large farmers. The size of the farm definitely will affect the profitability of dairying

activity. Previous research studies revealed that size of the farm sufficiently be large to get the benefit of large-scale operation.

3.7: Profitability

Profitability as an essential factor in sustainability of dairy farms and it also positively influence the dairy farmers intention to remain the industry. The market price of milk, feed prices, labor costs, treatment costs, and average fixed costs per cow are the main factors affecting dairy farms' profitability. Feed prices have an equal impact on the profitability of the biggest and smallest dairy farms. If milk and feed prices are comparable across farms, scalability gives larger farms a competitive edge in profitability because they can spread their fixed expenses over a greater number of milk units. Small farms with less than ten cows can turn a profit thanks to unpaid family labor and minimal facility investments, even though production scale affects profitability since fixed expenses are spread across larger units of cows. Unpaid family work may help farms remain profitable as they grow in size, but when herds size surpasses ten cows, scale usually outweighs the benefits of family labor. Profit earned from the dairying is determined by subtracting various cost relating to rearing such as feeding cost, labour cost, veterinary and insurance cost, finance cost and other cost from various types of revenue earned. Different forms of revenue, various elements of cost and different terms of profit are explained below:

Revenue received- Most common form of revenue generated from dairying activities are from the sale of milk and milk products to the marketer, sale of cow dung and sale of calves.

Finance Cost- Finance cost include interest on loan taken for the purpose of purchasing milking animals, and construction and maintenance of cattle shed. Experience shows that vast majority of farmers have milking animals that are born in their home and have cattle shed that are made years back.

Fodder Cost- Fodder cost include const of greed fodder dry fodder such as straw and concentrates. Majority of the farmers used their own labour for the purpose of getting green fodder. Cost of concentrate is the major element of the cost of rearing.

Labour Cost- Majority of the dairy farmers use their own labour for rearing their cattle. Only large sized firms used hired labour or permanent labour. The major portion of the labour cost will be the cost own labour.

Medical and Insurance Cost- This element cost include cost of medical treatment, cost of minerals and vitamins, cost of artificial insemination, cost of vaccination and cattle insurance premium.

Other Costs- This includes cost of various amenities such as water, electricity etc., and other miscellaneous expenses such as transportation cost and others.

Accounting Profit- It is the profit earned by the farmer after deducting all expenses including revenue cost, finance cost, depreciation of cattle shed from the total revenue generated from the dairying.

Economic Profit- It is the profit earned by the dairy farmer after deducting all expenses incurred and own labour cost from the total revenue received.

3.8: Future Prospects

The future prospects of dairy farming in Kerala are promising, with the state having higher cattle productivity than the national average. Growth of population and growth in the disposable income in the hands of the people create a conducive environment for the development of dairying activities in Kerala. However, to remain competitive, the dairy industry in Kerala will need to adopt modern technologies and improve its marketing and supply chain.

There are various factors which influences the future prospects of dairying, the presence of which will positively influence the dairy business and induce the dairy farmers to remain in the activity. These factors are explained in the following paragraphs.

Use of sexed semen technology, strengthening indigenous breed, improving artificial insemination, Provision of proper treatment for infertility, Cross breeding and Selective breeding, Mobile Artificial Insemination dispensary and Genetic improvement are some of the factors that influence the future of dairying in Kerala.

Other types of factors required for the future prospects are-Production of quality seeds for fodder varieties, install more plants to make bypass protein and bypass fat feed, mineral combination, complete mixed diet, and cow feed. encouraging post-harvest practices including the use of chaff cutters for silage production and fodder processing, fodder block technology, Adoption of Ration Balancing Programme, Centralized fodder cultivation by using Kudumbasree and selling the same through dairy cooperatives, Subsidized cattle feed and more incentives for fodder cultivation, Allotting vacant agricultural land for fodder farming, Mobile app for feed cultivation and balanced feeding.

The factors relating health treatment of the cattle such as Training farmers to help them to understand cows for signs of illness, Facilities for routine vaccination/immunization and diagnostic laboratory, Affordable veterinary services in time, Adoption of Information Network for Animal Productivity and Health(INAPH), Awareness camps to help farmers early detection of diseases, Encourage farmers for regular deworming, Encourage farmers to use kits available for early detection and prevention of sub-clinical mastitis and Promoting the practice of using Ethnoveterinary Medicines are also relevant.

Hands on training with continuous follow up of performance, Production cost reduction through increased productivity, improve animal healthcare and breeding facilities, Scaling up through increase farm size, Reduce stress level: cows are untethered and have individual pens with rubber mat, Music play in the milking parlor, Regular technical guidance about scientific feeding, breeding, healthcare and management practices through TV, Social media etc., and Improve scope of production by including more productive buffalo will help the farmers for the sustainable development of the business.

Development of proper production, process and marketing infrastructure to meet quality requirements, Developing specific dairy export zone, Provide chilling and storage facilities at village levels, Setting up food parks for providing infrastructure to small dairy product units and Promote milk processing cluster are

the important support facilities to be provided for the infrastructure development that is essential for the future of the dairying.

Focus on value added products, Advertising by giving emphasis on nutritional value on consuming dairy products, Ensure reasonable price to farmers, Setting up of more dairy co-operatives, Marketing of A2 milk- milk from indigenous cattle, Ensure price competency across product categories, Implementing internationally compatible and future oriented policies, Creating exportable surplus across product categories and Effective international campaign putting emphasis on the goodness of indigenous products are the various market related support service provided to the farmers to motivate them to remain in the industry.

Various other services are Package proposals for farmers by banks and other financial institutions, Comprehensive Insurance coverage for all risk at affordable rate, Attract young people to run dairy farm by changing their attitude, Promote more investment in dairy farming through offering incentives and subsidies, Promote more research in the dairy sector, Encourage more start-up in dairy sector, Improve the availability and access to credit facilities for small dairy farmers, Treat dairy farm loan as agricultural loan for getting additional subsidy to the farmers, Offer additional tax benefits for small dairy products units and Organizing animal welfare camp, awareness camp etc.,

3.9: Sample Size Determination

a) Cochran's Formula for Sample Size determination

Using the Cochran formula, you may determine the optimal sample size based on the expected proportion of the attribute in the population, the desired level of precision, and the desired level of confidence. Cochran's method is seen to be particularly suitable in circumstances involving sizable populations.

The Cochran formula is:

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where:

- e is the intended precision level (also known as the error margin),
- p is the (estimated) percentage of the population that possesses the relevant trait.
- q is 1 – p.

b) Krejcie and Morgan Sample size

Krejcie and Morgan sampling size is a commonly used approach in estimating the appropriate sample size for research studies. It is used when researchers do not have access to the entire statistical population of interest and need to make decisions based on a representative sample. The Krejcie and Morgan method helps in determining the sample size needed to make accurate inferences about the population

The formula used for these calculations was:

$$n = \frac{X^2 * N * P * (1-P)}{(ME^2 * (N-1)) + (X^2 * P * (1-P))}$$

Where:

- n = sample size
- X² = Chi – square for the specified confidence level at 1 degree of freedom
- N = Population Size
- P = population proportion (.50 in this table)
- ME = desired Margin of Error (expressed as a proportion)

3.10: Test of Reliability: Cronbach's Alpha

Alpha was developed by Lee Cronbach in 1951 to provide a measure of the internal consistency or reliability of a test or scale; it is expressed as a number between 0 and 1. The sample size formulas can be used to determine the sample size

needed to test coefficient alpha with desired power or to estimate coefficient alpha with desired precision. The sample size formulas closely approximate the sample size requirements for an exact confidence interval or an exact test. If the alpha value lies in between 0.60 to 0.80 we can say that data is reliable as shown in the following table (Bonett, D. G. (2002)).

Cronbach's Alpha Value	Reliability Level
0.0 - 0.20	Less Reliable
>0.20 – 0.40	Somewhat Reliable
>0.40 – 0.60	Reliable enough
>0.60 – 0.80	Reliable
>0.80 – 1.00	Very Reliable

3.11: Test of Normality

An assessment of the normality of data is a prerequisite for many statistical tests because normal data is an underlying assumption in parametric testing. There are two main methods of assessing normality: Graphical and numerical. There are various methods available to test the normality of the continuous data, out of them, most popular methods are Shapiro–Wilk test and Kolmogorov–Smirnov test. (Alnomasy, Nawal, 2023)

a) Kolmogorov-Smirnov test is used to test whether a sample comes from a specific distribution. We can use this procedure to determine whether a sample comes from a population that is normally distributed. (www.real-statistics.com)

The Kolmogorov-Smirnov test is defined by:

H_0 : The data follow a specified distribution

H_a : The data do not follow the specified distribution

Test Statistic: The Kolmogorov-Smirnov test statistic is defined as

$$D = \max_{1 \leq i \leq N} (F(Y_i) - i/N, i/N - F(Y_i))$$

where F is the theoretical cumulative distribution of the distribution being tested which must be a continuous distribution. (www.real-statistics.com)

b) **Shapiro-Wilk test** is a statistical procedure used for assessing whether a dataset is normally distributed. In technical terms, it tests the null hypothesis that a sample comes from a normally distributed population. The test calculates a statistic, W , which quantifies how a given set of data conforms to a normal distribution. Technically, the Shapiro-Wilk test involves comparing the observed data with a corresponding set of normally distributed values. The W statistic is derived from the correlation between the data and the corresponding normal scores. A value of W close to 1 suggests that the data follow a normal distribution. (<https://medium.com>)

CHAPTER IV

PROFILE OF DAIRY FARMERS: A DESCRIPTION

4.1: Introduction

The dairy farming in the developing countries like India is mainly from the rural area, it is being considered as a substitute avenue for income generation for the landless and small farmers. It is highly essential to get the picture of socio-economic and demographic profile of dairy farmers to understand the basic characteristics of the farmers in the sample districts. The socio-economic and demographic measure is the combination of sociological, demographic and economic factors. This will indicate an individual's demographic, economic and social position in the economy based on income, education and occupation (Thankachan & Joseph, 2019).

The data which communicates the socio- economic and demographic profile of the farmers are taken from the primary data, which consist of 384 dairy farmers in Kerala from the districts of Thiruvananthapuram, Ernakulam and Palakkad.

4.2: Farmer Classification by Farm Size

In Kerala, dairying is considered to be a subsidiary occupation for small and marginal farmers and agricultural laborers. That is why, most of the dairy farm in Kerala is small sized having one two herd of cattle.

Table 4.1
Farm size wise farmer classification

Size	Number of Farmers	Per cent
Small	293	76.3
Medium	72	18.8
Large	19	4.9
Total	384	100

Source: Primary Data

Table 4.1 shows that the majority of farmers (76.3%) own small farms, reflecting that smaller-scale farming is the most common type. 18.8% of the total are medium-sized farm owners. This middle segment is smaller than the small farmers, but it still constitutes nearly one-fifth of all farmers. Only 4.9% of the farmers own large farms, showing that large-scale farming is relatively rare in this population.

4.3: Gender of the Dairy Farmers

Gender is an omnipresent demographic descriptor and most significant in assessing the social and economic empowerment of workforce. Like other agricultural production process, sole women farmer involvement is very difficult in dairying. And the dairy farming involves many tedious works. That is the reason for a large number of male farmers involved in this sector.

Table 4.2

Gender-wise classification by farm size

Farm size/ Gender	Male		Female		Total	
	Number	Per cent	Number	Per cent	Number	Per cent
Small	191	49.7	102	26.6	293	76.3
Medium	53	13.8	19	4.9	72	18.8
Large	18	4.7	1	0.3	19	4.9
Total	262	68.2	122	31.8	384	100

Source: Primary Data

Table 4.2 shows that the majority of farmers in small farm category are male, with 191 males (49.7%) compared to 102 females (26.6%). This means that nearly half of the small farm owners are men, while just over a quarter are women. Together, they represent 76.3% of the total farmers in the data set. Similarly, most medium farm owners are male, with 53 men (13.8%) and only 19 women (4.9%). Medium farms make up 18.8% of the total. Large farms have the least representation overall, with 18 males (4.7%) and just 1 female (0.3%). This indicates that large farms are male-dominated and account for only 4.9% of all farmers. In total, 262 farmers (68.2%) are male, and 122 (31.8%) are female. This demonstrates a

significant gender gap in farming, with males more likely to own farms, particularly medium and large ones.

Dairy farming is a farm activity which involves a full day's dedicated work throughout the year despite of all constraints. This will be the reason for male dominance in the sector. There is a need to give more importance to women farmers in this sector and more schemes are to be implemented to ensure the active involvement of women in this sector. But women farmers alone find it hard to take up this job as it requires a lot of hard labour.

By giving proper awareness and required assistance, more women dairy entrepreneurs may come to dairying and by which they can support their family with the additional income earned from dairy farming. It has also noticed that there are dairy farms which are owned by a group of women dairy farmers with the financial assistance of Kudumbashree mission, and this has to be expanded all over the state.

Government has introduced a number of schemes concentrating on women empowerment. Dairy farming is a good avenue for women as they do not have to go to outside their home for work since the farm units can be set up near to their house and can generate an additional income for supporting their family. Thus, women have to explore these opportunities so that they can have a better livelihood.

However, the number of dairy farmers registered in the dairy cooperatives are concerned we can see that the number of females may outnumber the male. The intention behind this is to avail the benefit of special programme initiated by the state government through Dairy Development Department specially for the women. But the involvement of women farmers in the farming activities are found to be less and it is also observed that women mostly help the male farmers in maintaining the milch animals.

4.4: Age of the Dairy Farmers

Age is both an observable and a universal demographic variable and is another important criterion which influences a person to be part of dairy farming activities. Since, the work that will be performed in this sector is relatively heavy

and monotonous; the farmers are unable to perform their job during their old ages. In other sense, aging can be an important constraint that will determine the economic sustainability of dairy farmer in the long run.

Youngsters are reluctant to accept dairying as their profession. Therefore, most of the dairy farmers in Kerala are middle aged or aged. Most of the young people in Kerala prefer white collar jobs and none of them are ready to prefer dairying as their profession. They are reluctant to pursue this career because they feel that dairy farming is an inferior profession. The young generation is not attracted to this sector. They are concentrating more on white collar jobs. Even though unemployment is prevailing in Kerala at a higher rate, the younger population does not prefer this sector. Therefore, who will take up this sector in future is a big question mark. In order to continue this activity, it is essential to educate the younger generation about the possibilities and instill a pride for farming.

Table 4.3
Age in years by farm size

Age/Farm size	Small		Medium		Large		Total	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
18-25	5	1.3	0	0	0	0	5	1.3
26-40	19	4.9	6	1.5	5	1.3	30	7.8
41-55	125	32.6	41	10.7	9	2.3	175	45.6
>55	144	37.5	25	6.5	5	1.3	174	45.3
Total	293	76.3	72	18.7	19	4.9	384	100

Source: Primary data

Table 4.3 shows that very few farmers are in younger farmer (age 18-25) group, with only 5 (1.3%) being small farmers. This suggests that younger generations may not be as involved in farming or are just entering the field. A small portion of farmers are in middle-aged farmer (age 26-40) group, with 30 (7.8%) in total, distributed across small, medium, and large farms. This suggests that some middle-aged individuals are involved, but they are not the majority. The largest group of farmers is between the ages of 41 and 55, with 45.6% of the total. This age group dominates across all farm sizes, particularly small farms. Another large group

is made up of those older than 55, who account for 45.3% of the total. Many of these farmers are likely approaching retirement age, which could affect the future of farming in this population.

The majority of farmers are middle-aged or older, with the 41-55 and over 55 age groups together making up over 90% of the farming population. Very few young farmers are represented, which might suggest challenges in attracting younger generations to farming.

4.5: Marital Status

Marriage can be a significant factor that motivates the workers to choose and continue with a specific employment. Normally people prefer to do those jobs which are secure and provide better earnings that enable them to meet the expenses of maintaining a family.

Since, more than 90 percent of the farmers belongs to the age groups of 40 years and above, it will quite natural that majority of them will be married.

Table 4.4

Marital status

Marital Status	Number of Farmers	Per cent
Married	336	87.5
Unmarried	24	6.3
widow(er)	24	6.2
Total	384	100

Source: Primary data

Table 4.4 shows that 87.5 percent of the farmers are married. The number of unmarried and widowed farmers are equal in number (24).

4.6: Educational Qualification of the Dairy Farmers

Educated people in Kerala are not ready to engage in agricultural activities including dairying. That is why most of the dairy farmers have matriculation or

below matriculation as their qualification. The reason behind is that, most of the dairy farmers are aged and middle aged and it is difficult for them to get access to higher education at that time. The achievement of education is very important for upgrading higher sustainability in the socio- economic well-being of the people

Table 4.5
Educational qualification

Educational Qualification	Number of farmers	Per Cent
SSLC and below	289	75.3
Plus Two	44	11.5
Graduation	30	7.8
PG	9	2.3
ITI/Diploma	6	1.6
B. Tech	3	0.8
Others	3	0.8
Total	384	100

Source: Original information

Table 4.5 indicates that 75.3% of farmers possess educational qualifications up to the point of matriculation. Only 11.5 per cent of the respondents have plus two, 7.8 per cent of the farmers are graduated and only 2.3 per cent are post graduated. And 2.4 per cent have B. Tech or Diploma as their educational qualification.

Most of the dairy farmers are from a low-income group is the reason for the lack of education as it is difficult to get access to formal education due to financial constraints.

4.7: Highest Educational Qualification of Family Members

Even though most of the dairy farmers have only formal education, there is a tendency among the common people of Kerala to give access to higher education for their children, and therefore, most of the dairy farmers' members of the family have higher educational qualification

Table 4.6

Highest educational qualification of family members of dairy farmers

Qualification	Number of farmers	Per cent
SSLC	50	13.0
Plus Two	54	14.1
Degree	165	43.0
PG	68	17.7
Technical	47	12.2
Total	384	100

Original information

According to Table 4.6, 43% of family members have degree as their qualification and 17.7 per cent have PG, 14.1 per cent qualified plus two and 12.2 per cent have technical qualification. Only 13 percent have matriculation and up to matriculation. This indicate that the low educated dairy farmers are ready to give better educational opportunity to their younger generation.

4.8: Occupational Status of the Farmers

The occupational status of the dairy farmers is classified into main occupation and subsidiary occupation.

4.8.1: Main Occupation

In Kerala, we can see that majority of person engaged in the dairying opt this as their subsidiary occupation. Most of the people in Kerala rear cattle as a passion and not as main sources of income earning activity.

Table 4.7

Main occupation of the dairy farmers

Occupation	Number of farmers	Per Cent
Agriculture	200	52.1
Dairying	123	32
Private Job	10	2.6
Govt Job/Retired	10	2.6
Self-Employed	28	7.3
Coolie	13	3.4
Total	384	100

Source: Primary data

Table 4.7 reveals that 52.1 percent of the farmers' main occupation is agriculture. Only 32.0 percent of the respondents engaged in dairying as their main activity. 2.6 per cent of the respondents have private job and another 2.6 per cent have government job and 7.3 per cent are self-employed and 3.4 per cent are coolies. This table also reveals that majority of those who engaged in agriculture prefer to do dairying as their subsidiary activity. The major reason behind this will be the availability of fodder etc at free of cost.

