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**OPPORTUNITIES AND CHALLENGES OF THE DAIRY SECTOR
IN INDIA**

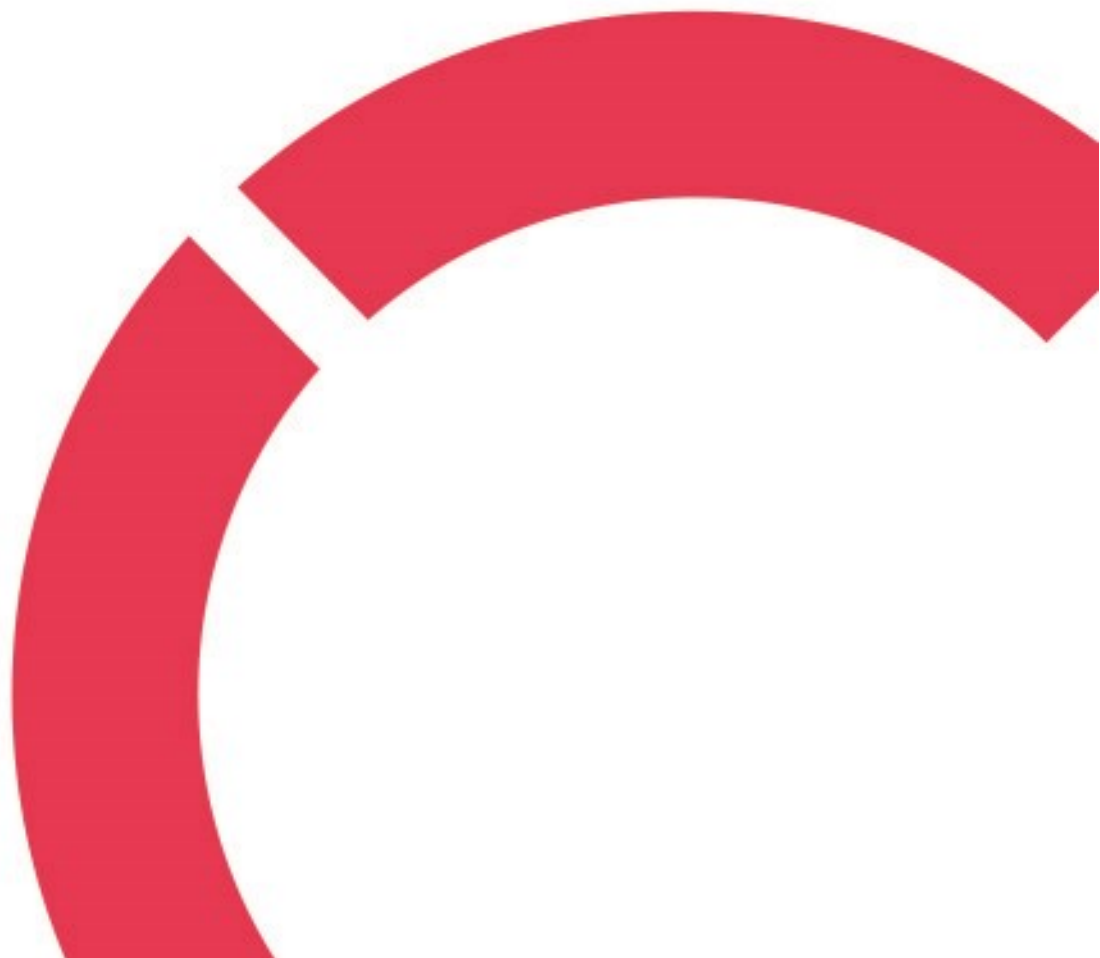
An analysis of service quality, consumer behaviour and growth prospects

Thesis

CENTRIA UNIVERSITY OF APPLIED SCIENCES

Master of Business Administration, International Business Management

December 2023



ABSTRACT

Centria University of Applied Sciences	Date December 2023	Author Sandeep Sran
Degree programme Master of Business Administration, International Business Management		
Name of thesis OPPORTUNITIES AND CHALLENGES OF THE DAIRY SECTOR IN INDIA. An analysis of service quality, consumer behaviour and growth prospects		
Centria supervisor Johanna Österberg-Högstedt	Pages 56 + 11	
Instructor representing commissioning institution or company		
<p>This thesis examined the prospects and challenges of the dairy industry in India, which happens to be one of the country’s largest growing sector. The thesis aimed to investigate the current status and future prospects of the dairy sector of Punjab in India, which provides livelihood, nutrition, income, and empowerment for millions of rural families and contributes to the national economy. The thesis also evaluated service quality and consumer attitudes toward dairy products in India, which have a high demand and preference, especially for milk and curd. The thesis used questionnaires for data collection and analysis. The thesis collected data from 150 consumers (75 urban and 75 rural) and 110 dairy owners in rural Punjab using surveys. The thesis found that there are significant differences between the urban and rural consumers in terms of their preferences, satisfaction, and availability of dairy products. The thesis also found that the dairy owners in rural Punjab have various practices, strategies, resources, and outcomes in their dairy business. They face various opportunities and challenges in terms of production, processing, marketing, and income generation. Moreover, the thesis explored the expectations that they have towards the local government regarding their dairy products. The thesis discussed the implications and limitations of the research findings for both theory and practice. The thesis contributed to the existing literature on consumer behaviour towards dairy products by providing new insights and perspectives from a specific context.</p>		

<p>Key words Consumer, dairy owners, dairy products, dairy sector, milk production, opportunities, Punjab</p>
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CONCEPT DEFINITIONS

BST

Bovine Somatotropin

GCMMF

Gujarat Cooperative Milk Marketing Federation

MSP

Minimum Support Price

NDDB

National Dairy Development Board

rBST

Recombinant Bovine Somatotropin

VAP

Value Added Products

ABSTRACT
CONCEPT DEFINITIONS
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1 INTRODUCTION

The dairy farming is an ancient and important agricultural activity that provides livelihood and income for millions of rural families in India. India is the world's largest producer and consumer of milk and dairy products, accounting for 22% of the global milk production (Banerjee 2022). However, behind these impressive numbers lies a complex and challenging reality for the dairy industry in India. The dairy industry is one of the most significant sectors in India's economy, contributing 5% to the national GDP and employing 80 million dairy farmers directly (ClearIAS 2022). However, this sector faces various obstacles in terms of business development and management, such as low-productivity, poor quality, fragmented supply chain, shortage of feed and fodder, hygiene and health issues, lack of infrastructure and training, and low returns (Banerjee 2022; Civildaily 2022; ClearIAS 2022). This research aims to investigate the current status and future prospects of the dairy industry in India, with a focus on the state of Punjab, which is one of the leading agricultural states and a major producer of dairy products in the country (IMARC Group 2022).

Despite its economic and social significance, the dairy industry in India has received limited attention from academic research. Most of the existing studies focus on technical aspects of dairy production or processing, while neglecting the consumer behaviour and preferences towards dairy products (Civildaily 2022). Moreover, there is a lack of comparative analysis between different regions or states in India regarding their dairy sector performance and potential. This research aims to fill these gaps by evaluating the consumer behaviour towards dairy products in rural areas of Punjab and by identifying the opportunities and challenges for the growth of the dairy sector in India.

The main research question of this thesis is: How do consumers and dairy owners in Punjab perceive and participate in the dairy sector? To answer this question, the following sub-questions will be addressed:

1. What are the main factors that influence consumer preferences, attitudes, awareness, satisfaction, and loyalty towards different types of dairy products?
2. What are the main factors that influence owner practices, strategies, resources, and outcomes in their dairy business?
3. What are the main challenges and opportunities for enhancing consumer demand and producer supply for dairy products?

The main objective of this research is to analyse consumer and owner behaviour towards dairy products in Punjab using questionnaires. The specific objectives are:

1. To collect primary data from consumers in rural and urban areas of Punjab regarding their preferences, attitudes, awareness, satisfaction, and loyalty towards different types of dairy products.
2. To collect primary data from owners in rural areas of Punjab regarding their practices, strategies, resources, and outcomes in their dairy business.
3. To identify the challenges and opportunities for enhancing consumer demand and owner's supply for dairy products.
4. To provide recommendations for improving consumer satisfaction and loyalty, as well as owner productivity and profitability.