4.8.2: Subsidiary Occupation

Majority of the rural people in Kerala engage in dairying as their subsidiary occupation. Non availability of land and other resources hinder majority of the people in Kerala to opt dairying as their main occupation and therefore they engage in dairying along with other job.

Table 4.8

Subsidiary occupation of dairy farmers

Occupation	Number of Farmers	Per cent
Agriculture	104	27.1
Dairying	270	70.3
Self employed	4	1.0
Coolie	6	1.6
Total	384	100

Source: Primary Data

Table 4.8 explains that 270 respondents out of 384 prefer dairying as their subsidiary occupation. This reveals that 70.3 percent of the people in Kerala prefer dairying as their subsidiary occupation along with other main occupation. Out of the total respondents engaged in dairying as the main occupation, 27.1 per cent engaged in agriculture as their subsidiary occupation.

4.9: Number of Members in the Family

Number of members in the family have greater influence in the effective running of dairy business. Without the help of all family members no farmers can do the dairying activity smoothly. Even though in Kerala most of the families have four or less than four members.

Table 4.9
Number of members in the family

Number of family members	Number of Farmers	Per Cent
1-4	248	64.6
5-6	115	29.9
above 6	21	5.5
Total	384	100

Original information

As per Table 4.9, 64.6 percent of the families have four or less than four members in the family. Only 30 percent of the family have 5 or 6 members in the family and 5.5 percent of the families have more than 6 members. This reveals that majority of the families engaged in the dairying activities in the state of Kerala follow nuclear family system.

4.10: Monthly Household Income

In Kerala we can see that most of the dairy farmers are from marginalised family. Most of the people engaged in the dairying are small and marginal farmers, agricultural labourers and daily wagers. Therefore, monthly household income of the dairy farmers in Kerala will in the low group. And majority of farmers engaged in

dairying as their subsidiary occupation and therefore, household income also include income from other sources.

Table 4.10

Monthly household income in rupees

Monthly Income	Number of Farmers	Per Cent
Below 25000	229	59.6
25000 - 50000	99	25.8
50000 - 75000	34	8.9
75000 -100000	13	3.4
Above 100000	9	2.4
Total	384	100

Original information

According to Table 4.10, 59.6% of the respondents make less than \$25,000 per month. 25.8 per cent of the respondent household's income lies in between 25,000 to 50,000 and 8.9 per cent of the respondents have income is between 50,000 to 75,000 and 3.4 per cent have income between 75,000 to 1,00,000 and only 2.5 per cent have income above 1,00,000. This explains that majority of the dairy farmers are in the low-income category. This shows that the income earned from the dairying activity is very low. We can also say that only low-income group people are engaged in dairy farming.

4.11: Daily Return from Milk Production:

As most of the dairy farmers in Kerala are small and marginal and they treated dairying as their subsidiary occupation, the income generated from this occupation definitely be small. This can be seen from the following table.

Table 4.11

Daily return from milk sale.

Range of Daily Return	Number of Farmers	Per cent
Less than 500	49	12.8
500-1000	102	26.6
1000-2000	130	33.8
2000-3000	56	14.6
3000-4000	23	5.9
4000-5000	13	3.4
Above 5000	11	2.9
Total	384	100

Source: Primary data

Table 4.11 shows that 49 farmers (12.8%) earn less than 500 rupees daily from milk production. This suggests that a significant portion of farmers may struggle with low profitability. The largest group (33.8%) earns between 1000 and 2000 rupees daily, followed by 26.6% earning 500-1000 rupees. These moderate returns indicate that the majority of farmers fall within this earnings bracket. Only 2.9% earn more than 5000 rupees per day, indicating that few farmers enjoy high returns from dairy farming. The earnings distribution shows that most farmers earn between 500 and 2000 rupees daily, with only a small percentage earning substantial returns.

4.12: Details of Milk Animals

Kerala's cattle are mostly divided into two categories: native and crossbred. Eighty-two percent of the cattle available in Kerala are crossbreds, which have exotic heritage from Jersey, Brown Swiss, Holstein Friesian, or a mix of these breeds. The Holstein Friesian breed is renowned for producing large amounts of milk, whereas the Jersey breed is noted for its high milk fat percentage. In Kerala, indigenous cattle make up 18% of all cattle. In general, native tropical varieties are renowned for their high yield even in subpar feeding conditions, their ability to withstand changes in the atmosphere, their resilience to a variety of parasites and diseases, and their ability to tolerate noise. Among the significant native cattle

breeds are Amritamahar, Deoni, Gir, Vechur, Red Sindhi, Rathi, and others. Ninety-five percent of the 25.20 lakh MT of milk produced in the state is produced by cross-bred cows. The milk production of indigenous cows is only 1640 MT, or 0.07 percent. 1.26 lakh MT (5 percent) of goat milk are produced. Non-discrete buffalo, indigenous buffalo, and non-discrete cattle provide the remaining portion.

4.12.1: Number of Dry Cows and Buffaloes under Different breeds

As per the opinion of the dairy farmers, the major problem they are facing is the long period of reproduction. This resulted in the keeping the dry cattle for a long period irrespective of the breed. This definitely affected the earning from this activity.

Table 4.12

Number of dry cows under different breed

	Number of dry Cattle	Per Cent
Number of Brown Swiss Cows in dry	14	4.2
Number of Holstein Friesian Cows in dry	93	28
Number of Jersey Cows in dry	190	57.2
Number of Sindi Cows in dry	4	1.2
Number of other cows in dry	26	7.8
Number of Murrah Buffalo in dry	5	1.6
Total	332	100

Source: Primary data

Table 4.12 exhibits the number of dry cows and buffaloes in the hands of sample farmers during the study period under various breeds. Jersey breed cows are large in number (190) followed by Holstein Friesian (93) other cows (26) Brown Swiss (14). As far as buffaloes are concerned only a limited number of farmers are maintaining dry buffaloes in the sample area.

4.12.2: Number of Milking Cows and Buffaloes under Various Breeds

A wide variety of breeds of cattle can be seen in the state of Kerala. Most of the farmers desired to rear cross bred cattle as their yield is comparatively higher

than that of local breed. The major breed commonly seen are Jersey, Brown Swiss, Holstein Friesian, Sindhi etc.

Table 4.13
Number of milking cows under different breed

	Number of milking cattle	Per Cent
Number of Murrah Buffalo in milk	5	0.8
Number of other cows in milk	60	10.4
Number of Sindi Cows in milk	9	1.6
Number of Jersey Cows in milk	291	50.4
Number of Holstein Friesian Cows in milk	180	31.2
Number of Brown Swiss Cows in milk	32	5.6
Total	577	100

Source: Primary data

Table 4.13 exhibits the total number of milking cows and buffaloes maintained by the sample farmers under various breeds in the study period. Jersey cows are large in number (291) followed by Holstein Friesian (180) other cows (60) Brown Swiss (32) and Sindhi (9). Number of buffaloes are very small in number (5). More than half of the milking cows reared the dairy farmers in the study area is Jersey followed by the Holstein Friesian. The preference of the farmers towards the breed Jersey definitely be the high fat content of the milk which is the normal criteria used for pricing the milk by the dairy cooperatives. Holstein Friesian is preferred due the high yield that get from that breed. The least preferred breed of cattle is Sindhi (1.6%). Only 0.8 per cent of the respondent farmers are rearing buffalo for milk production which is conformed to the general state of composition of different types milking animals in the state of Kerala.

4.12.3: Period of Lactation

For cows to produce milk, they must calve, and the time between calvings is known as the lactation cycle. The lactation period of a dairy cow is typically 305 days, which includes a 60-day dry period and a yearly calving interval. However, the

length of a cow's lactation period can vary depending on management practices. For example, continuing to harvest milk can lead to longer lactations. Some other factors that can affect a cow's lactation period are -Body condition, Feeding, Persistency and Calf death. However, anything from 150 to 240 days is to be found as a typical lactation length.

For the study the lactation period is taken as the number of months during which the farmers can get yield from the milking cattle. The lactation period may also vary with the breed and the herd management adopted the farmers.

Table 4.14: Lactation period in months

	Average Lactation period in months	Std. Deviation
Lactation period of Brown Swiss Cow	9.84	2.081
Lactation period of Holstein Friesian cow	11.85	2.799
Lactation period of Jersey cow	10.97	2.186
Lactation period of Sindi cow	8.69	2.394
Lactation period of other cows	10.31	2.942
Lactation period of Murrah buffalo	8	1

Source: Primary data

Table 4.14 explains the lactation period of various breeds of cows and buffaloes. From the table we can say that Holstein Friesian cows have the longest lactation period (with mean 11.85) which is followed by Jersey (mean 10.67) and other cows (mean 10.31). Murrah Buffalo, the only breed seen in the sample area, have the shortest lactation period (Mean 8.00). At the same time highest variation in lactation period is shown in the case of other cows (2.942) followed by Holstein Friesian (2.799). The information about the lactation period of the cattle of the sample area is the same that of the general trend in Kerala about the lactation period of various breed of cattle.

4.12.4: Dry Period of Milking Animals

To maximize milk production in the next lactation, the dairy cow's mammary gland needs a nonlactating phase before an impending parturition. The time between stopping the milk removal process and the subsequent calving is referred to as the "dry period." A cow's dry period is a time when she rests and recovers her udder and body and to regenerate her mammary tissue after lactation. This period allows the cows to recover from damage that occurs during lactation. It is a time to cure long-term infections and to prevent new udder infections and prepares the cow for the next lactation.

The dry period is a crucial phase in a dairy cow's lactation cycle. Cows typically go through a dry period after about nine months of lactation. Prolonged dry periods can lead to obesity and difficulty calving.

Practically, the dry period depends on the length of reproduction. Length of reproduction may depend on the effectiveness of artificial insemination and the adoption of scientific method of herd management. Longer the dry period higher the impact on profitability of the dairying.

Table 4.15

Dry period of milking animals in months

	Average dry period	Std. Deviation
Dry period of Brown Swiss Cow	3.06	1.093
Dry period of Holstein Friesian Cow	2.46	0.713
Dry period of Jersey Cow	2.55	0.825
Dry period of Sindi Cow	3.29	1.204
Dry period of other Cows	3.19	1.309
Dry period of Murrah Buffalo	3	1

Source: Primary data

Table 4.15 shows the dry period of various breeds of cows and buffaloes in the sample area. It shows Holstein Friesian breed has the shortest (Mean 2.46) dry period, followed by Jersey (Mean 2.55) and Murrah buffalo (3.00). Sindhi cows have the longest (Mean 3.29) dry period. Lowest variation of dry period is exhibited in

the case of Holstein Friesian (0.713) and Jersey Cows (0.825). This table reveals that Holstein Friesian and Jersey Cows has the lowest dry period. This may be the reason for having large number of these breeds in the hands of sample farmers. This also reveals that the average dry of the different breed of cattle reared by the dairy farmers in Kerala is more than that of the standard dry period of the cows.

CHAPTER V

PROFITABILITY OF DAIRY FARMING: AN ANALYSIS

5.1: Introduction

The main goal of every dairy farmer is to attain profit. Milk is the only farm product among the other agricultural product where one can get around 70 percent of the market price. Dairying is the only farming activity which provides a guaranteed daily or a weekly income to the farmers. It is also a product that can be marketed directly to the consumers without any middlemen. Therefore, it is necessary to examine the profitability aspect of the production.

This chapter provides information about the daily milk production with price received from different channels of distributions, other income from dairying including income from the sale of value-added products, various costs incurred for dairying and the profit earned by the dairy farmers of different farm size from different channels.

5.2: Daily Milk Production:

In Kerala most of the farmers are rearing two or three heads of cattle as they are considering dairy farming as their subsidiary occupation. And the productivity of cattle is very low compared to the global standard. The table below explain the detail about the production of milk by the dairy farmers.

Table 5.1
Quantity of milk produced per day.

Quantity	Number of Farmers	Per cent
10 or less than 10	60	15.6
11 to 20	91	23.8
21 to 30	93	24.2
31 to 40	46	11.9
41 to 50	33	8.6
51 to 60	19	4.9
61 to 70	12	3.1
71 to 80	10	2.6
81 to 90	4	1.1
91 to 100	6	1.6
More than 100	10	2.6
Total	384	100

Source: Primary data

Table 5.1 shows that 60 farmers (15.6%) produce 10 litres or less per day. These farmers may be small-scale producers, likely selling locally or for personal use. The most common production ranges are 11-20 litres (23.8%) and 21-30 litres (24.2%), indicating that nearly half the farmers produce within this moderate range. A smaller percentage produces higher amounts, with 11.9% producing 31-40 litres and 8.6% producing 41-50 litres daily. Only 2.6% of farmers produce more than 100 litres daily. These are likely large-scale dairy farmers. The data shows that most farmers produce between 11 and 30 litres of milk per day, reflecting a mid-level production capacity, with fewer farmers operating on either extreme of very low or very high milk production.

5.3: Average Milk Yield of Milking Animals of Different Breed per day

The average milk production per cow per day in India varies depending on the breed of cow. In the case of indigenous or non-descript cows the average milk yield was 3.44 kilograms per day. But in the case of Holstein, it is 25 litres of milk per day and in the case of Red Sindhi it is 12 litres of milk per day and that of Jersey it is 20 litres of milk per day. Brown Swiss cow produces about 19–25 kg of milk per day. However, yield may also vary with the method of herd management adopted by the farmers.

Table 5.2

Average milk yield per day of different breed of cattle

	Average milk yield in litter	Std. Deviation
Average milk yield per day in lactation of Brown Swiss Cow	16.47	8.986
Average milk yield per day in lactation of Holstein Friesian Cow	21.81	16.01
Average milk yield per day in lactation of Jersey Cow	23.5	23.928
Average milk yield per day in lactation of Sindi Cow	10.09	5.77
Average milk yield per day in lactation of other cows	16.22	11.423
Average milk yield per day in lactation of Murrah Buffalo	7.6	2.059

Source: Primary data

Table 5.2 gives a detailed information about the average yield per day of different breeds of cows and buffaloes. It reveals that the highest yield is from the Jersey cows (23.50), that is why majority of the famers prefer this breed. The second highest yielding breed is Holstein Friesian (21.81) followed by Brown Swiss (16.47) and other cows (16.22). The Sindhi cows' yield is the minimum. The average yield of Murrah buffalo, the only breed seen in the study area, is 7.6 per day. By examining the Standard Deviations (SD) of the yield of different breed of cattle in the study area, we can say that the yield from Jersey Cow, Holstein Friesian Cow

and other cows most are highly varying, the reason for which may be the change in weather conditions and feeding practices followed by the farmers.

5.4: Milk Marketing Channels:

Majority of the dairy farmers in Kerala select the marketing channel on the basis of return in the form of milk price offered by the channel. Most of the farmers in Kerala have a trend to use traditional marketing channel i.e., sale of milk directly to consumers because it will give them an opportunity to get highest price for their produce.

Table 5.3

Marketing Channel Selected by the respondent dairy farmers

Channel	Number of Farmers	Per cent
Cooperative	41	10.7
Non- Cooperative	102	26.6
Both	241	62.7
Total	384	100

Source: Primary data

Table 5.3 shows that only a small portion of farmers (10.7%) rely solely on cooperatives to market their milk. This suggests that cooperatives are not the dominant marketing channel among farmers in this dataset. A larger group (26.6%) uses only non-cooperative channels, which might indicate a preference for traditional or direct sales methods. The majority (62.7%) use both cooperative and non-cooperative channels, suggesting that many farmers are diversifying their marketing strategies to maximize sales.

5.5: Sale of Milk per day

This table explains the quantity of milk sold by the farmers per day to the different channels of distribution. The most important channels here considered are dairy cooperatives, direct sale to consumers, private dairies, hotels and shops and sales through home delivery. Most of the farmers used more than one of these

channels for selling their products. There is a tendency among the dairy farmers not to depend solely on a single channel to sell their products.

Table 5.4
Sale of milk per day to different vendors

	Number of farmers	0to5 liters	6to10 liters	11to15 liters	16to20 above	Above 20	Average quantity in liters	Std. Deviation
Direct sale of milk to consumers in Quantity (per day)	218	27	60	30	42	59	17.681	13.5806
Marketing of milk through Cooperative societies in Quantity (per day)	282	33	78	46	58	58	18.66	20.012
Marketing of milk through local vendors in quantity (per day)	8	1	2	3	1	1	19.25	20.865
Marketing of milk through private dairies in quantity (per day)	1					1	40	.
Marketing of milk through Shops/Hotels in quantity (per day)	19	9	4	1	4	1	9.26	6.773
Marketing of milk through Home Delivery in quantity (per day)	127	36	33	14	12	32	17.39	20.175
Total	655	106	177	94	117	154		

Source: Primary Data

Table 5.4 shows the most commonly used channel by the respondents are dairy cooperatives (282) followed by direct sale to consumers (218). Certain farmers use both of the channels for selling their milk i.e., Direct sale and sale to dairy cooperatives. At the same time the highest quantity of milk sold is to the local vendors (Mean 19.25) followed by cooperative societies (Mean 18.66). Sales through home delivery and direct sale to the consumers shows the same average quantity i.e., 17.39 and 17.68. The lowest quantity of milk sold by the sample farmers is through Shops/Hotels (Mean 9.26). Out of the total respondents only one

farmer sells his product to private dairy. The highest variation in the quantity of milk sold by the farmers is seen in the case of sale to local vendors (20.865) followed by sales through home delivery (20.175).

The table also shows that the highest number of milk producer sell 6-10 litres of milk to the channel. The next model quantity of milk sold by the dairy farmer is above 20 litres.

5.6: Price Received for One Litre of Milk

Normally the price received by the dairy farmers depends on the number of intermediaries operated between the farmers and the consumers. If the farmer depends on the lengthy channel for selling their product, he will get low price for their products. If he can sell the product directly to the consumers, he can fetch higher price for his product. Majority of the study conducted previously proved that sale of milk directly to the consumers will fetch high price. Dairy cooperatives generally pay the lowest price because the length of channel they follow to sell the produce to the consumers. It will see in the table below.

Table 5.5

Price received for one litre of milk from different types of vendors

	Number of milk producers	Average price of milk per liter	Std. Deviation
Direct sale of milk to consumers in Amount (per day)	218	60.51	2.933
Marketing of milk through Cooperative societies in Amount (per day)	282	45.34	2.585
Marketing of milk through local vendors in amount (per day)	8	55	3.928
Marketing of milk through private dairies in amount (per day)	1	50	.
Marketing of milk through Shops/Hotels in amount (per day)	19	56.83	3.317
Marketing of milk through home Delivery in amount (per day)	127	60.71	4.641

Source: Primary data

Table 5.5 exhibits the price received by the farmers for a litre of milk from various channels of distribution. The highest price received by the farmers is from the sale through home delivery (Mean 60.71) followed by the sale of milk directly to the consumers (Mean 60.51). The average price received from the sale to dairy cooperatives is only Rs.45.34. This is the lowest price offered by the channel opted by the farmers in the study area. The average price received through shops and hotels is Rs.56.83 and from local vendors it is Rs.55 and from private dairies it only Rs.50. The highest variation (4.64) in the price received by the farmers is seen in the case of sale through home delivery. The lowest variation (2.58) is shown in the case of price offered by the dairy cooperative society.