This thesis is divided into six chapters. Chapter 1 introduces the topic and provides the background information for the research. Chapter 2 reviews the literature on dairy farming and dairy industry in India. Chapter 3 describes the research design and methodology used for data collection and analysis. Chapter 4 presents the results from questionnaire while summarising the data. Chapter 5 discusses all data and provides limitations, and suggestions. Chapter 6 concludes the thesis.

This research has a personal significance for me as I belong to a farming family of Punjab that relies on dairy products for livelihood. Punjab has well-known milk plants, such as The Punjab State Cooperative Milk Producers Federation Limited (Milkfed), which was established in 1973 to improve dairy farming and supply its products to neighbouring states (Bajwa 2021). This research will cover the dairy sector of Punjab and investigate the consumer and owner's behaviour towards dairy product. It will also examine the factors that influence their preferences, satisfaction, practices, strategies, resources, and outcomes. It will also explore the challenges and opportunities for enhancing consumer demand and producer supply for dairy products.

2 MILK PRODUCTION IN INDIA

This chapter reviews the types of milk consumption, feeding, infrastructure, transportation and processing of dairy farms and products in past, current and future of dairy industry in India. This chapter will also cover related topics of similar studies that have been covered by other authors.

2.1 Dairy sector

India used to be a milk deficit nation from the 1950 to 1960, despite having the largest cattle population in the world. India depended on imports to meet its domestic demand for milk and dairy products. The situation worsened in 1970, when India's per capita consumption of milk was the lowest in the world (Manohar 2021.). It was a critical time for India's dairy sector, which needed a major transformation. The National Dairy Development Board (NDDB) was established in 1965 to spearhead the development of the dairy industry in India. Under the leadership of Dr. Verghese Kurien, known as the "Father of White Revolution", NDDB launched Operation Flood in 1970, which was the world's largest dairy development program. Operation Flood aimed to create a network of village-level dairy cooperative societies that would be linked to district-level unions and state-level federations. This pattern was replicated across India in three phases, with financial and technical assistance from the World Bank, the European Union, and other international agencies. The first phase focused on increasing milk production by providing better breeds, feeds, and veterinary services to farmers. The second phase expanded the urban markets and improved the processing and distribution infrastructure. The third phase consolidated and strengthened the dairy cooperatives and enhanced their quality and productivity (NDDB 2022.). Operation Flood added 30,000 new dairy cooperatives, which increased the total number of cooperatives to 73,000 by 1996. The program also increased India's milk production from 22 million tonnes in 1970 to 80 million tonnes in 1996, making India the largest milk producer in the world (ClearIAS 2022.). Operation Flood also improved the income and livelihoods of millions of rural families who were engaged in dairying (IBEF 2022).

One of the main outcomes of Operation Flood was the improvement of milk quality and safety for the consumers across India. By creating a National Milk Grid, Operation Flood eliminated the middlemen who often adulterated or diluted the milk, and reduced the seasonal price fluctuations that affected both the producers and the consumers (Ani 2022.). Operation Flood also established quality standards and

testing facilities for milk and dairy products, and promoted hygienic practices and modern technologies among the farmers and cooperatives. As a result, India became not only the largest milk producer but also a major exporter of value-added dairy products such as milk powder, butter, cheese, infant food preparations, and spreads (IBEF 2022.). The Indian dairy sector has shown strong growth potential in the value-added products segment, which is expected to grow at 15-20% annually (Manohar 2021). The factors driving this growth include the higher population of vegetarian people in the country who prefer dairy as a source of protein, the rising per-capita income and urbanization that increase the demand for convenience and variety, the changing consumer preferences and awareness that favour healthy and nutritious products, and the increasing demand for certain value-added products categories like ice cream, flavoured milk, curd, and butter milk especially during summers (Nanda Kumar, Das & Gulati 2022). The higher procurement and prices of milk are expected to benefit both the organized and the unorganized sectors, as they would incentivize the farmers to take better care of their cattle and enhance their milk production (Livemint 2022).

The future of the dairy sector in India depends on modernising the infrastructure and adopting technological advancements. This will open many possibilities for the dairy sector, such as improving the quality and safety of milk and dairy products, enhancing the productivity and profitability of farmers and cooperatives, and expanding the domestic and export markets. Refrigeration plays an important role in the dairy sector, as it helps to preserve the freshness and shelf life of milk and dairy products. However, refrigeration in rural India is low and India is a tropical country with high temperatures and humidity. Therefore, there is a need to invest in cold chain infrastructure and logistics to reduce wastage and spoilage of milk and dairy products. (IBEF 2021.)

The demand for dairy products in India is growing due to the rise in income level and urbanisation, which increase the consumption of milk and dairy products per capita. The demand for cheese is growing especially in hotels, restaurants and cafes, as cheese is used as an ingredient in various cuisines. The cheese market in India is expected to grow at a CAGR of 20.6% from 2020 to 2025. (Invest India 2022.)

The dairy industry plays an important role in the growth of rural economy in India. Rising urbanisation in India has led to an increase in demand of milk and milk products at various steps. The dairy industry alone has grown to 11% in 2022, up from 9% in 2021 (Invest India 2022). Since the dairy sector has provided income generation opportunities for millions of farmers, the government has been actively involved in providing required inputs and introducing various schemes. Secondly, the dairy industry

recognizes the need of private sector to contribute to the growth of the sector and make it as prosperous as other manufacturing sectors. For high yielding cattle, the basic need is cattle breed and nutritious feed and fodder. Thus, the government has intervened through scientific investment by the help of private sector to meet required nutritious feed and fodder, genetic upgradation of cattle population along with conservation of indigenous cattle breed. For this, the industry is likely to establish IVF laboratories or make reproductive technologies available for farmers at affordable price at their doorstep. (IBEF 2022.)

There is an estimated growth of about 13%-15% for value added products like flavoured milk, processed packed milk, cheese, curd, etc. Hence, schemes like dairy processing and infrastructure development fund will help in upgradation of infrastructure which will lead to possibilities of reducing cost of production and maximizing manufacturing more and more value-added products. (Food Marketing Technology 2022.)

The dairy cooperative sector has played a major role in the development of the dairy sector in India since the launch of Operation Flood in 1970, which was the world's largest dairy development program that created a network of village-level dairy cooperatives across the country (IBEF 2022). The dairy cooperative sector will further enhance its role by providing processed dairy products such as packed milk, flavoured milk, cheese, curd, etc. These value-added products have higher margins and longer shelf life than liquid milk, and cater to the changing consumer preferences and needs. The share of value-added products in the total revenue of dairy cooperatives is expected to increase from 28% in 2018-19 to 40% by 2024-25 (Nanda Kumar et al. 2022). The future of dairy farmers is greatly supported by dairy cooperatives, which are enhancing their infrastructure and modernising their operations. Dairy cooperatives are helping farmers by making them aware of scientific feeding methods, providing collection and transportation facilities, offering veterinary services and artificial insemination facilities, ensuring timely payment and fair prices, and giving access to credit and insurance (Banerjee 2022).

Looking ahead, the dairy industry in India is aiming to build a \$355 billion industry by 2025 (Saluja 2022). There are few emerging trends that are shaping the future of the dairy industry. One of the trends is direct-to-consumer deliveries, which will involve an increase in the number of businesses that provide express direct-to-consumer deliveries of dairy and dairy products (Saluja 2022). This will enhance customer convenience and satisfaction, as well as reduce intermediaries and wastage. Another trend is health and wellness products, which will cater to the consumers who are becoming more

health-conscious and aware of the nutritional benefits of dairy products. There will be a higher demand for products that have high nutritional values, such as probiotics, functional foods and organic dairy. Companies will have to innovate and diversify their product portfolio to cater to these changing preferences and needs. A third trend is digital transformation, which will involve the adoption of digital technologies to improve efficiency, productivity, quality, and traceability of their operations. Technologies such as artificial intelligence, blockchain, internet of things, cloud computing, etc. will enable data-driven decision making, automation, transparency, and customer engagement. (Mani 2021.)