As the price is the important factor that influenced the dairy farmers in the channel selection, the dairy cooperatives have to increase the procurement price paid to the farmers by reducing the marketing cost of by increasing the profitability of the Union by diversifying the product they marketed.

5.7: Repeated ANOVA to Assess the Difference among the Sale Price Offered by Different Channel.

H₀: There is no significant difference among the different channel in respect of price offered for milk to the farmers.

Table 5.6

Result of repeated ANOVA

Anova: Single Factor						
SUMMARY						
<i>Groups</i>	<i>Number of farmers</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>	<i>F Value</i>	<i>P Value</i>
Direct sale to customers	212	12832	60.51	8.83	832.90	<0.0001*
Sale through Cooperative Societies	275	12468	45.34	6.77		
Local Milk Vendors	8	440	55.00	15.42		
Sale to Shops and Hotels	18	1023	56.83	11.08		
Sales through Home delivery	124	7524	60.67	21.83		

Source: Primary data

*significance @ 5% level of significance

As per the table 5.6, At the 5% level of significance, the null hypothesis is rejected, and it is concluded that the price of a Liter of milk varies significantly among channels. Considering the mean, sale through home delivery is providing maximum price per liter, i.e., Rs.60.68, followed by direct sale of the consumers (s.60.51), whereas sale to cooperative societies provide the lowest price per liter i.e., Rs.45.34, for milk. Sale to shops and hotels fetches average price of Rs.56.83 per liter and sale to local vendors gives them a price of Rs. 55.00 per liter.

5.8: Average Sale of Value-added Product (in kg) by the Sample Farmers

As most of the respondents take dairying as a subsidiary occupation, they have no time to produce value added product and market the same. Therefore, they pour the milk in raw form. In the study area most of the dairy farmers sell their product in raw form. Only a meagre number of farmers are ready to convert raw milk into value added product and sell the same.

Table 5.7

Average sale of value-added products per day

	Curd	Ghee
Direct sale to consumers in Quantity (per day)	3.34 (32)	0.75 (4)
Marketing through shops/Hotels in quantity (per day)	8.00 (3)	---

Source: Primary data

Table 5.7 exhibits the average quantity and the number of farmers who sell milk products to different marketing channel per day. The table shows that out of the 384 sample only 39 famers sell the milk in the form of value-added products. Out of these, 32 farmers sell curd to the consumers directly and 3 farmers sell it to the hotels. And the average quantity of curd sold in a day to the consumers is only 3.34 litres and to the hotels it is 8 litres per day. This reveals that majority of the dairy farmers sell the milk in raw form in the study area. Four farmers sell ghee directly to the consumers. The average quantity of ghee sold by the dairy farmers is only 750

gram per day. Almost all of the farmers are reluctant to convert raw milk to value added product and thereby to explore this profitable market.

5.9: Number and Cost Incurred for purchasing animals

Out of the total number of respondents most of them are small dairy farmers. Most of them engage in dairy farming as a tradition and have milking animals not by purchasing them from the market but by rearing the calves born in their home. In the sample area only a limited number of farmers are purchased cattle during the study period.

Table 5.8

Average number and cost incurred for purchasing cows during the period

	Number of farmers who purchased cattle	Average number of cattle purchased	Average cost incurred to purchase cattle (Rs.)
local cows	20	1.90	45250.00
Local Heifer	15	2.00	14466.67
Crossbred cows	88	1.67	55965.91
Crossbred Heifer	2	1.00	14250.00

Source: Primary Data

Table 5.8 shows the number of farmers who have purchased milk cows and also its average number. The table reveals that most of the sample farmers haven't purchased cattle during the year. Only 125 farmers out of 384 purchased cows during the period. Out of these 125 farmers 88 farmers purchased cross bred cows. The average number of crossbred cows bought is 1.67 and that of local cows is 1.90. The average cost of purchasing crossbred cow is Rs.55966 and of local cow is Rs.45250. Only a small number of farmers purchased Heifer.

5.10: Average Cost incurred for constructing cattle shed etc.

The dairy farmers in Kerala used concrete or tiled cattle shed for the purpose. Only a limited number of farmers are using kutcha shed. Out of the total respondents only a few farmers constructed cattle shed in the study period.

Table 5.9

Average cost of constructing cattle shed

	Number of farmers	Average cost (Rs.)
Cost of constructing concrete cattle shed	43	189419
Cost of constructing cattle shed with sheet/tile	62	92661
Cost of constructing Katcha cattle shed	12	43250

Source: Primary Data

Table 5.9 exhibits the average cost of constructing different types of cattle shed and the number of dairy farmers constructed cattle shed during the period. It reveals that 43 farmers constructed concrete cattle shed with an average cost of Rs.1,56,744.19 and 62 farmers constructed cattle shed with sheet or terracotta tiles with an average cost of Rs.1,19,596.77 and 12 farmers constructed kutcha cattle shed with natural materials with an average cost of Rs.40501.29.

5.11: Expenditure of Dairy Farming

Among the different components of cost of production feeds and fodder alone accounts for 65 per cent of total expenditure in dairy farming (Rao,1986). Sharma et al. (1986) reported that feeding was the major component costing on an average 60 per cent of total cost of milk production. On average, labour costs accounted for 19% of overall expenditures, making them the second most important component expense. While fixed costs accounted for 15% of total spending, miscellaneous expenses averaged 5.63 percent.

Cost of rearing cattle is the important factor that influence the farmer either to stay in the job or to exit. Most of the farmers depend more on the concentrates the cost of which is increasing at higher rate compared to the increase in milk price.

For study purpose total expenditure incurred by the dairy farmer is classified in to different category on basis of nature of expenditure as financial costs, Fodder costs, Labour cost, Medicine costs and other costs. Financial cost includes interest on loan taken to purchase animals and for constructing and maintenance of cattle

shed. Fodder costs include cost of green fodder, dry fodder and concentrates. Labour costs include cost of own labour and cost of hired and permanent labour. Medicine costs include cost of medical treatment, cost of vaccination, cost of artificial insemination, cost of vitamins and mineral and insurance premium. Other costs include cost of water, electricity and other miscellaneous expenditures.

Table 5.10
Cost of milk production per month

	N	Mean (Rs.)	Std. Deviation (Rs.)
A. Financial Costs			
Interest on loan/capital taken for purchasing animals (Amount)	54	1400.00	2122.69
Interest on loan/capital taken for constructing cattle shed (Amount)	29	875.86	950.15
Maintenance of cattle shed (Amount)	25	756.00	659.59
B. Fodder Costs			
Cost of green fodder (Amount)	43	3744.42	4652.25
Cost of dry fodder (Amount)	317	2587.85	2756.71
Cost of concentrates (Amount)	382	11560.41	20191.64
C. Labour Costs			
Cost of own labour (Amount)	374	11517.38	6048.53
Cost of hired labour (Amount)	23	18078.26	12124.35
Cost of permanent labour (Amount)	10	16980.00	12166.05
D. Medicines, Vitamins etc.			
Insurance premium (Amount)	122	646.97	829.33
Medical treatment expenses (Amount)	363	936.54	988.79
Cost of Vitamins and minerals (Amount)	339	636.71	841.04
Cost of artificial insemination (Amount)	171	630.18	625.38
Cost of vaccination (Amount)	25	832.00	646.76
E. Other Costs			
Cost of utilities including power, water etc., (Amount)	347	706.92	1068.31
Other Costs (Amount)	31	1516.13	2702.97

Source: Primary data

Table 5.10 explains the costs incurred under various heads for the dairy farming activities. By analyzing the table, we can say that all kinds of expenditure are not incurred by all farmers.

Here only 54 farmers out of 384 paid interests on loan taken for the purpose of purchasing milking animals. Majority of the farmers have used their own fund for the purpose of buying the animals or haven't bought cattle during the study period. The average amount spend for the purpose is Rs.1400 per month. Also 29 farmers alone spent money as interest on loan taken for the purpose of constructing cattle shed. The reason behind this is that majority of the farmers have existing cattle shed for usage. No amount has been spent by them in the recent years for the purpose. The average amount spent by the said farmers is Rs.875.86 per month.

Considering the expenses relating to cattle shed maintenance only 25 farmers out of 384 had spent something. The average amount spent by the farmers for the purpose is Rs.756 per month.

The green fodder needed for feeding is collected by the majority of the farmers either from their own sources or from the nearby sources by using their own labour. Only 43 farmers bought green fodder for the purpose. The average amount spend for the purpose is Rs.3744.42. The figure indicates that green fodder is commonly bought by big farmers. Generally small farmer collects green fodder from the nearby area by using their own or family's labour.

Most of the farmers are using dry fodder as the main source of food for the milking animals. 317 farmers out of 384 are spending money for buying dry fodder for the purpose. The average monthly expenditure incurred for the purpose is Rs.2587.85.

Concentrates are the most important items of expenses incurred by the farmers. All of the farmers except two are using concentrates as the main fodder. The average amount spent by the farmers per month for this item of expense is Rs.11560.41.

In the case of dairy farming majority of human capital needed for dairy farming is from the farmers' family itself. None of the small and medium farmers use hired labour for this purpose. Their own and family members effort is used for the various jobs relating to dairy farming. Only large dairy farms are using hired labour. 374 farmers out of 384 are investing their own and family members time as human capital for dairying. The average opportunity cost calculated on the basis of time spent by the farmers are Rs.11517.38 per month.

Only large dairy farmers are using hired and permanent labour for doing dairy farming activities. Here 23 and 10 farmers are using hired and permanent labourers respectively for the purpose. The average monthly amount spent for the hired labour is Rs.18078.26 and for permanent labour is Rs.16980.

Most of the farmers are reluctant to insure their cattle. The major reason for this reluctance is higher amount of premium. Most of the farmers haven't get the benefit of subsidized insurance of the government and other agencies. Here out of 384 farmers only 122 farmers have insured their milking animals. The average amount spent by the farmers for the purpose is Rs.646.97 per month.

The other important recurring expenditure incurred by the dairy farmers is expenditure relating to medical treatment. Most of the farmers i.e., 363 out of 384 farmers spend some amount monthly for medical treatment. The average monthly amount spent for the purpose is Rs.936.54.

As cost of vitamins and minerals are concerned most of the farmers spent reasonable amount for the purpose which indicates the dairy farmers are aware about the importance of the giving mineral and vitamins to the milking animals to get quality milk and to ensure health and reproduction of milk animals. Here 339 farmers out of 384 regularly give vitamins and minerals to the milking cows. On an average the dairy farmers in Kerala spent Rs.636.71 per month for this. If we consider the minerals and vitamin supplied to the farmers at free of cost by the animal husbandry department of the Kerala government, the quantity used for the purpose will be far bigger than the amount specified here.

Even though, artificial insemination is available free of cost at government veterinary hospital, most of the farmers are not ready to go there. That is why they incur expenses for insemination in the nature of transportation etc., Here 171 farmers out of 384 spent moneys for the purpose. The average amount spent by the farmers for a month for vaccination is Rs.630.18.

Most of the farmers used vaccination facility provided by the veterinary hospital free of cost. Only 25 farmers vaccinated their milk animals by spending some amount for that. Average amount spent for vaccination for a month is Rs.832.

In the case of cost of utilities such as power, water etc., 347 farmers spent something for that. On an average the farmers spent Rs.706.92 in a month.

Other expenses are incurred only by large dairy farmers. Here only 31 farmers spent something for that. The average monthly amount spent for the purpose is Rs.1516

5.12: Volume and Income from Cow Dung

One of the challenges faced by the dairy farmers in the Kerala definitely be the disposal of cow dung. Presently most of the agriculturists are not ready to use cow dung as a manure for the farming purpose. This leads to low demand for the same. Dairy farmers having limited land availability faces great problem of managing this which leads to environmental issue and thereby they face protest from their neighbors. This forces the farmers to sell this rich manure at the price offered by the buyers which is relatively low. Therefore, the income from this byproduct cannot contribute more to the total revenue from the dairying activity.

5.12.1: Disposal of Cow Dung

In the sample area most of the farmers do dairying along with other agricultural activities. Because of this majority of the farmers used the cow dung as manure for their agricultural activities. Cow dung is an important source of energy which is not explored by the farmers in the state.

Table 5.11

Disposal of cow dung produced

	Number of farmers	Per Cent
All quantity sold for getting income	95	24.7
All quantity used for farming	68	17.7
A portion sold and another portion used for farming	204	53.1
Used for Gober gas plant for cooking	5	1.3
Total	384	100

Source: Primary data

Table 5.11 explains how cow dung is used by the sample farmers. While surveying, most of the farmers opined that the major problem they are facing is the getting market for the cow dung produced. Here most of the farmers (53.1%) sold a portion of the dung and the other portion is used for agricultural purpose. 24.7% of the farmers sold the entire cow dung produced and 17.7% of the farmers used the entire quantity of cow dung used for farming. Only a very few percentages (1.3%) of farmers are using cow dung for their gober gas plant. It is helpful for the dairy farmers if agricultural department take initiative by implementing such schemes that promote the use of cow dung as manure for agricultural purpose.

5.12.2: Income from the Sale of Cow Dung

Because of low demand for the cow dung dairy farmers are compelled to sold off this at a cheaper price. The income received from this byproduct have contributed very meagre portion of the total revenue from dairying.

Table 5.12

Average Income from cow dung in a month

	Number of farmers	Per Cent
Below Rs.500	146	38
Between Rs.500 and Rs.1000	111	28.9
Between Rs.1000 and Rs.2000	55	14.3
Above Rs. 2000	72	18.8
Total	384	100

Source: Primary data

Table 5.12 explain the number and percentage of farmers receiving income from the sale of cow dung which is grouped in to four slabs. Here 28.9 percent of farmers are receiving income between Rs.500 and Rs.1000, 21.6 percent of farmers are receiving income below Rs.500, 18.8 percent farmers are receiving income above Rs.2000 and 14.3 percent of farmers are receiving income between Rs.1000 and Rs.2000. If the concerned government departments take initiative to promote the use of cow dung for the agricultural activities as a manure, it will definitely help the dairy farmers to improve their profitability.

5.13: Volume and Income from Calves' Birth in a Year

Another byproduct which contributes to the total revenue to the dairy farmer is the number of reproductions in a year. Scientific herd management will result in giving birth to one calf in a year. In the sample area we cannot see this number. The reason behind this definitely will be the long period of reproduction resulting from unscientific feeding and breeding method followed by the dairy farmers.

Table 5.13

Number and Income from calves' birth during a year

	Number of calves born	Average Number of Calves	Average Income from sale of calves (Rs.)
Number of calves yield by the animals in a year	242	1.6	13361.47
Number of Heifer yield by animals in a year	317	1.71	17422.22

Source: Primary Data

Table 5.13 exhibits the number of calves and income generated from the birth of calves (male) and heifer (female) during a year. The table shows that the average number of calves and heifer yield during a year is 1.60 and 1.71 respectively. On an average a farmer will get Rs.13361.47 from the sale of calves during a year and get Rs.17422.22 from the sale of heifer. If the dairy farmers can implement scientific herd management, they can definitely increase income from this source there by improve the profitability.

5.14: Profitability

5.14.1. Introduction

Experts rank profitability as an essential factor in sustainability of dairy farms (van Calker et al., 2005). Profitability of dairy farms is influenced primarily by value of milk in the marketplace, labour cost, cost of feed, cost of treatment and average fixed cost per cow, Feed represents the greatest cost of producing milk (Krpálková, 2016). Green grass and paddy straw, two locally or regionally produced non-commodity feeds, are mostly impacted by growing conditions that affect crop output. The price of corn, wheat, millets, and other commodities is reflected in concentrates, or cattle feed. Feed prices have an equal impact on the profitability of the biggest and smallest dairy farms. If milk and feed prices are comparable across farms, scalability typically offers larger farms a competitive edge in profitability because they can spread their fixed expenses over a greater number of milk units.

Although scale of production influences profitability because fixed costs are distributed over more units (kilograms or litres) of milk, small farms with fewer than 10 cows can be profitable because of unpaid family labour and negligible investments in facilities (Hemme and Otte, 2010). Unpaid family labour may help farms remain profitable as herd sizes grow, but when herd sizes surpass ten cows, scale usually outweighs the benefits of family labor. The majority of milk is valued as a commodity, even in cases where household producers sell their excess milk in neighbourhood spot markets. When supply and demand are out of balance, milk prices paid to farmers fluctuate rapidly. Specialty milks (e.g., organic, grass-fed, local, A2A2) are priced according to supply and demand within their niche (Britt et al.,).

The balance between milk supply and demand will continue to have a significant impact on profitability since dairy farmers raise output rapidly when demand rises and decrease output more slowly when supply surpasses demand. This volatility in prices paid to farmers for milk inevitably drives less profitable farms out of business (Britt et al.,).

Profit in simple terms is defined as any financial gain arising from any business activity. It helps in estimating the effectiveness of its business activity. Accounting profit and economic profit are the two primary categories into which profit is separated. The accounting profit does not take into consideration the implicit cost (Opportunity cost), whereas economic profit includes the implicit cost for the estimation of profit. When the accounting profit is positive, the economic profit can be negative. However, the business always pays its tax based on its accounting profit, whether or not it is economically successful which is based on its economic profit.

5.14.2: Profitability of different Farm size

For sustainable development of every activity profit is essential. Here to know the profitability of dairy farms having different scale of operation, comparison of Accounting Profit and Economic profit in total, per cow and per productive cow are calculated. Accounting profit is calculated after deducting all out-of-pocket expenses from total revenue received. Total revenue here includes the sale proceeds of milk and milk products sold to the different channels and the proceeds from sale of cow dung and calves born. Economic profit is determined by subtracting imputed cost (own labour cost) from the Accounting Profit.

Table 5.14

Summarized profitability statement of different farm size

Sl No.	Size of Farm	Revenue Profit (Rs.)	Economic Profit (Rs.)	Economic Profit/cow (Rs.)	Economic profit/Productive cow (Rs.)	Accounting Profit (Rs.)	Accounting profit/cow (Rs.)	Accounting Profit/Productive cow (Rs.)
1	Small	175375	172435	58690	78120	291943	110402	148537
2	Medium	556288	551297	75614	104847	715047	98052	138013
3	Large	1009198	997619	54731	76318	1161908	64944	92479

Source: Primary Data

Table 5.14 explains that Economic and Accounting profit in total is higher in the case of large firm because of the large number of cattle they have. However, if we consider the Economic profit per cow and per productive cow the medium farm

gets higher profit and the large farm get lower profit. But in the case of accounting profit per cow and productive cow the small farm fetched the highest profit instead of medium farm as shown in the case of economic profit. The reason behind this will be the presence of hired labour and other cost. The accounting profit per cow and per productive cow is very low in the case of large sized farms compared to the small and medium sized farm. The major reason is the presence of hired and permanent labour cost incurred by them.

5.14.3: Profitability of farmers choosing different channel

For the convenience of the study the marketing channel selected by the dairy farmers are grouped here in to three groups i.e., Cooperative Channel, Non-Cooperative Channel and Both. As already explained, in Kerala majority of the dairy farmers depends both cooperative and traditional channel for selling their produce to get the benefit of higher price from the traditional channel and to get the benefit of free/subsidized input service from the dairy cooperatives. As price offered by the marketing channel is the major factor which contribute to the profit of the dairy farmer, the highest profit will normally be earned by those farmers who market their product to the channel which offer higher price for the milk.

Table 5.15

Profitability statement – different channel wise

SI No.	Channel Choice	Revenue Profit (Rs.)	Economic Profit (Rs.)	Economic Profit/cow(Rs.)	Economic profit/Productive cow (Rs.)	Accounting Profit (Rs.)	Accounting profit/cow (Rs.)	Accounting Profit/Productive cow (Rs.)
1	Cooperative	84923	82180	22999	30437	159448	63406	83266
2	Non-Cooperative	212224	208067	61756	80819	345596	122072	160469
3	Both	357119	353366	68524	92023	491664	106445	145235

Source: Primary Data

Table:5.15 explains the level of economic profit and accounting profit per cow and per productive cow of the farmers from different marketing they choose. Conforming to the general tendency of getting higher profit from the direct channel, farmers using the non-cooperative sector get higher economic and accounting per

cow and per productive cow. As per the table above the highest accounting and economic per cow is earned by the farmers who depend both of the channel simultaneously. The reason behind this will be the practice of blending the benefit of high price from non-cooperative sector and availing the free or subsidized input service from the cooperative sector that will definitely help them to reduce the cost of production and that will lead to higher profitability. The dairy farmers who solely depend on cooperative sector for supplying their produce get less than half of the economic profit earned by the farmers who use non-cooperative or both for marketing their produce.

5.15: Correlations of dairy profitability with Channel Choice and Farm Size

As already explained farm size and channel choice have a great impact on the profitability of the dairy farmer. This has to be separately studied to know the direct impact of farm size and channel choice on profitability. Kendall's tau tool is used here for this purpose.

Table: 5.16

Kendall's tau results

Correlation with	Kendall's tau	Z score
Channel Choice	0.172	0.052*
Farm size	-0.184	0.035**

Source: Primary Data

Table 5.16 provides the Kendall's tau correlation results of dairy farming profitability with channel choice and farm size. The result shows statistically significant relationship between both of the controlling variables on dairy profitability. Farms size have negative relation with profitability. And channel choice has a positive relation.

CHAPTER VI

STRATEGIC FACTORS AND CONSTRAINTS IMPACTING THE PROFITABILITY OF DAIRY FARMING

6.1: Introduction

Literature in the concerned subjects disclosed that profitability is the important concern that influence the sustainable development of the dairy farming business. In India, particularly in Kerala dairy farming has faced various constraints which affect the profitability and sustainability of the dairying activity in one or another way. There is presence of various factors that influence the profitability of the farmers which results into get satisfied dairy farmers that lead the farmers to remain the dairy business. Dairy farmers have expected future prospects for dairy farming which will depend on the fulfillment of some related factors. This chapter deals with result of technical analysis, by using various statistical tools, of the presence of various constraints, the impact of constraints and factors on profitability and channel choice selection and influence of farm size and channel selection on profitability.

6.2: Test of Reliability

For testing the reliability of the data Cronbach's Alpha value is used here. If the alpha value lies in between 0.60 to 0.80 we can say that data is reliable as shown in the following table.

Table 6.1

Reliability test

Construct	No. of items before the reliability test	No. of items after the reliability test	Cronbach's Alpha
Supply side constraints	13	12	0.717
Economic Constraints	11	10	0.671
Demand based Constraints	6	6	0.685
Market Based Constraints	6	5	0.671
Technical Constraints	8	7	0.658
Social Constraints	8	7	0.654

Source: Primary data

Table 6.1 shows the reliability test results in which Cronbach's Alpha of the six constructs are reported near to 0.7. It is inferred that all the constructs are having reliability after deleting the required number of statements as per the test suggestion.

6.3: Test of Normality

Normality test is done for the purpose of determining whether parametric or non-parametric test is adopted for the purpose of analyzing the data. For this purpose, in this study Kolmogorov-Smirnov test and Shapiro-Wilk test are used.

Table 6.2

Normality test

Tests of Normality						
Construct	Kolmogorov-Smirnov^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Supply Constraints	0.092	383	0.000	0.987	383	0.002
Economic Constraints	0.064	383	0.001	0.984	383	0.000
Demand Constraints	0.096	383	0.000	0.976	383	0.000
Market Constraints	0.108	383	0.000	0.978	383	0.000
Technical Constraints	0.108	383	0.000	0.983	383	0.000
Social Constraints	0.084	383	0.000	0.981	383	0.000

Source: Primary data

Table No.6.2 exhibit the Normality test results of 6 Constructs wherein none of the constraints has accept the null hypothesis which means the sample data lacks normality. It infers that the non-parametric test shall be executed for taking inferences on population.

6.4: Factors Affecting Dairy Farming in Kerala

There are various types of factors or determinants which generally will affect the dairy farming. Dairy farmers have to take into consideration the impact of all of these factors on profitability and decision to select the suitable marketing channel. Here these factors are grouped into Demand side factors, price and incentive factors, supply side factors, financial support and assistance factors, procurement factors and other services. Some of these factors will positively influence and others negatively influence the profitability and channel choice selection of the farmers. The impact of these factors on these two are separately studied by using suitable statistical tools.

6.4.1: Factors Influencing the Dairy Marketing Activities:

Mean Score Analysis

The factors influencing the dairy farmers are grouped into six categories and all of them are separately studied to know the extent of impact of each variable under all categories.

6.4.1.a: Demand side factors

Regular demand for the product is the major influencing factor for the success of any activity. As far as milk and milk products is concerned there is a regular market. However, the seasonal fluctuation in the milk production will adversely affect demand for the milk in the market. This will lead to the practice of not taking the entire milk produced by the farmers by the vendors in the surplus season. Therefore, dairying is greatly affected by the regular demand for the product irrespective of the season.

Table 6.3

Demand side factors: Sign test results

Demand side factors	Number of farmers	Mean	Rank	P value
Regular demand for the product	384	3.97	1	<0.0001**
Facility to sell the entire milk produce even during flush season	384	3.82	2	<0.0001**
Friendly attitude from the marketer	384	3.64	3	<0.0001**
Favourable milk collection time	384	3.53	4	<0.0001**
Market for the value-added products	383	3.38	5	<0.0001**

Source: Primary data

sign test Claim value:3, *significance @ 5% , **significance@1%

Table 6.3 presents the ranking of the factors which have influenced the dairy farmers in their business. As per the mean value provided in the table, we can say that all of the demand side factors influence the dairying. The most important factor which influence the dairy farmer is the ‘Regular demand for the product’. The Second important factor is ‘Facility to sell the entire milk even during the flush season’. The least important factor is ‘Market for the value-added products’.

6.4.1.b: Price or incentive factors

Price of the product determines the profitability of the business. Therefore, price and other incentives received from the vendors will greatly influence the farmers. In Kerala certain milk vendors adopt collecting milk at different price in different seasons. Certain marketing channels offers various kinds of incentives in different forms to the dairy farmers to retain the farmers which will also affect them.

Table 6.4

Price or incentive side factors: Sign test results

Price/incentive factors	Number of farmers	Mean	Rank	P value
No underpricing during flush season	384	3.65	1	<0.0001**
Regular and timely payment for milk	384	3.45	2	<0.0001**
Uniform price for the product in all season	384	3.42	3	<0.0001**
Quality based price fixation	384	3.33	4	<0.0001**
Production/Supply based bonus or incentive system	384	3.01	5	0.876
Advance payment at needed time	384	2.93	6	0.227
Chance to win award for best performance	384	2.88	7	0.032*
Regular payment of bonus	384	2.81	8	<0.0001**
High price during summer season	384	2.46	9	<0.0001**
Fair or reasonable price for the product	384	2.01	10	<0.0001**

Source: Primary data

Sign test; Claim value:3, *significance @ 5%, **significance@1%

Table 6.4 shows that out of the ten price of incentive related factors only eight factors have significantly influenced the dairy farming activities. The most important price related factor which influence the farmers is ‘No underpricing in the flush season’. The second important factor is ‘Regular and timely payment for milk’ followed by ‘Uniform price for the product in all season’. The least important influencing factor is ‘Fair or reasonable price for the product’.

6.4.1.c: Supply side factors

These factors relate to the various facilities provided to the farmers by the marketers. These facilities include veterinary aid, vaccination and insemination

facilities, cattle feed on credit, free or subsidized insurance etc., These provisions have great impact on the cost of maintaining of the cattle.

Table 6.5

Supply side factors: Sign test results

Supply side factors	Number of farmers	Mean	Rank	P value
Free/subsidized vaccination facility	384	3.65	1	0.049*
Free/subsidized artificial insemination	384	3.56	2	0.052
Free/subsidized veterinary medical service on demand	384	3.37	3	0.058
Regular supply of cattle feed on credit	384	3.37	3	0.051
Schemes like calf protection scheme	384	3.11	4	0.050
Supply of green fodder and fodder (including seeds) at reasonable price	383	2.78	5	0.049*
Arrangements of free/subsidized insurance for cattle	384	2.66	6	0.052

Source: Primary data
sign test; Claim value:3; *significance @ 5%; **significance@1%

Table 6.5 shows that out of the seven supply side factors only two factors have significant influence on dairy farming. As per the mean score the most influencing factor is 'Free or Subsidized vaccination facilities' followed by 'Free or subsidized artificial insemination'. 'Free or subsidized veterinary medical service of demand' and 'Regular supply of cattle on credit' have the same impact. 'Arrangement of free or subsidized insurance for cattle' is the least influencing factor.

6.4.1.d: Financial support and assistance factors

In the field of dairy farming, we can see numerous schemes for giving financial aid to the dairy farmers either introduced by the State /Central Government or by the milk marketing Federation. All these facilities normally will influence the dairy farmers in their operation. Here six of such financial support and assistance factors are taken to study the impact.

Table 6.6

Financial support and assistance: Sign test results

Financial support and assistance factors	Number of farmers	Mean	Rank	P value
Provision for farmer pension scheme	384	3.10	1	0.049*
Financial assistance/support for cattle purchase	384	2.53	2	0.045*
Provision of subsidies/other benefits like government assistance, MNREGP etc...	384	2.51	3	0.045*
Facilitation of loans/credit schemes of other financiers on easy terms	384	2.44	4	0.042*
Scholarships and awards to children/dependents from the agencies	382	2.36	5	0.041*
Assistance to get financial help on cattle mortality	384	2.31	6	0.048*

Source: Primary data

sign test; Claim value:3; *significance @ 5%; **significance@1%

Table 6.6 exhibits that out of six factors considered here to know the impact on dairy farming, all of them have significant influence. As per mean score only one factor, ‘Provision for Farmer pension scheme’ has greater influence in the dairying operation. The least important financial support factor is ‘Assistance to get financial help on cattle mortality’.

6.4.1.e: Procurement factors

Distance to the place of procurement, weighing and measurement mechanism, use of mechanical devices for collection of milk and door step collection of milk are the important procurement factors taken here to know how it influences the operation of dairy farmers.

Table 6.7

Procurement factors: Sign test results

Procurement factors	Number of farmers	Mean	Rank	P value
Distance to the place of procurement is minimum	384	3.71	1	<0.0001**
Correct weighing and measurement of my produces	383	3.53	2	<0.0001**
Mechanized/digitalized mechanism for procurement	384	3.16	3	<0.0001**
Collection of milk at door steps	384	2.78	4	<0.0001**

Source: Primary data

sign test; Claim value:3; *significance @ 5%; **significance@1%

Table 6.7 explains the impact of procurement factors on the dairy farming activities. Out of the four factors studied here all of them have significantly influence the dairy farmers. The most important factor is ‘Distance to the place of procurement is minimum’. The second factor is ‘Correct weighing and measurement of the produces’ followed by ‘Mechanized/digitalized mechanism for procurement’. The other factor ‘Collection of milk at door steps’ have least influence on the dairy farming.

6.4.1.f: Other services

In addition to the above explained factors there are numerous services of benefits that the dairy farmers received from the marketing agencies which influence the dairy farmers in their dairying activities. These include friendly treatment from the staff, hope to get benefit in future, participation in management, good conflict management system, group insurance scheme etc.

Table 6.8

Other services: Sign test results

Other service	Number of farmers	Mean	Rank	P value
friendly treatment from staff of agency	384	3.68	1	<0.0001* *
Hope to get more benefit in future	384	3.13	2	<0.025*
Opportunity to enjoy participation in management	384	2.71	3	<0.0001* *
Up to date information about the government schemes	384	2.7	4	<0.0001* *
Opportunity to make good liaison with other government departments	384	2.59	5	<0.0001* *
Existence of good conflict management system	384	2.37	6	<0.0001* *
Provision for group insurance for dairy farmers	384	2.36	7	<0.0001* *

Source: Primary data

sign test; Claim value:3; *significance @ 5%; **significance@1%

Table 6.8 shows that all of the factors explained here have significantly influence the dairy farmers in their activities. The important one is ‘Friendly treatment from staff of agency’ followed by ‘Hope to get more benefit in future’. The least important factor is the ‘Provision for group insurance for dairy farmers’.

6.5: Impact of Factors on Profitability

6.5.1: OLS Regression Analysis

The factors which significantly influence the farming activities will have positive or negative influence on the dairy farming profitability. For the purpose of studying the extent and direction of the impact of various factors on the profitability of dairy farmer Ordinary Least Square method is used here. The following table show the result of the Regression Analysis.

Table: 6.9

Factors Influencing Dairy profitability: OLS Regression results

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>
constant	11.0282	0.2530	43.59	<0.0001***
Demand factors	0.1310	0.0561	2.334	0.0201**
Price factors	0.2158	0.0663	3.253	0.0012***
Supply side factors	-0.0760	0.0664	-1.145	0.2529
Financial support factors	-0.0206	0.0596	-0.3464	0.7292
Procurement factors	0.1658	0.0486	3.407	0.0007***
Other services	0.2234	0.0649	3.441	0.0006***

Source: Primary data

*** indicate significant at 1% level, ** indicate significant at 5% level

The results reported in Table 6.9 relate to the regressions of various factors on the profitability of dairy farming measured by accounting profit per productive cow. As we can see, the effects of factors on profitability are not exhaustive in the regression results. More specifically, price factors, procurement factors and other services are significant at 1% and demand factors are significant at 5% level. However, supply side factors and financial support factors do not have any impact on profitability. It is interesting to note that the coefficients all significant factors in the model have their expected positive relationship.

6.5.2: Quantile regression analysis

The resulting estimates, from Regression Analysis, of various factors on the conditional mean of farmers' profitability measured in terms of accounting profit per cow are not necessarily indicative of the magnitude and nature of the effects of factors on the lower tail or upper tail of the distributions of performance measure. A more comprehensive picture of the covariate effects on farmers' profitability can be obtained by estimating a group of conditional quantile functions.

Table 6.10

Factors Influencing Dairy profitability: Quantile Regression Results

	tau	coefficient	std. error	t-ratio
constant	0.25	10.5225	0.3626	29.0138***
	0.50	11.6579	0.2358	49.4343***
	0.75	11.7625	0.1903	61.7844***
Demand factors	0.25	0.1708	0.0804	2.12256**
	0.50	0.0210	0.0523	0.401355
	0.75	0.0036	0.0422	0.0870088
Price factors	0.25	0.2926	0.0950	3.07785***
	0.50	0.2043	0.0618	3.30473***
	0.75	0.0120	0.0499	0.240702
Supply side factors	0.25	-0.0973	0.0952	-1.02246
	0.50	0.1064	0.0619	1.71804*
	0.75	0.1130	0.0500	2.26093**
Financial support factors	0.25	-0.0503	0.0854	-0.589615
	0.50	-0.0089	0.0555	-0.16049
	0.75	-0.0351	0.0448	-0.784638
Procurement factors	0.25	0.2378	0.0697	3.40866***
	0.50	0.2290	0.0453	5.04809***
	0.75	0.1364	0.0366	3.7247***
Other services	0.25	0.2864	0.0930	3.07763***
	0.50	0.1163	0.0605	1.92297*
	0.75	0.1381	0.0488	2.82797***

Source: Primary Data

*** indicate significant at 1% level, ** indicate significant at 5% level * indicate significant at 10% level

The QR results of this study are summarized in Table 6.10. Three different QR estimates for quantiles—0.25, 0.50, and 0.75—are given for the QR models. As shown in Table, the coefficients of procurement factors and other services for profitability are significant in the model for all quantiles. In every quantile, we observe that procurement factors and other services positively affect the profitability of dairying. In the case of procurement factors, we observe higher and significantly positive effects of this factors on the middle quantiles of 0.50. With regard to the

other factors, demand factors positively affect the lower tail of the distribution, price factors positively impact lower and middle tail and supply side factors positively affect middle and upper tail of the distribution. There is no evidence of the impact of financial support factors on the profitability of dairy farming across quantiles.

6.5.3: Impact on Factors on Profitability with Farm Size and Channel Choice as Controllable Variable

Regression Analysis

In addition to the various factors that influence the profitability of the dairy farmers the size of the farm and the channel they selected for marketing their produce will also affect the profitability. To know the magnitude and the direction of the impact of different factors with channel choice and farm size as controllable variable, here Regression analysis is conducted and the result of which is presented in the following table.

Table 6.11

Factors Influencing Dairy profitability, with farm size and channel choice as control variables: OLS Regression Results

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>
constant	10.8788	0.2657	40.930	<0.0001***
Demand factors	0.1195	0.0543	2.200	0.0284**
Price factors	0.2046	0.0642	3.186	0.0016***
Supply side factors	-0.0820	0.0644	-1.273	0.2039
Financial support factors	-0.0067	0.0579	-0.117	0.9071
Procurement factors	0.1545	0.0471	3.281	0.0011***
Other services	0.2093	0.0628	3.331	0.001***
Channel choice (Coop, Non-coop, Both)	0.1690	0.0390	4.326	<0.0001***
Farm size	0.1884	0.0485	3.882	0.0001***

Source: Primary Data

***indicate significant at 1% level, ** indicate significant at 5% level

Table 6.11 provides regression results on the impact of various factors on profitability of dairy farming with farm size and channel choice as controlling variables. There is no change in the significance and sign of coefficients of significant factors, although some differences were noticed in other cases. Accordingly, there were no considerable differences in the inferences of the two regression estimations. The results produced the evidence on the moderating effects of farm size and channel choice in determining the impact of factors on dairy profitability.

6.6: Impact of Factors on the Choice of Marketing Channel.

6.6.1: Discriminant Analysis

Discriminant analysis is used to predict group membership. The basic principle underlying a discriminant model is to choose linear combinations of the predictor variables that will maximize between group variance to within group variance. It is a technique for analyzing data when the criterion or dependent variable is categorical and the predictor or independent variables are metric. In fact, the linear contribution of predictor variables discriminates between the categories of the dependent variables. As the three channel choices, the dependent variables are in categorical form they are to be compared based on the loadings of six factors that are predictor variables in metric form. Demand, supply, price, procurement, financial support and other services are the predictor variables in the model.