2.2 White revolution

India achieved a remarkable feat in 1970 when it became self-sufficient in milk production, thanks to the White Revolution, also known as Operation Flood. This was a historic initiative that boosted the production of milk in the rural areas of the country and transformed the dairy sector. The National Dairy Development Board (NDDB) was established in 1965 to implement the White Revolution, with the vision of replacing exploitation with empowerment, tradition with modernity, and transforming dairying into a source of development for India's rural people. The White Revolution was spearheaded by Dr. Verghese Kurien, who is widely regarded as the "Father of the White Revolution" in India. He also played a key role in establishing Amul, one of India's leading dairy brands. The objective of the White Revolution was to increase milk production, augment rural incomes, ensure fair prices for consumers, and improve the quality and variety of milk and dairy products. This was achieved by creating a network of village-level dairy cooperatives that procured milk from farmers and provided them with inputs and services, while also linking them to urban markets through a National Milk Grid. The White Revolution was implemented in three phases from 1970 to 1996, with financial and technical support from various national and international agencies. (Ani 2022.)

The White Revolution had a significant impact on India's dairy sector and rural economy. It made India the world's largest milk producer, surpassing the United States in 1998. It increased the per capita availability of milk from 112 grams per day in 1970 to 355 grams per day in 2014. It also improved the income and livelihoods of millions of rural families who were engaged in dairying. Today, India is a major producer and consumer of dairy products, as well as an exporter of value-added products such as milk powder, butter and cheese. (testbook 2021.)

India has seen a remarkable growth in milk production over the decades. According to figure 1, in 1950–1951, the country produced only 17 million tonnes (MT) of milk. This increased slightly to 21.2 MT in 1968–1969, the year before Operation Flood was launched to boost dairy farming. Operation Flood had a significant impact on milk output, which rose to 30.4 MT in 1979–1980 and 51.4 MT in 1989–1990. By 2020–21, India’s milk production reached 210 million tonnes, making it the largest milk producer in the world. India’s milk production is growing at a rate of over 6%, which is three times faster than the global average of 2%. (Ministry of Fisheries, Animal Husbandry and Dairying 2022.)