Table 6.12

Group means of the predictor variables

Channel Choice	Factors	Mean	SD
Cooperative sector	Demand factors	3.756	0.4889
	Price factors	3.098	0.6635
	Supply side factors	3.373	0.6021
	Financial support factors	2.666	0.6865
	Procurement factors	3.124	0.7169
	Other services	2.756	0.5545
Non-cooperative sector	Demand factors	3.647	0.5741
	Price factors	3.284	0.6299
	Supply side factors	3.131	0.5349
	Financial support factors	2.484	0.5755
	Procurement factors	3.361	0.6651
	Other services	2.769	0.6018
Both Sectors	Demand factors	3.697	0.6221
	Price factors	2.992	0.6454
	Supply side factors	3.220	0.5587
	Financial support factors	2.542	0.6331
	Procurement factors	3.296	0.6865
	Other services	2.807	0.5817
Total	Demand factors	3.690	0.5962
	Price factors	2.953	0.6487
	Supply side factors	3.213	0.5599
	Financial support factors	2.540	0.6247
	Procurement factors	3.295	0.6855
	Other services	2.792	0.5832

Source: Primary data

The results of analysis reported in Table 6.12 discuss the importance of the six predictor variables involved in the channel choice function. At first the group means of the predictor variables are considered. Among the six factors identified the farmers who have opted cooperative channel perceive only two factors – financial support and other services - at lower scale.

Dairy farmers who depend on no-cooperative sector for the marketing of their produces have higher perceptions on price and procurement factors compared

to that of cooperative sector. The dairy farmers have given lower weightage to the factors such as supply side, demand side and financial support, for choosing non-cooperative sector as the channel option for marketing their produces. Those who depends both sectors as their marketing channel found leverage in the differences between the two channel choices in terms of most factors.

6.6.2: Univariate F ratio

To know at first in which of the factors three channel groups (farmers with different channel choice) differentiate significantly, univariate F ratios have been computed.

Table 6.13
Tests of Equality of Group Means- With factor scoring

S.L No.	Tests of Equality of Group Means					
	Prospective factors	Wilks' Lambda	F	df1	df2	Sig.
1	Demand factors	0.997	0.532	2	381	0.58
2	Price factors	0.978	4.21	2	381	.016**
3	Supply side factors	0.985	2.806	2	381	.062*
4	Financial support factors	0.994	1.24	2	381	0.29
5	Procurement factors	0.991	2.747	2	381	.078*
6	Other services	0.999	0.243	2	381	0.78

Source: Survey data *at ten per cent level **at five per cent level

The values of F statistics are reported in Table 6.13 and we could observe that the statistically significant difference exists in the factors such as price (at 5% level), supply and procurement (at 10% level).

6.6.3: Eigen Value and Canonical Correlation

The eigenvalues indicate the importance of each discriminant function in differentiating the groups, while the canonical correlation measures the strength of the relationship between the discriminant function and group membership.

Table 6.14

Eigen values - With factor scoring

Function	Eigen value	% of Variance	Cumulative %	Canonical Correlation
1	0.646	83.2	83.2	0.536
2	0.492	16.8	100	0.384

Source: Survey data

Table 6.14 shows that the first discriminant function explains 83.2% of the variance, which is quite substantial. However, the canonical correlation of 0.536 suggests that this function is moderately effective in distinguishing between the three groups.

6.6.4: Wilks' Lambda - With Factor Scoring

Wilks' Lambda is the product of the univariate Lambda for each function, computed by finding the ratio of within –group sum of squares to total sum of squares in a one-way ANOVA where the dependent variable is the discriminant score for each respondent and the predictor variable is the category (one or zero) to which the respondent belongs. Wilks' Lambda takes a value between 0 and 1 and lower the value of Wilks' Lambda, the higher is the significance of the discriminant function.

Table 6.15

Wilks' Lambda - With factor scoring

Wilks' Lambda			
Test of Function(s)	Wilks' Lambda	Chi-square	Sig.
1	0.644	26.988	.018**
2	0.882	2.203	0.82

Source: Survey data

*Significant at 5% level

Table 6.15 shows that the value of Wilks' Lambda of first function is 0.664 and second is 0.882. The statistical test of significance for Wilks' Lambda is carried

out with the chi-squared transformed statistic, in which the coefficient of the first function is significant at 5 per cent level.

6.6.5: Standardized Canonical Discriminant Function

Standardized Canonical Discriminant Function coefficients, similar to a regression coefficient, aid in the precise interpretation of the discriminant coefficient. The influence of a unit change in a predictor variable on the discriminant function score is minimal when the discriminant coefficient is modest. The standardized discriminant function's coefficients are unaffected by the measurement units. The standardized discriminant function's coefficients' absolute values show how much each variable contributes to the ability to distinguish between the two groups.

Standardized Canonical Discriminant Function Coefficients helps to interpret the discriminant coefficient. A small value of the discriminant coefficient means that the impact of a unit change in a predictor variable is small in the discriminant function score. The coefficients of standardized discriminant function are independent of the units of measurements. The absolute values of the coefficients in standardized discriminant function indicate the relative contribution of the variables in discriminating between the two groups.

Table 6.16

Standardized Canonical Discriminant Function Coefficients with factor scoring

S.L No.	Standardized Canonical Discriminant Function Coefficients		
	Prospective factors	Function 1	Function 2
1	Demand factors	0.216	0.111
2	Price factors	0.622	0.423
3	Supply side factors	0.573	-0.484
4	Financial support factors	0.007	-0.601
5	Procurement factors	-0.79	0.045
6	Other services	0.031	0.754

Source: Survey data.

Table 6.16 gives the standardized canonical discriminant function coefficients. It indicates that price factor is the most important factor, which discriminates between the channel choice of dairy farmers, followed by supply side, and demand factors.

6.6.6: Structural Coefficients

Another way of finding the relative contributions of the predictor variables in discriminating between the channel choice of dairy farmers is through comparing the structural coefficients of the predictor variables. The structural coefficients are obtained by computing the correlation between the discriminant score and each of the independent variables. These are also called discriminant loadings

Table 6.17
Structure Matrix with factor scoring

Sl. No.	Structure Matrix		
	Prospective factors	Function 1	Function 2
1	Demand factors	0.611*	0.596
2	Price factors	0.521*	-0.165
3	Supply side factors	0.399*	0.333
4	Financial support factors	.342*	-0.198
5	Procurement factors	0.228*	0.035
6	Other services	-0.012	0.466*

Source: Survey data

Table 6.17 reports the correlation coefficient between the discriminant score and the demand factor is 0.611, whereas the correlation with price factor is 0.521. The correlation with other factors such as supply, financial support procurement and other services are 0.399, 0.342 ,0.228 and -0.012 respectively. Demand, price and supply are the most important characteristics using Standardized Canonical Discriminant Function Coefficients and Structure Matrix. The positive coefficients

for these factors indicate that higher scores in each factor contribute to the likelihood of being classified into a particular channel preference group. This means that farmers with better perception on these factors are more likely to have to the cooperative or mixed channel group.

6.7: Major Constraints Faced by the Dairy Farmers in Kerala

One of the areas of this research is to find the presence of various constraints faced by the dairy farmers and their impact on profitability. For these various constraints are identified from the literature related to the area and these are grouped in to six major areas such as Supply constraints, Economic constraints, Demand constraints, Market constraints, Technical constraints and Socio-Psychological constraints. Sign Test is used for the purpose of knowing the existence of these constraints, Ordinary Least Square method and Quantile regression method is used for studying the impact of these constraints on the profitability. Accounting Profit per productive cow is taken as the dependent variable.

6.7.1: Presence of Constraints

The presence of constraints faced by the dairy farmers is studied by using the mean value of various constraints determined by Sign Test.

Table 6.18

Presence of various constraints: Sign Test results

	Number of Farmers	Mean	Median	Std. Deviation	Z value	P Value
Supply Constraints	384	3.0590	3.0843	0.4735	2.688	0.007**
Economic Constraints	384	3.6904	3.6971	0.4439	16.256	<0.001**
Demand Constraints	384	2.5043	2.4716	0.5292	13.464	<0.001**
Market Constraints	384	3.1188	3.1286	0.5714	3.625	<0.001**
Technical Constraints	383	3.3778	3.3368	0.4555	12.927	<0.001**
Social Constraints	384	3.7132	3.7074	0.4876	16.118	<0.001**

Source: Primary data

Table 6.18 describes the mean, median and standard deviation of the 6 constraints like supply side constraints, economic constraints, demand constraints, market constraints, technical constraints and Social Constraints Wherein Mean, Median and standard deviations are positively signed. Null hypothesis is rejected @5% level of significance and it is inferred that all constraints are positively existed among the population. Out of these six constraints all constraints except demand constraints will greatly affect the dairy farmers as per the mean value obtained.

6.7.2: Gender and Constraints faced

H₀: There is no significant difference between male and female relating to Supply Constraints, Economic Constraints, Demand Constraints, Market Constraints, Technical Constraints and Social Constraints among milk farmers in Kerala.

Table 6.19

Gender wise difference in Constraints faced by Dairy Farmers: Mann Whitney U test results

Constructs	Gender	N	Mean Rank	Sum of Ranks	Z value	P value
Supply Constraints	Male	262	189.83	49735.50	-0.693	0.488
	Female	122	198.23	24184.50		
	Total	384				
Economic Constraints	Male	262	206.65	54143.50	-3.673	<0.001**
	Female	122	162.10	19776.50		
	Total	384				
Demand Constraints	Male	262	193.75	50761.50	-0.324	0.746
	Female	122	189.82	23158.50		
	Total	384				
Market Constraints	Male	262	193.85	50788.50	-0.352	0.725
	Female	122	189.60	23131.50		
	Total	384				
Technical Constraints	Male	261	201.18	52509.00	-2.386	0.017*
	Female	122	172.35	21027.00		
	Total	383				
Social Constraints	Male	262	200.74	52594.50	-2.143	0.032*
	Female	122	174.80	21325.50		
	Total	384				

Source: Primary Data

Table 6.19 narrates the mean rank and association of the six constraints namely Supply Constraints, Economic Constraints, Demand Constraints, Market Constraints, Technical Constraints and Social Constraints between male and female.

Null hypothesis is rejected at 5% level of significance and therefore there is significant difference between male and female farmers relating to Economic Constraints, Technical Constraints and Social Constraints whereas no significant difference is visible on Supply constraints, Demand constraints and Market Constraints between male and female. Considering mean rank of Supply constraints, it affects more among female farmers than male farmers. But in the case of all other constraints, it affects more among male farmers than female farmers.

These results suggest that gender as a socio - demographic variable is not linked with Economic, Technical and Social constraints and linked with Supply, Demand and Market constraints. Therefore, the results did not provide support for hypotheses relating to Economic constraints, Technical constraints and Social constraints. At the same time the result provide support for hypothesis relating to Supply constraints, Demand constraints and Market constraints.

6.7.3: Age and Constraints faced

H₀: There is no significant difference among different age group of the farmers relating to Supply Constraints, Economic Constraints, Demand Constraints, Market Constraints, Technical Constraints and Social Constraints among milk producing farmers in Kerala.

Table 6.20

**Age wise difference in Constraints
faced by Dairy Farmers: Kruskal Wallis test results**

Constructs	Age of milk producer	N	Mean Rank	Chi-Square	P Value
Supply Constraints	18-25	5	204.30	1.060	0.787
	25-40	30	189.83		
	40-55	175	186.70		
	Above 55	174	198.46		
	Total	384			
Economic Constraints	18-25	5	206.00	0.642	0.887
	25-40	30	186.33		
	40-55	175	188.78		
	Above 55	174	196.92		
	Total	384			
Demand Constraints	18-25	5	171.50	4.129	0.248
	25-40	30	201.60		
	40-55	175	180.63		
	Above 55	174	203.47		
	Total	384			
Market Constraints	18-25	5	172.40	1.274	0.735
	25-40	30	175.43		
	40-55	175	191.05		
	Above 55	174	197.48		
	Total	384			
Technical Constraints	18-25	5	99.70	5.092	0.165
	25-40	30	185.67		
	40-55	174	200.82		
	Above 55	174	186.93		
	Total	383			
Social Constraints	18-25	5	118.60	3.684	0.298
	25-40	30	178.35		
	40-55	175	200.06		
	Above 55	174	189.46		
	Total	384			

Source: Primary Data

Table 6.20 highlights the mean rank and association of Supply constraints, Economic constraints, Demand constraints, Market constraints, Technical

constraints and Social constraints among different age groups of milk producers in Kerala. The table shows that Null hypothesis is accepted in all cases at 5% level of significance which means that there is no significance difference among different age group of farmers relating all constrains explained in the table. This explains that all farmers in the different age group have the same opinion regarding of the constraints faced by them.

Considering the mean rank of Supply Constraints and Economic Constraints it affects more among the farmers in the age group 18-25. Demand constraints and Market constraints are more affected by the farmers who have the age above 55 as they have the highest mean rank. At the same time regarding mean rank of Technical constraints and Social constraints it affects more among the farmers in the age group of 40-55.

6.7.4: Marital Status and Constraints faced

H₀: There is no significant difference among different marital status of the farmers relating to Supply Constraints, Economic Constraints, Demand Constraints, Market Constraints, Technical Constraints and Social Constraints among milk producing farmers in Kerala.

Table 6.21

Marital status wise difference in Constraints faced by Dairy Farmers: Kruskal Wallis test results

Constructs	Marital status	N	Mean Rank	Chi-Square	P Value
Supply Constraints	Married	336	192.81	3.151	0.369
	Unmarried	24	204.96		
	widow(er)	22	165.36		
	separated	2	289.00		
	Total	384			
Economic Constraints	Married	336	199.85	13.391	0.004*
	Unmarried	24	127.71		
	widow(er)	22	148.18		
	separated	2	223.50		
	Total	384			
Demand Constraints	Married	336	189.48	3.340	0.342

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	Unmarried	24	220.69		
	widow(er)	22	199.41		
	separated	2	286.00		
	Total	384			
Market Constraints	Married	336	197.92	10.835	0.013*
	Unmarried	24	122.04		
	widow(er)	22	184.57		
	separated	2	215.00		
	Total	384			
Technical Constraints	Married	335	197.82	12.830	0.005**
	Unmarried	24	188.13		
	widow(er)	22	113.61		
	separated	2	125.50		
	Total	383			
Social Constraints	Married	336	196.54	5.805	0.121
	Unmarried	24	185.25		
	widow(er)	22	138.55		
	separated	2	194.50		
	Total	384			

Source: Primary Data

Table 6.21 shows the mean rank and association of Supply constraints, Economic constraints, Demand constraints, Market constraints, Technical constraints and Social constraints among different marital status of the milk producing farmers in Kerala.

The table explains that at 5% level of significance null hypothesis is rejected on Economic constraints, Market constraints and Technical constraints which means that there is significance difference among different marital status of farmers relating to these constraints. Whereas null hypothesis is accepted on Supply constraints, Demand constraints and Social constraints that means there is no significance difference among different marital status of the farmers regarding these constraints. Considering the mean rank of all constraints except Technical constraints affect more on the separated farmers. In case of Technical constraints, it affect more on the married farmers.

The result shows that there is no link between marital status of the dairy farmers in Kerala relating to Economic constraints, Market constraints and Technical constraints whereas there is link between marital status and Supply constraints, Demand constraints and Social constraints. Therefore, the hypothesis is partially satisfied.

6.7.5: Education and Constraints faced

H₀: There is no significant difference among different level of education of the farmers relating to Supply Constraints, Economic Constraints, Demand Constraints, Market Constraints, Technical Constraints and Social Constraints among milk producing farmers in Kerala.

Table 6.22
Education wise differences in Constraints
faced by Dairy Farmers: Kruskal Wallis test results

Constraints	Educational qualification of the dairy farmer	N	Mean Rank	Chi-Square	P Value
Supply Constraints	SSLC and below	289	197.30	9.325	0.156
	+2	44	170.23		
	graduation	30	187.17		
	PG	9	169.39		
	ITI/Diploma	6	175.75		
	B.Tech	3	88.83		
	Others	3	316.50		
	Total	384			
Economic Constraints	SSLC and below	289	189.58	6.091	0.413
	+2	44	201.45		
	graduation	30	197.32		
	PG	9	190.67		
	ITI/Diploma	6	259.33		
	B.Tech	3	260.83		
	Others	3	97.50		
	Total	384			
Demand Constraints	SSLC and below	289	188.01	11.938	0.063
	+2	44	234.28		
	graduation	30	188.83		
	PG	9	157.89		

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	ITI/Diploma	6	165.50		
	B.Tech	3	287.83		
	Others	3	111.00		
	Total	384			
Market Constraints	SSLC and below	289	189.65	7.268	0.297
	+2	44	211.00		
	graduation	30	161.82		
	PG	9	228.78		
	ITI/Diploma	6	244.25		
	B.Tech	3	248.67		
	Others	3	233.83		
	Total	384			
Technical Constraints	SSLC and below	288	194.13	4.025	0.673
	+2	44	191.15		
	graduation	30	180.90		
	PG	9	225.22		
	ITI/Diploma	6	158.08		
	B.Tech	3	172.50		
	Others	3	99.17		
	Total	383			
Social Constraints	SSLC and below	289	190.69	7.508	0.276
	+2	44	215.32		
	graduation	30	169.30		
	PG	9	181.11		
	ITI/Diploma	6	174.33		
	B.Tech	3	208.67		
	Others	3	318.50		
	Total	384			

Source: Primary Data

Table 6.22 explains the mean rank and association of Supply constraints, Economic constraints, Demand constraints, Market constraints, technical constraints and Social constraints among different qualification of milk producing farmers in Kerala. It shows that null hypotheses are accepted at 5% level of significance among different qualification of farmers on all constraints, that means there is no significance difference among different type of qualifications of farmers on Supply, Economic, Marketing, Demand, Technical and Social constraints. Entire farmers have the same opinion regardless of their qualifications about the different types of

constraints faced by them. Considering the mean rank Supply constraints and Social constraints affect more on the farmers having other qualification, Economic constraints, Demand constraints and Market constraints affect more on the farmers with B.Tech qualification and Technical constraints affect more on the farmers having qualification SSLC and below.

6.8: Impact of Constraints on Profitability

6.8.1: OLS Regression Analysis

Presence of constraints definitely affect the profit earning capacity of the dairy farmers. To take remedial measures it is essential to study the magnitude and nature of various constraints on the profitability of dairy farmers. For this purpose, Ordinary Least Square method (Regression) is used by which we can say that which constraints affect more and in which direction it affects the profitability of the dairy farmers.

Table 6.23

Impact of Constraints on Profitability: OLS Regression Results

	Coefficient	Std. Error	t-ratio	p-value
constant	12.5045	0.4058	30.8111	<0.0001***
Supply Constraints	-0.0287	0.0625	-0.4598	0.6459
Economic Constraints	-0.2313	0.0674	-3.4311	0.0007***
Demand Constraints	-0.1256	0.0579	-2.1670	0.0308**
Market Constraints	-0.0063	0.0511	-0.1235	0.9018
Technical Constraints	-0.0401	0.0640	-0.6276	0.5307
Social Constraints	-0.0442	0.0671	-0.6589	0.5104

Source: Primary data

The results reported in Tables 6.23 relate to the regressions of various constraint factors on the profitability of dairy farming measured by accounting profit per productive cow. As we can see, the effects of constraints on profitability are not exhaustive in the regression results. More specifically, only economic constraints and demand constraints are significant (at 1% and 5% respectively) in this regard. However, supply constraints, market constraints, technical constraints and social

constraints do not have any influence on profitability. Interestingly, all of the model's constraints have coefficients that exhibit the expected negative relationship.

6.8.2: Quantile Regression Analysis

We have already proved the Ordinary Least Squares model is often problematic; therefore, the results should be interpreted with caution. (The resulting estimates of various constraints on the conditional mean of farmers' profitability measured in terms of accounting profit per cow are not necessarily indicative of the magnitude and nature of the effects of constraints on the lower tail or upper tail of the distributions of performance measure. A more comprehensive picture of the covariate effects on farmers' profitability can be obtained by estimating a group of conditional quantile functions (Hao and Naiman, 2011).

The magnitude and type of the effects of constraints on the lower tail or upper tail of the performance measure distributions are not always reflected in the estimates of various constraints that are produced on the conditional mean of farmers' profitability as expressed in terms of accounting profit per cow. By estimating a set of conditional quantile functions, a more complete picture of the covariate impacts on farmers' profitability can be acquired.

Repeating the QR process is a well-known statistical modelling approach that adopts a general linear model to fit the conditional quantiles of the response variable without assuming the properties of the parametric distribution. (Hao and Naiman, 2011). The quantile process allows the shape of the distribution to depend on predictors (Hao and Naiman, 2011).

Table 6.24

Impact of Constraints on Profitability: Quantile Regression results

	tau	coefficient	std. error	t-ratio
constant	0.25	0.2463	0.0356	6.9156***
	0.50	0.2506	0.0671	3.7319***
	0.75	0.2405	0.0565	4.2576***
Supply Constraints	0.25	-0.5178	0.5494	-0.9425
	0.50	0.4837	1.0358	0.4669
	0.75	0.2345	0.0871	-2.6917***
Economic Constraints	0.25	-0.2879	0.0592	-4.8643***
	0.50	-0.2491	0.0116	-2.3361***
	0.75	-0.2662	0.0938	-2.8365***
Demand Constraints	0.25	0.0663	0.0509	1.3023
	0.50	0.0962	0.0959	1.0027
	0.75	-0.1414	0.0807	-1.7532*
Market Constraints	0.25	-0.0280	0.0449	-0.6238
	0.50	-0.0434	0.0846	-0.5135
	0.75	-0.0749	0.0711	-1.0530
Technical Constraints	0.25	0.0144	0.0562	0.2557
	0.50	-0.0807	0.1060	-0.7620
	0.75	-0.1369	0.0891	-1.5365
Social Constraints	0.25	-0.1152	0.0589	-1.9547**
	0.50	-0.1479	0.1111	-1.3306
	0.75	0.0119	0.0935	0.1275

Source: Primary Data

***indicates significant at 1%level **significant at 5% level

Tables 6.24 presents a summary of the QR results of this study. For each of the two QR models, we have three distinct QR estimates for quantiles that include 0.25, 0.50, and 0.75. As shown in table, the coefficients of economic constraints for profitability are significant in the model for all quantiles. In every quantile, we observe that economic constraints negatively affect the profitability of dairying; however, we observe higher and significantly negative effects of this constraint on the lower quantiles of 0.25. With regard to the other constraints, both supply and

demand constraints negatively affect the upper tail of the distribution, while social constraints impact lower tail. There is no evidence of the impact of other constraints on the profitability of dairy farming across quantiles. The insignificant effects of technical constraints on the profitability of dairy farming indicate the farmers in Kerala, now have sufficient sources to access information on technical aspects of dairy farming. This might be due to the better veterinary services offered by the dairy cooperatives and Government agencies including the government veterinary hospital. Similarly, market constraints on profitability are not evident at any of the level of the distributions.

6.8.3: Impact of constraints on profitability with farm size and channel choice as controllable variable.

6.8.3.a: OLS Regression Analysis

Different marketing channels operating in the dairy market of Kerala offered different rate for the milk they collected from the farmers which will affect the profitability of dairy farmer. Size of the farm will also influence the profitability as the size have a negative relation with the cost of production because of the economies of large-scale operation. In this situation, it will be fruitful to study the influence of various constraints on profitability along with farm size and channel choice by using Ordinary Least Square.

Table 6.25

Impact of Constraints on Profitability with farm size and channel choice as control variables: OLS Regression Results

	Coefficient	Std. Error	t-ratio	p-value
constant	12.2186	0.4074	29.9900	<0.0001***
Supply Constraints	-0.0152	0.0601	-0.2531	0.8003
Economic Constraints	-0.2373	0.0648	-3.6590	0.0003***
Demand Constraints	-0.1412	0.0558	-2.5280	0.0119**
Market Constraints	-0.0089	0.0492	-0.1816	0.8560
Technical Constraints	-0.0247	0.0619	-0.3997	0.6896
Social Constraints	-0.0546	0.0654	-0.8351	0.4042
Farm size (small, Medium, Large)	-0.1972	0.0500	-3.9430	<0.0001***
Channel choice (Coop, Non-coop, Both)	0.1997	0.0401	4.9770	<0.0001***

Source: Primary Data

Table 6.25 provides regression results on the impact of various constraints on profitability of dairy farming with farm size and channel choice as controlling variables. There is no change in the significance and sign of coefficients of significant constraints, although some differences were noticed in other cases. Accordingly, there were no considerable differences in the inferences of the two regression estimations. The results produced the evidence on the moderating effects farm size and channel choice in determining the impact of constraints on dairy profitability.

6.8.3.b: Quantile Regression analysis

To know the magnitude and nature of the effects of constraints with farm size and channel choice as controllable variable on the lower tail or upper tail of the distributions of performance measure, QR estimates is applied here. A more comprehensive picture of the covariate effects on farmers' profitability can be obtained by estimating a group of conditional quantile functions. (Kostov, P, 2013)

Table:6.26

Impact of Constraints on Profitability with farm size and channel choice as control variables: Quantile Regression Results

Variables	tau	coefficient	std. error	t-ratio
constant	0.25	0.2493	0.0717	3.4798***
	0.50	0.2558	0.0583	4.3884***
	0.75	0.2254	0.0639	3.5241***
Supply Constraints	0.25	-0.3573	1.0902	-0.3277
	0.50	-0.14630	0.0868	-1.6674*
	0.75	-0.1876	0.0973	-1.9278*
Economic Constraints	0.25	-0.3032	0.1175	-2.5809***
	0.50	-0.2953	0.0956	-3.0905***
	0.75	-0.1970	0.1049	-1.8784*
Demand Constraints	0.25	0.0589	0.1010	0.5829
	0.50	-0.1523	0.0821	-1.8550*
	0.75	-0.2018	0.0901	-2.2396**
Market Constraints	0.25	-0.0178	0.0892	-0.1990
	0.50	-0.0383	0.0726	-0.5271
	0.75	-0.0593	0.0796	-0.7451
Technical Constraints	0.25	0.0027	0.1123	0.0240
	0.50	-0.0276	0.0913	-0.3020
	0.75	-0.0856	0.1002	-0.8541
Social Constraints	0.25	-0.1016	0.1184	-0.8581
	0.50	-0.1199	0.0963	-1.2445
	0.75	-0.0204	0.1057	-0.1933
Farm size (small, Medium, Large)	0.25	-0.0353	0.0893	-0.3956
	0.50	-0.1935	0.0726	-2.6650***
	0.75	-0.1626	0.0797	-2.0414**
Chanel choice	0.25	0.2795	0.0543	5.1471***
	0.50	0.1411	0.0422	3.341***
	0.75	0.1646	0.0381	4.3186***

Source: Primary Data

*** indicate significant at 1% level ** indicate significant at 5% level

Table 6.26 provides the quantile estimations of different constraints on dairy profitability. On comparing the results reported in Table 6.26, no noticeable differences were found with regard to the effects of constraints on profitability of upper and lower distribution of the sample. In other words, there is no evidence of asymmetric impact of constraints on profitability of dairy farming. Among the constraints, only economic constraints were found to be significant across distribution. However, supply constraints are now significant for median level distribution along with upper tail distribution. Demand constraints are persisting only for upper tail distribution as in the previous results. The moderating effects of farm size and channel choice are quite evident across all quantiles, where the impact of farm size is found negative and that of channel choice are positive.

Table Summary of hypotheses test results

No.	Hypothesis	Statistical Test	Conclusion
1	Multiple factors that include demand, price, supply, finance, procurement and other services contribute positively to the profitability of dairy farming in Kerala.	Sign Test, OLS Regression, Cross Sectional Quantile Regression	Price factors, procurement factors, other services and demand factors are significant. However, supply and financial support factors do not have any impact on profitability. The coefficients all significant factors in the model show that they have positive relationship with profitability.
2	Multiple factors, including demand, price, supply, finance, procurement and other services influence the selection of marketing channel by dairy farmers	Discriminant Analysis	Price factor is the most important factor, which discriminates between the channel choice of dairy farmers, followed by supply, and demand factors.
3	Dairy farmers in Kerala face various challenges/constraints relate to supply, demand, marketing, economic, technical and social factors	Mean score analysis, Sign Test, Mann Whitney U test, Kruskal Wallis	Out of these six constraints all constraints except demand constraints will greatly affect the dairy farmers. Demographic factors such as

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	each at different levels	H test,	gender and marital status have some relationship with economic, technical, market and social constraints.
4	The challenges/constraints faced by farmers concerning supply, demand, marketing, economic, technical and social factors adversely impact their profitability	OLS Regression Analysis and Cross-sectional Quantile Regression Analysis	The effects of constraints on profitability are not exhaustive; only economic constraints and demand constraints are significant. Supply constraints, market constraints, technical constraints and social constraints do not have any influence on profitability. The coefficients exhibit the negative relationship.

CHAPTER VII

PROSPECTS OF DAIRY FARMING IN KERALA

7.1: Introduction

This chapter deals with the future prospects of dairy farming and farmers' satisfaction towards various services offered by marketing channels in Kerala. The future prospects of dairy farming can be significantly tied to farmers' satisfaction levels and their intentions to continue with dairying as their source of livelihood. Dairy farmers' decisions to continue in dairying are influenced by a range of factors, including economic stability, market trends, access to technology, needed infrastructure, government policies and other related services like healthcare and insurance services. The farmers' expectation about the presence of various support services in future shall influence them to take decision whether to continue or not in dairy farming activities. This chapter explains the various factors that possibly shape the future prospects of dairying as the means of earnings for farmers. It also examines level of satisfaction of dairy farmers with regard to various services related to demand, price and incentives, supply, financial support, procurement and other services offered by the marketing channels they opt and assesses how the farmers' satisfaction influence them to continue in dairying as their occupation.

7.2: Factors Influencing the Future Prospects of Dairy Farming

7.2.1: Exploratory Factor Analysis

The future prospects of dairy farming in Kerala can be influenced by multiple factors. Here, at first an Exploratory Factor analysis (EFA) has been administered to identify the main factors that describe the perception of dairy farmers towards the future prospects of dairying in Kerala. EFA is a multivariate statistical technique that reduces different input variables into a specified number of factors.

The research uses Principal Component Analysis (PCA) method to reduce the 57 item variables those have been considered to be affecting the perception of dairy farmers about the future of dairy farming as a means of livelihood. Kaiser-Meyer-Olkin test and Bartlett's Test of Sphericity measure of sampling adequacy shall determine the suitability of EFA for this purpose.

Table 7.1

KMO and Bartlett's test of sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	Bartlett's Test of Sphericity (Approx. Chi-Square value)	p value
0.818	16003.217	0.000*

Source: Survey data

*Significant at one per cent level

The KMO statistics presented in Table 7.1 indicate the ratio of the squared correlations among the variables to the squared partial correlations. The KMO statistic ranges from 0 to 1, with Kaiser (1974) recommending values above 0.5 as acceptable. In this study, the KMO value is 0.818, suggesting that exploratory factor analysis (EFA) is suitable for the data. Additionally, Bartlett's test evaluates the null hypothesis that the original correlation matrix is an identity matrix, which would imply that all correlation coefficients are zero. For factor analysis to be valid, there must be some correlation among the variables, meaning the correlation matrix cannot be an identity matrix. The results indicate that there are indeed relationships among the variables that warrant inclusion in the analysis. In this study, Bartlett's test yields a highly significant result ($p < 0.001$), confirming that factor analysis is appropriate. Consequently, the study proceeds with principal components factor analysis on all independent variables assessed through 57 items.

Table 7.2
Total variance explained

Component	Initial Eigenvalues			Rotated Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.107	24.749	24.749	7.852	26.385	26.385
2	4.679	18.210	32.958	3.679	13.025	39.410
3	3.629	13.367	39.325	3.229	9.628	49.038
4	2.387	8.714	44.039	2.687	8.145	57.183
5	1.983	6.006	48.045	2.483	7.811	64.994
6	1.391	3.843	51.888	2.191	6.858	71.853
7	1.028	3.509	55.398	2.203	6.542	78.394

Extraction Method: Principal Component Analysis.

Source: Survey data

Table 7.2 presents the total variance attributed to each component along with their Eigenvalues. From the data, seven significant factor components have been identified. By applying Kaiser's criterion, which retains only those variables with Eigenvalues exceeding one, it is observed that the first component accounts for 24.749% of the total variance, the second for 18.210%, the third for 13.367%, the fourth for 8.714%, the fifth for 7.811%, the sixth for 3.843%, and the final component for 3.509%. Collectively, these seven factor components explain 78.394% of the total variance. The analysis, utilizing varimax rotation with Kaiser Normalization, has revealed the emergence of these seven factors. Based on the correlation between items within a factor and the similarity in their contributions while shaping the future prospects of dairying, we label these factors as:

Factor 1: Breeding factors- First factor comprises of five items, use of sexed semen technology, strengthening indigenous breed, improving artificial insemination, Provision of proper treatment for infertility, Cross breeding and

Selective breeding, Mobile Artificial Insemination dispensary and Genetic improvement.

Factor 2: Feeding factors- Nine items denotes the feeding related actions required for the future prospects are-Production of quality seeds for fodder varieties, install more plants to make bypass protein and bypass fat feed, mineral combination, complete mixed diet, and cow feed. encouraging post-harvest practices including the use of chaff cutters for silage production and fodder processing, fodder block technology, Adoption of Ration Balancing Programme, Centralized fodder cultivation by using Kudumbasree and selling the same through dairy cooperatives, Subsidized cattle feed and more incentives for fodder cultivation, Allotting vacant agricultural land for fodder farming, Mobile app for feed cultivation and balanced feeding.

Factor 3: Animal health related factors- Eight items related to the health management for animals. They include train farmers to help them to understand cows for signs of illness, Facilities for routine vaccination/immunization and diagnostic laboratory, Affordable veterinary services in time, Adoption of Information Network for Animal Productivity and Health(INAPH), Awareness camps to help farmers early detection of diseases, Encourage farmers for regular deworming, Encourage farmers to use kits available for early detection and prevention of sub-clinical mastitis and Promoting the practice of using Ethnoveterinary Medicines.

Factor 4: Herd management- Herd management practices cover eight items. They are Hands of training with continuous follow up of performance, Production cost reduction through increased productivity, improve animal healthcare and breeding facilities, Scaling up through increase farm size, Reduce stress level: cows are untethered and have individual pens with rubber mat, Music play in the milking parlor, Regular technical guidance about scientific feeding, breeding, healthcare and management practices through TV, Social media etc., and Improve scope of production by including more productive buffalo.

Factor 5: Infrastructure related: Five items explain the infrastructure management defined by development of proper production, process and marketing infrastructure to meet quality requirements, Developing specific dairy export zone, Provide chilling and storage facilities at village levels, Setting up food parks for providing infrastructure to small dairy product units and Promote milk processing cluster are the important support facilities to be provided for the infrastructure development that is essential for the future of the dairying.

Factor 6: Market related- Twelve items related to marketing aspects such as focus on value added products, Advertising by giving emphasis on nutritional value on consuming dairy products, Ensure reasonable price to farmers, Setting up of more dairy co-operatives, Marketing of A2 milk- milk from indigenous cattle, Ensure price competency across product categories, Implementing internationally compatible and future oriented policies, Creating exportable surplus across product categories and Effective international campaign putting emphasis on the goodness of indigenous products are the various market related support service provided to the farmers to motivate them to remain in the industry.

Factor 7: Other services related- Ten items explain the other services related factor. These items defining other services are Package proposals for farmers by banks and other financial institutions, Comprehensive Insurance coverage for all risk at affordable rate, Attract young people to run dairy farm by changing their attitude, Promote more investment in dairy farming through offering incentives and subsidies, Promote more research in the dairy sector, Encourage more start-up in dairy sector, Improve the availability and access to credit facilities for small dairy farmers, Treat dairy farm loan as agricultural loan for getting additional subsidy to the farmers, Offer additional tax benefits for small dairy products units and Organizing animal welfare camp, awareness camp etc.