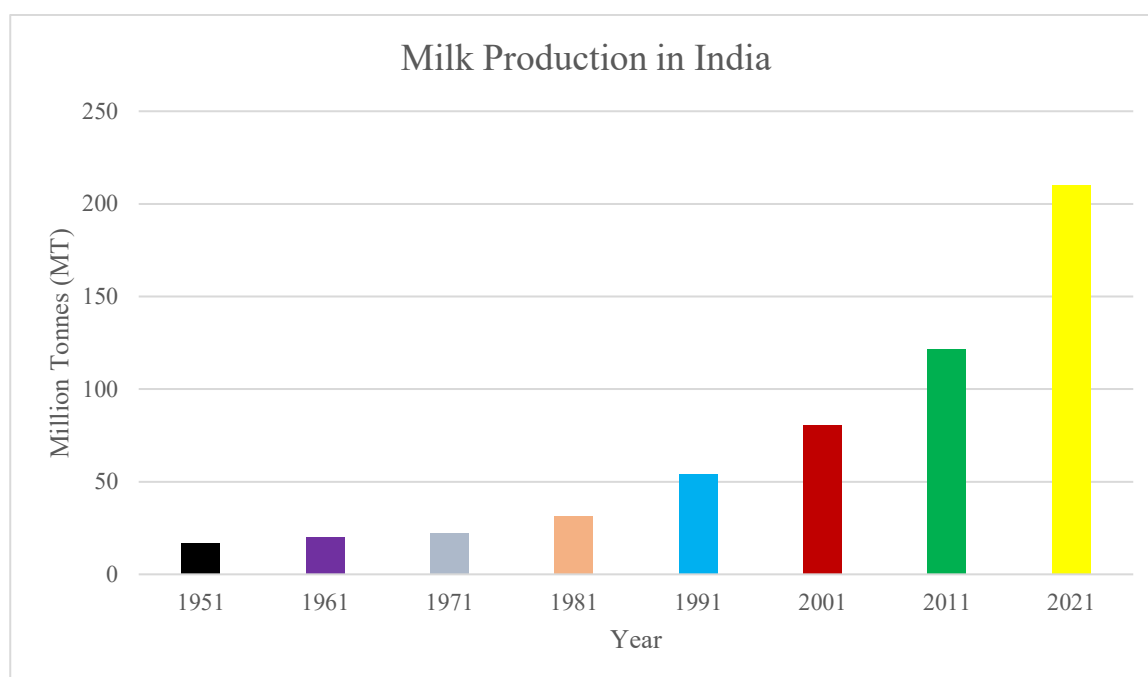


FIGURE 1. Milk production in India (Ministry of Fisheries, Animal Husbandry and Dairying 2022)

2.3 Factors affecting milk yield

India is the world’s largest milk producer, with a production of 198 million tonnes in 2020-21, accounting for 24% of the global milk production (Invest India 2022). The dairy sector is a key contributor to the Indian economy, providing livelihoods to more than 40 million households, mostly in rural areas. However, the demand for milk and dairy products is projected to reach 260 million tonnes by 2022, requiring a significant increase in milk production and quality (Punjabi 2009). To achieve this goal, several factors affecting milk yield need to be considered and improved. These factors include breed, lactation cycle, fertility, nutrition and environment and stress factors (GVPPL 2021).

The breed of cattle is one of the key factors affecting milk production in the country. In India, there are many varieties of cattle breeds as shown in table 1. The Tharparkar breed has the highest volume of milk production compared to other breeds of cows. (Toppo 2022.)

TABLE 1. Cattle breeds in India (Toppo 2022).

Breed of cows	Yield (milk-production)
Tharparkar	1800-2600 kg per lactation
Sahiwal	1400-2500 kg per lactation
Red Sindi	1250-1800 kg per lactation
Gir	1200-1800 kg per lactation
Haryana	600-800 kg per lactation

Cows have to calve to produce milk and the lactation cycle is the period between two calvings. Cows usually dry off for about two months before the next calving, which is a rest period that is necessary to maximize milk production. However, long dry periods decrease the average annual production and may also reduce the lifetime production. The lactation period is the duration of milk production after calving. If this period is shortened, then the milk production of the dairy farm would be less. In case of Indian breeds, the lactation period is shorter but in some breeds this period is longer with very little milk production. (FAO & IDF 2011.)

Fertility is very important for the dairy farmers and their economic success. Pregnancy affects milk production, which is reduced after the fifth month of pregnancy and further reduced by the eighth month of pregnancy. Finding new methods to improve fertility and dairy cow welfare can lead to economic improvement. Identification of non-pregnant cows at an earlier stage after insemination was traditionally performed around 40 days of insemination by physical examination of the reproductive tract. However, identification at an earlier stage improves reproductive efficiency, which can be diagnosed after 26 days via ultrasound. Hence, new technologies to identify non-pregnant cows at an earlier stage may play a vital role in improving reproductive efficiency. (NADIS 2015.)

The season plays a vital role in our life and it is also an important factor for milk production, which includes both temperature and daylight hours. Dairy owners should be prepared for seasonal changes. Farmers use LED lights to artificially increase the daylight hours to increase their overall milk production. The same LED lights can be used as heating solutions during winter. Mastitis is an infection of

the udder caused primarily by bacteria. The infected udder produces less milk and lower quality milk. The most apparent symptoms of mastitis are mild to severe swelling of the udder. In many cases, the cow's body temperature will increase and the milk that she produces will have a watery appearance and may contain flakes, clots or blood. There is a chance of passing the infection to other cows. Affected cows are also likely to be less fertile and have a greater chance of premature birth. (DAERA 2021; NADIS 2015.)

2.4 Factors affecting quality of milk

The quality of milk is a key competitive advantage for dairy businesses, as it affects the demand, price and value-added potential of milk and its products. Consumers are becoming more aware and discerning of the quality and safety of dairy products, as well as their nutritional and environmental impact. Therefore, dairy businesses need to monitor and manage the factors that influence the quality of milk throughout the supply chain, from farm to fork. (Nanda Kumar et al. 2022.)