Table 7.3

Farmers' expectations on Dairy Farming: Factors Emerged

		Component						
		1	2	3	4	5	6	7
A	Breeding Factors							
1	Use of sexed semen technology	0.816						
2	Focus on strengthening indigenous breed	0.709						
3	Proper treatment for infertility and cross/selective breeding	0.621						
4	Mobile Artificial Insemination dispensary	0.597						
5	Genetic improvement	0.528						
B	Feeding Factors							
1	Production of quality seeds for fodder varieties		0.843					
2	More plants to produce cattle feed, mineral mixture etc.,		0.728					
3	Production of fodder by using cluster approach		0.707					
4	Promotion of fodder block technology, silage making et.,		0.65					
5	Adoption of Ration Balancing Programme		0.628					
6	Centralized fodder cultivation by using Kudumpasree		0.592					
7	Subsidized cattle feed and more incentives for fodder cultivation		0.564					
8	Allotting vacant agricultural land for fodder farming		0.532					
9	Mobile app for feed cultivation and balanced feeding		0.508					
C	Animal Health Related							
1	Train farmers to understand cows for signs of illness			0.834				
2	Facilities for routine vaccination/immunization and diagnostic laboratory			0.778				
3	Affordable veterinary services in time			0.768				
4	Adoption of Information Network for Animal Productivity and Health (INAPH)			0.632				
5	Camps to impart awareness about animal health management.			0.608				
6	Regular deworming			0.587				
7	Make available Kits for early detection and			0.534				

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	prevention of sub-clinical mastitis							
8	Using of Ethnoveterinary Medicines			0.512				
D	Herd Management Related							
1	Hands of training with continuous follow up				0.844			
2	Optimal farm operation by harmonizing land, animals and skills				0.772			
3	Production cost reduction through increased productivity, animal healthcare and breeding facilities				0.734			
4	Scaling up through increasing farm size				0.709			
5	Reduce stress level: cows are untethered and have individual pens with rubber mat				0.687			
6	Music play in the milking parlor				0.632			
7	Guidance about scientific feeding, breeding and healthcare practices through TV, social media etc				0.563			
8	Improve scope of production by including more productive buffaloes				0.521			
E	Infrastructure Related							
1	Development of more production, process and marketing infrastructure.					0.832		
2	Developing specific dairy export zone					0.738		
3	Provide chilling and storage facilities at village levels					0.702		
4	Setting up food parks to help small dairy products units					0.643		
5	Promote milk processing cluster					0.562		
F	Market Related							
1	Focus on value-added products						0.943	
2	Advertising by giving emphasis on nutritional value on consuming dairy products						0.928	
3	Ensure reasonable price to farmers						0.877	
4	Setting up of more diary co-operatives						0.85	
5	Marketing of A2 milk- milk from indigenous cattle						0.828	
6	Ensure price competency across product categories						0.792	
7	Implementing internationally compatible and future oriented policies						0.763	
8	Creating exportable surplus across product categories						0.632	
9	Effective international campaign putting						0.608	

	emphasis on the goodness of indigenous products							
10	Effective packaging and branding of milk products produced by small farmers						0.586	
11	Centralized marketing by dairy cooperatives by using umbrella brand.						0.563	
12	Make use of social media platform for marketing of dairy products						0.504	
G	Other Services Related							
1	Package proposals for farmers by banks and other financial institutions							0.894
2	Comprehensive Insurance coverage for all risk at affordable rate							0.828
3	Attract young people to run dairy farm by changing their attitude							0.775
4	Promote more investment in dairy farming through offering incentives and subsidies							0.762
5	Promote more research in the dairy sector							0.725
6	Encourage more start-up in dairy sector							0.692
7	More access to credit facilities for small dairy farmers							0.633
8	Treat dairy farm loan as subsidized agricultural loan							0.582
9	Additional tax benefits for small dairy products units							0.538
10	Organizing animal welfare camp, awareness camp etc.							0.500

Source: Survey data

7.3: Future Factors Influencing Farmers' Intention to Stay in Dairy Farming:

7.3.1: Binary Logistic Regression using Stepwise Procedure

Binary Logistic Regression was employed to the collected data for studying the relationship between the response variable and combination of explanatory variables to find the most important predictors that discriminate the farmers' intention to stay. Table 7.4 gives the information of model fitting showing the statistical significance of the final X^2 .

Table 7.4

Model fit information: Binary logistic regression

Model	Model Fitting criteria -2 Log likelihood	Likelihood Ratio tests	
		χ^2	P Value
Intercept only	287.652	261.778	0.000*
Final	25.784		

Survey data

Table 7.4 reveals that when including only the constant, the value of -2 log likelihood of basic model was 287.652, and this value has decreased to 25.784 with the existence of the set of explanatory factors in the model. The value of the χ^2 was 261.778 which is significant at one per cent level. Hence, we infer that there is a significant connection between the explanatory factors and the response variable of intention to stay according to dairy farmers in Kerala.

Table 7.5

The pseudo R² of Binary Logistic Regression

R ²	Value
Cox & Snell	0.658
Nagelkerke	0.820

Survey data

Table 7.5 shows that farmers' intention to stay shows responsive to about 65.8% of the variance in explanatory factors according to Cox & Snell R² value, and 82% according to Nagelkerke R² value which is the modified form of Cox & Snell coefficient.

Table 7.6

Farmers intention to stay in dairy farming: Logistic Model Regression Results

S.L No.	Tests of Equality of Group Means						
	Prospective factors	β	SE	Wald	df	Sig.	Ex(β)
1	Breeding	0.952	0.21	20.571	1	0	2.592
2	Feeding	0.858	0.267	10.295	1	0.001	2.358
3	Infrastructure	0.493	0.247	3.990	1	0.046	0.611
4	Constant	-5.189	1.314	15.603	1	0	0.006

Survey data

The estimation of parameters of the logistic regression by using the Forward Stepwise (Likelihood Ratio) method based on Wald statistic for the final model is reported in Table 7.6. The results of fitting the logistic regression model to the data on intention to stay and corresponding coefficients, which are used in the equation for making the classifications in logistic regression indicate that breeding, feeding and infrastructure factors are the most critical in influencing the farmers' decisions in this regard.

7.4: Factors contributing to Farmers' satisfaction

A satisfied consumer definitely will decide to continue in dairying. The satisfaction is the result of profitability which in turn depends on various factors which are grouped here under different categories such as supply related, demand related, price related, financial support related, procurement related and other service related. Here statistical tools such as Mean score analysis and Binary logistic regression are used to study the impact of various factors on satisfaction that leads the farmers to remain in dairying.

7.4.1: Mean Score Analysis

Mean score analysis is used for the purpose of identifying the most influencing factors that help the farmers satisfied about the marketing channel they opted for marketing their produce.

Table: 7.7

Mean score analysis result

Factors	Number of farmers	Mean	St. Deviation
Demand	384	3.650	0.634
Price and Incentives	384	3.030	0.738
Supply	384	3.230	0.504
Financial Support	384	2.490	0.540
Procurement	384	3.328	0.681
Other Services	384	2.808	0.534
Overall Satisfaction	384	3.088	0.421

Source: Primary data

Table 7.7 shows that regarding the level of satisfaction, dairy farmers are satisfied with the services of their marketing channel particularly on demand related, procurement and supply related services. Along with the level of overall satisfaction, the satisfaction on price and incentives recorded at an average level, while on remaining factors, financial support and other services it is recorded at a lower level. Channel wise comparison of the mean satisfaction scores revealed that the satisfaction level of dairy farmers who have opted both cooperatives and non-cooperatives are more satisfied with the services than the others.

7.5: Farmers' satisfaction and their intention to stay in dairy farming:

7.5.1: Binary Logistic Regression using Stepwise Procedure

Binary Logistic Regression was employed to the collected data for studying the relationship between the farmers' intention to stay and combination of explanatory scores that reveals their satisfaction on different dimensions of channel services. Table 7.8 provides the information of model fit indicates the statistical significance of the final X^2 .

Table 7.8

Model Fit Information: Binary Logistic Regression

Model	Model Fitting criteria -2 Log likelihood	Likelihood Ratio tests	
		χ^2	P Value
Intercept only	175.154	92.348	0.000*
Final	82.806		

Source: Primary data

Table 7.8 indicates that while including only the intercept, the value of -2 log likelihood of basic model was 175.154, and this value has decreased to 82.806 with the presence of the set of explanatory factors in the model. The value of the χ^2 was 92.348 which is significant at one per cent level. Hence, we infer that there is a significant association between the satisfaction of farmers and the response variable of their intention to stay in dairy farming.

Table 7.9

The pseudo R² of Binary Logistic Regression

R ²	Value
Cox & Snell	0.692
Nagelkerke	0.757

Source: Primary data

Table 7.9 shows that according to Cox & Snell R² value, 69.20% and Nagelkerke R² value, 75.7%, farmers' satisfaction with dairy farming has the explained variance in their intention to stay.

Table 7.10**Impact of dairy farmers' satisfaction on their intention to stay in dairy farming: Logistic Model Regression Results**

S.L No.	Tests of Equality of Group Means						
	Satisfaction	β	SE	Wald	df	Sig.	Ex(β)
1	Demand	0.882	0.194	20.735	1	0.000*	2.417
2	Price and incentives	0.465	0.197	5.55	1	0.018**	0.628
3	Financial support	0.776	0.255	9.262	1	0.002*	2.173
4	Procurement	0.917	0.226	16.403	1	0.000*	0.400
5	Other services	0.86	0.308	7.783	1	0.005*	0.423
6	Constant	1.776	0.884	4.037	1	0.045**	5.908

Source: Primary data

*Significant at 1% level, ** at 5% level

Table 7.10 presents the estimated parameters of the logistic regression obtained through the Forward Stepwise (Likelihood Ratio) method using the Wald statistic. The findings from fitting the logistic regression model to the data regarding the intention to remain in dairy farming, along with the associated coefficients for farmers' satisfaction, suggest that factors such as satisfaction with procurement facilities, demand-related aspects, financial support services, pricing and incentives for milk producers, and other services provided by marketing channels significantly influence farmers' intention to persist in dairy farming. Excluding price and incentives, all other factors exhibit statistical significance at the 1% level. Accordingly, it is imperative for milk marketing channels and agencies to enhance their services to dairy farmers. Such improvements could play a crucial role in boosting milk production within the state, thereby improving the livelihoods and living standards of rural communities. Hence, dairy marketing channels at both cooperative and non-cooperatives should concentrate more on these services to retain more farmers in the dairying field there by making Kerala more self-reliant in milk production and gaining inclusive growth.

Table Summary of hypotheses test results

No.	Hypothesis	Statistical Test	Conclusion
1	Dairy farming in Kerala has good future prospects that influence the intention of the farmers to remain in dairying.	Exploratory Factor Analysis (EFA), Binary Logistic Regression	EFA identified seven significant factors that will contribute in shaping the future of dairy farming.
			The results of logistic regression indicate that breeding, feeding and infrastructure factors are the most critical in influencing the farmers' decisions to remain in dairying.
2	The level of satisfaction among dairy farmers regarding various aspects of their operations place a significant role in their decision to continue in dairy farming.	Mean score analysis, Binary Logistic Regression	Mean score results shows that dairy farmers are satisfied with the services of their marketing channel particularly on demand related, procurement and supply related services
			The findings from fitting the logistic regression model suggest that factors such as satisfaction with procurement, demand, financial support, pricing and incentives, and other services provided by marketing channels significantly influence farmers' intention to continue in dairy farming.

CHAPTER VII

FINDING AND CONCLUSION

This research investigates dairy marketing in Kerala from the perspectives of dairy farmers, focusing on their socioeconomic profile, challenges faced, and the ensuing impacts on farm profitability. Using a descriptive research design, the study collected data from 384 dairy farmers across three leading milk-producing districts in Kerala. Respondents in the cooperative system were chosen using a multistage random sampling technique, while those in the non-cooperative system were chosen using snowball sampling. The study adopts a non-parametric and non-linear approach for data analysis. The main objectives of this research include:

1. To identify the main factors that influence the profitability of dairy farming in Kerala
2. To examine the various factors that discriminate the selection of marketing channels for dairy products among farmers in Kerala.
3. To investigate the major constraints faced by dairy farmers and their impact on the profitability of farming activities in Kerala
4. To identify the strategic factors that shape the future of dairy farming and their effect on intention of farmers to stay in dairy farming.
5. To assess the level of satisfaction among farmers regarding different aspects of channel services and its effects on their intention to continue in dairy farming.

7.1: Findings of the study

Socio-economic Profile of dairy farmers in Kerala

Most of the farmers are male, middle-aged or older, and operate small farms. There is a significant gender gap in dairy farming, with males more likely to own

dairy farms, particularly medium and large ones. This suggests that as farm size increases, female involvement decreases abruptly. Small farms dominate transversely all age groups, making up 76.3% of the total, but medium and large farms are mainly owned by older farmers. The aging farmer population and absence of young farmers might raise worries about the long-term sustainability of dairy farming unless efforts are made to inspire younger people to engage in dairying. A strong cultural prominence on marriage exists among dairy farmers, with most being married and few being unmarried or widowed. A majority of farmers have education limited to secondary school or below, which may affect their access to advanced agricultural techniques and economic opportunities. However, their family members are attaining higher education levels, indicating a welcome shift in educational accomplishment over time.

While 32% of farmers trust on dairying as their primary income, 70.3% use it as a secondary occupation, underscoring its importance as a supplementary economic activity. The majority of farmers are in the lower-income group, which replicates the dairy sector's challenges, including low productivity and profitability due to various constraints. Most farmers earn between 500 and 2000 rupees daily, with only a small percentage earned substantial returns.

The most preferred breed of milking cow among the dairy farmers in Kerala is Jersey followed by Holstein Friesian. Jersey cattle have a lactation period of 10.97 months and produce the highest average daily milk yield of 23.5 liters. Holstein Friesians have a longer lactation period of 11.85 months, yielding 21.81 liters per day.

Milk production levels are normally moderate, with most farmers producing between 11 and 30 liters daily, and earnings are typically modest, with few farmers making high returns. There is a sturdy preference among the dairy farmers for using both cooperative and non-cooperative marketing channels for marketing their produce. Milk marketing channels show that direct sales to consumers and home delivery yield the highest prices, around 60.5-60.7, while cooperatives offer the lowest average price at 45.34. Farmers receive higher prices when selling directly or

through more personalized channels, while cooperative provide lower, but potentially more stable, returns. Only a limited number of dairy farmers (1.01%) are ready to sell value added product. All of them prefer to sell raw milk.

Most dairy farmers both sell and use cow dung for agriculture. Income earned from cow dung sales vary, with many farmers earning less than Rs.1000 per month. Farmers earn income from the birth of calves and heifers, with heifers providing higher income. The average income from calves and heifers is Rs.13,361.47 and Rs.17,422.22, respectively. Cost of labor and feed dominate dairying costs, with financial and medical expenses being comparatively lower. Crossbred cows are the most expensive and the most popular among dairy farmers in Kerala, with an average cost of Rs.55,965.91. Farmers constructing cattle sheds spend significantly more on concrete structures (Rs.189,419), while those opting for sheet/tile roofs spend about half as much (Rs.92,661). Katcha sheds are the cheapest option, costing Rs.43,250 on average.

Profitability of dairy farming

The profitability of dairy farming is greatly influenced by the price offered by the marketing channel. The study reveals that the accounting profit per cow is more for those farmers who sell their produce in the non-cooperative segment of the dairy market. The major reason for this is the highest price offered by this sector to the farmers compared to the dairy cooperatives.

Profitability of the farmers is also influenced by the size of the firm. The study reveals that when size increases the accounting profit per productive cow is decreasing. The potential reason behind is that the cost of hired labour used by the large farmers which is normally met by the small farmers by their own labour.

The Kendall's tau correlation result of dairy farming profitability with channel choice and farm size shows that there is statistically significant relationship between both of these controlling variables on dairy farming profitability. At the same time farm size have a negative relationship with dairy profitability i.e., when farm size increases the accounting profit per productive cow are decreasing.

The regression analysis of various factors on the profitability of dairy farming measured by accounting profit per cow reveals that the effect of factors on profitability is not exhaustive. Price factors, Procurement factors and other services are significant at 1% level and demand factors are significant at 5% level. However, Supply and Finance factors do not have any impact on profitability. It is interesting to note that the coefficient of all significant factors has positive relationship.

The quantile regression study shows that the coefficient of procurement factors and other services are significant for all quantiles and these factors positively affect the profitability of dairying. The demand factors positively affect the lower tail of the distribution, the price factors positively affect the lower and middle tail and the supply factors positively affect the middle and upper tail. But the financial support factors have no effect at all on profitability.

The OLS Regression result of factors on profitability with farm size and channel choice as controllable variable shows the evidence on the moderating effect farm size and channel choice in determining the impact of factors on dairy profitability.

Selection of marketing channels

Mean score analysis shows that all of the demand side factors, financial support and assistance factors, procurement factors and other services and most of the price and incentive factors have greater influence on the dairy marketing activities. But the supply side factors have limited impact of the dairying activities.

Standardized Canonical Discriminant Function Coefficients helps to interpret the discriminant coefficient exactly in the same way as a regression coefficient. The absolute values of the coefficients in standardized discriminant function indicate the relative contribution of the variables in discriminating between the two groups.

Group mean of the predictor variables show that among the six factors identified the farmers who have opted cooperative and non-cooperative channels have higher perception on demand factors, supply side factors, procurement factors and price factors. Those who depends both the channel for marketing their produce

found leverage in the differences between the two channel choices in term of most factors.

Standardized canonical discriminant function coefficient with factor scoring indicates that price factor is the most important factor, which discriminate between the channel choice of dairy farmers, followed by supply side and demand factors.

Constraints faced by the Dairy Farmers in Kerala

Dairy farmers in Kerala faces various challenges/constraints relate to supply, economic, demand, marketing, technical and social factors at different level. However, the existence of demand constraint is only at a low level. This is because of greater demand for milk in Kerala. Even during the flush season, the domestic milk production is not sufficient to meet the demand.

The effects of constraints on profitability are not exhaustive in the regression results. More specifically, only economic constraints and demand constraints are significant (at 1% and 5% respectively) in this regard. However, supply constraints, market constraints, technical constraints and social constraints do not have any impact on profitability. It is interesting to note that the coefficients of almost all the constraints in the model have their expected negative relationship. The study reveals that the impact of all constraints on profitability is negative. The regression result on the impact of various constraints on profitability with farm size and channel choice as controlling variable produced the evidence on the moderating effect farm size and channel choice have in determining the impact of constraints on dairy profitability.

The Quantile Regression result of the study having three distinct QR estimates for quantiles that include 0.25,0.50 and 0.75 reveals that the coefficient of economic constraints for profitability is significant in the model for all quantiles. In every quantile economic constraint negatively affect the profitability. Both supply and demand constraints negatively affect the upper tail of the distribution, while social constraints impact the lower tail. There is no evidence of the impact of other constraints such as technical and market constraints on the profitability of dairy farming across the quantiles.

Future prospects of Dairy Farming and Farmers' intention to stay in dairying.

The exploratory factor analysis, utilizing varimax rotation with Kaiser Normalisation, has identified breeding, feeding, animal health, herd management, infrastructure, market and other service are the seven factors that can shape the future prospects of dairy farming in Kerala.

When, the binary logistic regression model framed in the research relate these factors 'along with profitability' with farmers' intention to stay in dairying, it is revealed that feeding, breeding and infrastructure are the most critical in influencing the farmers' decision to stay in the sector.

Farmers' Satisfaction towards Marketing Channel services and their decision to continue in dairy farming

Regarding the level of satisfaction, dairy farmers are satisfied with the services of their marketing channel particularly on demand related, procurement and supply related services. Along with the level of overall satisfaction, the satisfaction on price and incentives recorded at an average level, while on remaining services, financial support and other services it is recorded at a lower level. Channel wise comparison of the mean satisfaction scores revealed that the satisfaction level of dairy farmers who have opted both cooperatives and non-cooperatives are more satisfied with the services than the others.

Binary logistic regression results show that the factors such as satisfaction with procurement facilities, demand related aspects, financial support services, pricing and incentives for milk producers and other services provided by marketing channels significantly influence farmers' intention to stay in dairy farming. It is imperative for the marketing channels to enhance their services to dairy farmers. Hence, dairy marketing channels at both cooperative and non-cooperatives should concentrate more on these services to retain more farmers in the dairying field there by making Kerala more self-reliant in milk production and gaining inclusive growth.

7.2: Suggestions

1. The future of dairy farming in Kerala appears promising. There is a significant demand for milk in the state that current domestic production levels cannot satisfy. Therefore, it is essential for state policy initiatives to be supportive of farmers, and the government should allocate adequate funding to provide subsidies and incentives to assist them.
2. Cooperatives must enhance their competitiveness against non-cooperative entities, which tend to offer higher prices for milk to farmers. If cooperatives are unable to match these prices, they should consider providing additional value-added services to farmers, such as increased subsidies for cattle feed, and free or subsidized veterinary medicines and insemination services.
3. There is a pressing need for new investments in research and development to create high-yielding breeds and improve the genetic quality of livestock. This advancement will enable farmers to benefit from economies of scale, which directly impacts farm profitability.
4. Currently, dairy cooperatives primarily focus on collecting milk from farmers. In the future, it is crucial to encourage farmers to engage in value addition, with cooperatives taking on the responsibility of marketing these enhanced products on behalf of the farmers.
5. The policy makers in the State need to develop a comprehensive development of the Dairy and Animal Husbandry sector through modernization and mechanization, create a supportive environment that enables farmers to continue in the field with dignity and satisfaction. Kerala requires a well-structured fodder plan to enhance fodder production.
6. Efforts should focus on promoting commercial fodder production with assured markets facilitated by cooperative societies and integrating fodder cultivation into the MGNREGS program. Cultivating fodder on wastelands should be encouraged, leveraging initiatives such as Kudumbasree units or self-help groups.

7. Farmers must be trained to adopt sustainable practices and enhance productivity from a field-level perspective. Additionally, milk producers need strong and reliable marketing networks to maximize the benefits of their efforts.
8. To address emerging challenges, the existing institutional framework in the livestock sector needs restructuring and revitalization. This includes enhancing institutional efficiency and fostering innovative models to support livestock sector development. Grassroots participatory organizations should be promoted across the state, serving as a vital link between the animal husbandry department and smallholders.

7.3: Future studies

The current research investigates the multiple dimensions of dairy marketing in Kerala, concentrating on specific blocks in the state's high milk-producing regions. Subsequent studies may consider extending the analysis to low milk-producing areas to determine the factors contributing to the people's disinterest in dairy farming, the challenges they face, and the support they seek. Furthermore, comparative analyses with neighboring states that excel in dairy production in South India, including Tamil Nadu, Andhra Pradesh, Telangana, and Karnataka, could yield significant insights into dairy marketing, which could inform effective policy measures for the State. There is an increase in the number of private players in dairy marketing, most of them sell milk and milk products in Kerala by importing milk from the neighboring states poses severe threat to the sustainable development of dairying, which necessitate in-depth study. Even though, there is a steep increase in the demand for value-added milk products, most of the marketers in Kerala focus on the sale of fluid milk only, which is met by the marketers from the neighboring states; this also demand further research.

7.4: Conclusion

This study examined dairy marketing in Kerala from the perspectives of dairy farmers. Utilizing a descriptive research design, data was collected from 384

dairy farmers across three prominent milk-producing districts in Kerala. The findings indicate that the profitability of dairy farmers is significantly influenced by the prices set by the marketing channels. Dairy farmers in Kerala face various challenges and constraints related to supply, economic conditions, demand, marketing, technical issues, and social factors at different levels. Although the models do not comprehensively cover all constraints, their impact on profitability is apparent. Statistically significant relationships exist between dairy farming profitability, channel selection, and farm size.

Several factors, including demand, pricing, supply, financing, procurement, and additional services, affect the selection of marketing channels. The coefficients derived from the standardized discriminant function reveal that price is the most critical factor distinguishing among channel choices, followed by supply factors, financial assistance, and demand considerations. Dairy farmers believe that the future of dairying in Kerala is promising, provided that adequate support is available for related services, health management, market conditions, feeding, and infrastructure. The results of the binary logistic regression, in conjunction with profitability, indicate that feeding, breeding, and infrastructure are the most significant factors influencing their intention to remain in the industry.

Satisfaction of dairy farmers with some aspects of channel operations is a prerequisite for the continuity of dairy farming. Farmers are satisfied with the services offered by their marketing channels, with the demand, procurement and supply services having the highest satisfaction level. Dairy farmers who cooperate with both types of marketers (cooperatives and non-cooperatives) reported higher than average degrees of satisfaction with services compared to other group members of different channels in comparative analysis. However, the findings of this research are not exhaustive and more such studies are necessary for strengthening the system and engaging measures not just to retain the present farmers, but also to form new entrants to the sector thereby increasing the milk production and make it a self-sustaining state.

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APPENDICES

Questionnaire for PhD Thesis (DAIRY MARKETING IN KERALA)

A: General Particulars

1. Name and address
2. Gender Male / Female /others
3. Age of milk producer
 - a) 18-25 b) 25-40
 - c) 40-55 d) Above 55
4. Marital status: Married/ Unmarried/ widow(er)/separated/others
5. Educational qualifications:
 - a) SSLC and below b) +2 c) graduation
 - d) PG e) ITI/Diploma f) B.Tec g) Others
6. Highest Educational qualification of family members
 - a) SSLC b) +2 c) Degree d) PG e) Technical
7. Main occupation
8. Subsidiary occupation
9. Total number of members in your family: a) 1-4 b) 5-6 c) above 6
10. Monthly family income:
 - a) Below 25000 b) 25000-50000
 - c) 50000 – 75000 d) 75000- 100000 e)Above 100000
11. Average time per day you are spending for dairying activities-

B: 12. Animals details

Sl No	Particulars	Cow					Buffalo		Other animals (specify)
		Brown Swiss	Holstein Friesian	Jersey	Sindi	Others	Murrah	Surti	
1	Number of animals in milk								
2	Number of animals in dry								

13. Average Lactation and dry periods in months

	Cow					Buffalo	
	Brown Swiss	Holstein Friesian	Jersey	Sindi	Others	Murrah	Surti
Lactation period							
Dry Period							

C: Yield

14. Average milk yield per day in lactation

Animals	Cow					Buffalo		Total
	Brown Swiss	Holstein Friesian	Jersey	Sindi	Others	Murrah	Surti	
Litres								

15. Average milk used for home consumption per day: ----- litres

16. Cost for animals per month

Sl No	Particulars	Qty/No	Rate	Amount
1	Interest on loan/capital taken for purchasing animals			
2	Interest on loan/capital taken for constructing cattle shed			
2	Maintenance of cattle shed			
3	Cost of green fodder			
4	Cost of dry fodder			
5	Cost of concentrates			
6	Cost of own labour			
7	Cost of hired labour			
8	Cost of permanent labour			
9	Insurance premium			
10	Medical treatment expenses			
11	Cost of vitamins and minerals			
12	Cost of artificial insemination			
13	Cost of vaccination			
14	Cost of utilities including power, water etc			
15	Other costs			

17. Marketing of your milk per day

Mode of marketing	Milk		Milk Products			
	Qty	Rs	Qty	Rs	Qty	Rs
Direct sale to consumers						
Cooperative societies						
Local milk vendors						
Private dairies						
Shops/hotels						
Home delivery						

18. Use of cow dung produced.

- A. All quantity sold for getting income
- B. All quantity used for farming
- C. A portion sold and another portion used for farming
- D. Used for goobar gas plant for cooking
- E. Other use (specify)

18. If the cow dung is sold, how much income you get per month?

- A. Below Rs. 500
- B. Between Rs. 500 and Rs. 1000
- C. Between Rs.1000 and Rs.2000
- D. Above Rs. 2000.

19. Number of calves/heifer yield by the animals in a year:

Particular	Number
Calf	
Heifer	

20. Income received during a year from the sale of calf/heifer:

Particular	Rs.
Calf	
Heifer	

21. Cost incurred in acquiring animals

Particulars	No. of animals bought	Cost per animal	Productive life(years)
Local Cow			
Local Calf			
Local Heifer			
Crossbred Cow			
Crossbred Calve			
Crossbred Heifer			
Local buffalo			
Local Calve			
Local Heifer			
Crossbred Buffalo			
Crossbred Calve			
Crossbred heifer			
Draft Animals			

22. Cost incurred for cattle shed and store

Type of shed	No. of sheds	Total cost of construction	Average life(years)
Concrete building			
Building with sheet/tile			
Shed with coconut leaves etc			
Store			
Office building			

23. Constraints faced by dairy farmers in cooperative and non-cooperative dairies

a) Supply side constraints

SI No	Particulars	VH	H	Av	L	VL
1	There is irregular and inadequate supply of cattle feed					
2	Emergency veterinary service is not available					

3	Visit of veterinary service is infrequent					
4	Vaccine is unavailable					
5	Semen at the AI centre is available occasionally					
6	Training facilities are limited					
7	Green fodder is not available throughout the year					
8	Supply of high milk yield animals are low					
9	Cattle feed are not available on credit-economic					
10	Mortality of milk animals is very high					
11	Low availability of any season immune animals					
12	Availability of skilled farm labour is scarce					
13	There is high mortality of calf					

b) Economic constraints

SI No	Particulars	VH	H	AV	L	VL
1	Payment of milk is always delayed					
2	Price of milk offered by the marketer is low					
3	Cost of fodder seed is very high					
4	Cost of cross bred cow is high					
5	Cost of veterinary service is high					
6	Cost of cattle feed and mineral mixture is high					
7	Low facility to avail loan to purchase milch animals					
8	Incentive or bonus for supplying milk is low					
9	Availability of high milk yield animals are low					
10	The premium for cattle insurance is very high					
11	Labour cost is very high					

c) Demand based constraints

Sl.No	Particulars	VH	H	AV	L	VL
1	Procurement of milk is irregular					
2	There is no or less provision for advance payment					
3	There is the practice of return of milk once procured					
4	During flush season entire milk is not taken					
5	The system of weighing and measurement is faulty					
6	The testing procedure is not transparent					

d) Marketing based constraints

SI No	Particulars	VH	H	AV	L	VL
1	There is no time to market or sell the product					
2	Knowledge about marketing practice is limited					
3	Risk taking behavior is very low					
4	Ability to market value added product Is lacking					
5	There is ill treatment from the side of marketer					
6	The marketer had adopted unethical practice of procurement.					

e) Technical constraints

SI No	Particulars	VH	H	AV	L	VL
1	Technical guidance is lacking					
2	High generic merit bull is not available					
3	Conception rate through AI centre is poor					
4	Knowledge about feeding and health care is poor					
5	Knowledge about cheap and scientific housing of animals is lacking					
6	Space of keeping cattle is not adequate					
7	In summer season milk yield is low					
8	Quality of milk from cross bred cow is poor					

f) Socio-psychological constraints

SI No	Particulars	VH	H	AV	L	VL
1	Socio-economic condition of farmers are very low					
2	Purchasing or bargaining power of farmers are low					
3	No time for scientific dairying due to busy domestic/agricultural work					
4	Cooperation from family members is lacking					
5	Milk of cross bred cows have poor acceptability among the public					
6	There is work-life imbalance due to heavy work load					
7	Social status of the dairy farmers are poor					
8	There is low level of literacy/knowledge among dairy farmers					

24. Factors influencing the selection of marketing channels:

SI No	Particulars	VH	High	Average	Low	VL
1	Regular demand for the product					
2	Facility to sell the entire milk produce even during flush season					
3	Market for the value added product					
4	Favourable milk collection time					
5	Friendly attitude from the marketer					

a) Demand side factors:

b) Price/Incentive factors

SI No	Particulars	VH	H	Av	Low	VL
1	Uniform price for the product in all season					
2	Fair or reasonable price for the product					
3	Quality based price fixation					
4	Regular and at timely payment for milk					
5	Advance payment at needed time					

6	No underpricing during flush season					
7	Higher price during summer season					
8	Regular payment of bonus					
9	Production/supply-based bonus or incentive system.					
10	Chance to win award for best performance					

c) Supply side factors

SI No	Particulars	VH	H	Av	Low	VL
1						
2	Regular supply of cattle feed on credit					
3	Supply of green fodder and fodder (including seeds) at reasonable price					
4	Free/subsidized veterinary medical service on demand.					
5	Free/subsidized Artificial Insemination					
6	Free/subsidized vaccination facility					
7	Schemes like calf protection scheme					
8	Arrangement of free/subsidized insurance for cattle					

d) Financial support and assistance factors

SI No	Particulars	VH	H	Av	Low	Low
1	Financial assistance/support for cattle purchase					
2	Facilitation of loans /credit schemes of other financiers on easy terms					
3	Scholarships and awards to children/dependents from the agencies.					
4	Assistance to get financial help on cattle mortality					
5	Provision of subsidies/ other benefits like government assistance, MNREGP etc					
6	Provision for farmer pension scheme					

e) Procurement factors

SI No	Particulars	VH	H	Av	Low	VH
1	Distance to the place of procurement is minimum					
2	Correct weighing and measurement of my produces					
3	Mechanised/digitalized mechanism for procurement					
4	Collection of milk at door steps					

f) Other service

SI No	Particulars	VH	H	Av	H	VH
1	Existence of good conflict management system					
2	Provisions for group insurance for dairy farmers					
3	Friendly treatment from the staff of agency					
4	Training on modern dairying					
5	Up to date information about the government schemes					
6	Opportunity to make good liaison with other government departments					
7	Hope to get more benefits in future					
8	Opportunity to enjoy participation in management					

25. Assess the satisfaction level of farmers about the marketing channels performance

a) Demand related

SI No	Particulars	HS	S	NO	DS	HDS
1	Regular demand for the product					
2	Facility to sell the entire milk produce even during flush season					
3	Market for the value-added product					
4	Favourable milk collection time					
5	Friendly attitude from the marketer					

b) Price/incentives

SI No	Particulars	HS	S	NO	DS	HDS
1	Uniform price for the product in all seasons					
2	Fair or reasonable price for the product					
3	Quality based price fixation					
4	Regular and at timely payment for milk					
5	Advance payment at needed time					
6	No underpricing during flush season					
7	Higher price during summer season					
8	Regular payment of bonus					
9	Production/supply-based bonus or incentive system					
10	Chance to win award for best performance					

c) Supply related

SI No	Particulars	HS	S	NO	DS	HDS
1	Regular supply of cattle feed on credit					
2	Supply of green fodder and fodder (including seeds) at reasonable price					
3	Free/subsidized veterinary medical service on demand					
4	Free/subsidized Artificial Insemination					
5	Free/subsidized vaccination facility					
6	Schemes like calf protection scheme					
7	Arrangement of free/subsidized insurance for cattle					

d) Financial support and assistance

SI No	Particulars	HS	S	NO	DS	HDS
1	Financial assistance/support for cattle purchase					
2	Facilitation of loans/credit schemes of other financiers on easy terms					
3	Scholarships and awards to children/dependents from the agencies					
4	Assistance to get financial help on cattle mortality					
5	Provision of subsidy/other benefits like government assistance, MNREGP etc					
6	Provision of farmer pension scheme					

e) Procurement factors

SI No	Particulars	HS	S	NO	DS	HDS
1	Distance to the place of procurement is minimum					
2	Correct weighing and measurement of my produce					
3	Mechanized/digitalized mechanism for procurement					
4	Collection of milk at door steps					

f) Other Services

SI No	Particulars	HS	S	NO	DS	HDS
1	Existence of good conflict management system					
2	Provision of group insurance for dairy farmers					
3	Friendly treatment from the staff of agency					
4	Training on modern dairying					
5	Up to date information about the					

	government schemes					
6	Opportunity to make good liaison with other government departments					
7	Hope to get more benefits in future					
8	Opportunity to enjoy participation in management					

26. Whether you recommend this profession to your next generation?

- a) Definitely b) Probably c) Possibly d) probably not e) never f) Don't know

27. Future of dairy markets from your perspectives

- a) Very good b) Good c) Average d) Poor e) Very poor

28. What are the strategies to be adopted for enhancing future prospects of dairy farming.

No	Particulars	VH	H	AV	L	VL
1	Development of proper production, process and marketing infrastructure to meet quality requirements					
2	Developing specific dairy export zone					
3	Use of sexed semen technology to ensure female pregnancy					
4	Train farmers to help them to understand cows for signs of illness or distress that affect milk supply					
5	Focus on strengthening indigenous breed					
6	Promoting the practice of using Ethnoveterinary Medicines					
7	Install more plants to produce cattle feed, mineral mixture, total mixed ration, bypass protein and bypass fat feed					
8	Facilities for routine vaccination/immunization and diagnostic laboratory					
9	Effective packaging and branding of milk products produced by small farmers					
10	Organizing animal welfare camp, awareness camp etc					
11	Optimal farm operation by harmonizing land, animals and skills- 10-15 animals					

12	Centralized marketing by dairy cooperatives by using umbrella brand for the products produced by the farmers					
13	Focus on value added products					
14	Make use of social media platform for marketing of dairy products					
15	Comprehensive Insurance coverage for all risk at affordable rate					
16	Improving artificial insemination- Proper treatment for infertility, cross breeding and selective breeding					
17	Production of fodder by using cluster approach					
18	Affordable veterinary services in time					
19	Production cost reduction through increased productivity, improve animal healthcare and breeding facilities					
20	Provide chilling and storage facilities at village levels					
21	Ensure reasonable price to farmers					
22	Attract young people to run dairy farm by changing their attitude					
23	Mobile Artificial Insemination dispensary					
24	Promotion of post-harvest management such as fodder block technology, chaff cutter for fodder processing and silage making					
25	Adoption of Information Network for Animal Productivity and Health(INAPH)					
26	Hands of training with continuous follow up of performance					
27	Scaling up through increase farm size					
28	Setting up food parks for providing infrastructure to small dairy product units					
29	Setting up of more diary co-operatives					
30	Promote more investment in dairy farming through offering incentives and subsidies					
31	Genetic improvement					
32	Adoption of Ration Balancing Programme					

33	Awareness camps to help farmers early detection of diseases					
34	Reduce stress level: cows are untethered and have individual pens with rubber mat					
35	Promote milk processing cluster					
36	Marketing of A2 milk- milk from indigenous cattle					
37	Promote more research in the dairy sector					
38	Production of quality seeds for fodder varieties					
39	Centralized fodder cultivation by using Kudumpasree and selling the same through dairy cooperatives					
40	Encourage farmers for regular deworming					
41	Music play in the milking parlor					
42	Ensure price competency across product categories and destination market					
43	Encourage more start-up in dairy sector					
44	Subsidized cattle feed and more incentives for fodder cultivation					
45	Encourage farmers to use kits available for early detection and prevention of sub-clinical mastitis					
46	Regular technical guidance about scientific feeding, breeding, healthcare and management practices through TV, Social media etc					
47	Implementing internationally compatible and future oriented policies from authorities					
48	Improve the availability and access to credit facilities for small dairy farmers					
49	Allotting vacant agricultural land for fodder farming					
50	Improve scope of production by including more productive buffalo					
51	Creating exportable surplus across product categories					
52	Treat dairy farm loan as agricultural loan for getting additional subsidy to the farmers					
53	Mobile app for feed cultivation and balanced feeding					

54	Advertising by giving emphasis on nutritional value on consuming dairy products					
55	Effective international campaign putting emphasis on the goodness of indigenous products					
56	Package proposals for farmers by banks and other financial institutions					
57	Offer additional tax benefits for small dairy products units					

29. Any other suggestions