Different breeds of cattle have different genetic potential and characteristics for milk production and composition. Dairy businesses need to select the breeds that suit their production system, market demand and environmental conditions. They also need to implement breeding programs that improve the genetic merit and performance of their cows for milk production and quality traits. (TANU 2021.)

The quantity and quality of feed and diet offered to the cows can affect the lactose, fat and protein percentage in the milk, as well as the flavour, odour and colour of the milk. Dairy businesses need to provide adequate and balanced feed and diet to their cows to meet their nutritional requirements and optimize their milk production and quality. They also need to consider the cost-effectiveness and availability of different feed ingredients and sources. (Erickson & Kalscheur 2020.)

The handling of milk after it leaves the cow can affect its quality and safety. Milk is an ideal medium for bacterial growth, so it should be handled hygienically to prevent contamination and spoilage. Dairy businesses need to follow good hygiene practices at every stage of milk handling to ensure that they produce safe and high-quality milk that meets the regulatory standards and customer specifications. They also need to train and supervise their staff on proper milk handling procedures and protocols. (Muehlhoff, Bennett & MacMahon 2013.)

Hormones are chemical messengers that regulate various physiological processes in animals, including milk production. Some hormones are naturally produced by the cow's body, while others are artificially administered to enhance milk production or treat diseases. One such hormone is recombinant bovine somatotropin (rBST), which is a synthetic version of bovine somatotropin (BST), a natural hormone that stimulates milk production in cows. rBST use is controversial as some studies have shown that it has negative effects on animal health and welfare, as well as consumer concerns about its safety for human health. Therefore, rBST use can affect the quality of milk by reducing its acceptability in some markets. Dairy businesses need to be aware of the legal and ethical implications of using hormones in their cows and the potential impact on their market access and reputation. They also need to follow the prescribed guidelines and protocols for hormone use and record keeping. (Jacoby 2017.)

By managing these factors effectively, dairy businesses can improve the quality of their milk and enhance their growth, consumer loyalty, and service excellence. The quality of milk products is very important and the quality of products is more focused on bringing about the improvement of the value chain from owner to consumer and to ensure the availability of a particular standard of quality milk and their products in the market. Also, dairy products need to follow the quality mark on their different products as well as acquire the food safety and quality planning systems for their dairy products before entering the market. According to the NDDB, the logo of the quality mark is valid for three years, in which the companies must follow the quality level of dairy products as well as food safety rules and comply with the terms and conditions of the agreement. A checking audit will be held on an annual basis. With the help of these factors, in the last few years, the NDDB received 55 applications from cooperatives throughout the country. Hence, these steps will improve the growth of dairy products as well as improve the consumer behaviour towards the quality of service of dairy products. (NDDB 2022.)

In addition to these factors, another aspect that affects the quality of milk is the processing infra-structure and procurement at the village level, where most of the milk production takes place in India. The NDDB has been focusing on improving this aspect by providing training programs, manpower support, retail sales facilities and quality testing equipment to the village cooperatives. This helps them to produce high-quality milk that meets customer expectations and builds trust in cooperative brands. (Cornall 2017.)

Another key factor that influences the quality of milk is enhancing milk productivity per animal. This can be achieved by providing healthy diet, medical care, vaccination, artificial insemination and other

services to improve animal health and welfare. Milk is a vital source of nutrition for human health, as it contains carbohydrates, vitamins, proteins and minerals that are essential for various bodily functions. Therefore, India has been observing World Milk Day every year on June 1 since 2016 to raise awareness about the importance of safe and nutritious milk consumption. India has also enacted Food Safety and Standards Act in 2006 to regulate the quality and safety of milk and its products. As a result, India has seen an improvement in the milk yield per animal and its quality, as well as its health benefits for consumers. (AgriTimes 2019.)

India is one of the leading global milk producers, accounting for about 17% of the world's milk production. However, most of the milk produced in India is still unprocessed and consumed locally. Only 20% of the milk is handled by the organized sector, which includes cooperatives and private dairies. The organized sector has been growing rapidly and is expected to increase its share of milk production from 30% to 65% by 2021-22. The organized sector focuses on providing quality milk and value-added products at competitive prices to the consumers, as well as ensuring fair returns to the farmers. (AgriTimes 2019.)

One of the emerging opportunities for the Indian dairy industry is exporting milk and its products to other countries, especially those that are milk-deficient or have high demand for dairy products. Some of these countries are China, Bangladesh, Thailand, Singapore, Malaysia, Philippines, Japan and other gulf countries like UAE, Oman etc. that are close to India. To tap this potential, the Indian dairy industry needs to develop more systematic research, innovation, technology and marketing strategies. One of the pioneers in this field is the Gujarat Cooperative Milk Marketing Federation (GCMMF), which has been exporting its popular brand Amul to various countries and has established a strong reputation for quality and value. (AgriTimes 2019.)

2.5 Theoretical concepts of growth, consumer behavior and quality of service

In this section, I will review some of the theoretical concepts of growth, consumer behavior and quality of service that are relevant to my thesis. These concepts will help me to understand and analyze the data that I collected from the questionnaires and the secondary sources.

Growth is a concept that refers to the increase in the size, quantity, or value of something over time. Growth can be measured in different ways, such as by using indicators such as gross domestic product

(GDP), sales revenue, market share, profit, etc. Growth can also be classified into different types, such as organic growth, which is achieved by expanding the existing business activities, or inorganic growth, which is achieved by acquiring or merging with other businesses. Growth is an important goal for many businesses, as it can enhance their competitive advantage, customer loyalty, and service excellence. However, growth also poses some challenges and risks, such as increasing complexity, cost, and competition. (Mankiw & Taylor 2017; Segal 2021.)

Consumer behavior is a concept that refers to the study of how individuals or groups make decisions to purchase, use, or dispose of goods and services. Consumer behavior is influenced by various factors, such as psychological factors (e.g., motivation, attitude, perception, learning, etc.), social factors (e.g., culture, family, reference groups, etc.), personal factors (e.g., age, gender, income, lifestyle, etc.), and situational factors (e.g., time, place, mood, etc.). Consumer behavior is an important concept for businesses to understand and predict their customers' needs, preferences, satisfaction and loyalty. By analyzing consumer behavior, businesses can design and deliver products and services that match or exceed their customers' expectations and create value for them. (Kotler, Keller & Chernev 2021; Solomon, Bamossy, Askegaard & Hogg 2016.)

Quality of service is a concept that refers to the degree to which a service meets or exceeds the customers' expectations. Quality of service can be evaluated by using different dimensions or criteria, such as reliability (the ability to perform the service dependably and accurately), responsiveness (the willingness to help customers and provide prompt service), assurance (the knowledge and courtesy of employees and their ability to convey trust and confidence), empathy (the caring and individualized attention given to customers), and tangibles (the appearance of physical facilities, equipment, personnel and communication materials). Quality of service is an important concept for businesses to achieve customer satisfaction and loyalty. By providing high quality of service, businesses can differentiate themselves from their competitors and create a positive image and reputation for themselves. (Parasuraman, Zeithaml & Berry 1988; Zeithaml, Bitner & Gremler 2018.)

3 RESEARCH METHOD

The aim of this research is to find out the consumer and owner's behaviour towards dairy products in Punjab, and the challenges and opportunities for the growth of the dairy sector in India. This research also explores the current methods and support provided by the local government to the dairy sector, and how they can improve the quality and demand of dairy products in the market. To achieve this aim, the research will adopt a suitable research strategy, design and ethics.

A research strategy is based on certain factors, such as availability of time, knowledge of researcher and research objectives. A research strategy helps the researcher to answer the research questions in a timely and clear manner. Research can be broadly divided into qualitative and quantitative. Qualitative research is based on theory, whereas quantitative research is based on data collection and analysis. Quantitative research has been a dominant strategy for conducting research (Bryman & Bell 2015). The goal of this research is to find out the growth and challenges of dairy sector. Therefore, I have opted for quantitative research in this study.

A research design is a blueprint or master plan that specifies the methods and techniques or procedures for collecting and analysing the information needed. A choice of research design reflects decisions about the priority being given to a range of dimensions of the research process. There are several categories of research design, such as cross-sectional design, longitudinal design, experimental design and case study design. A cross-sectional design, also known as survey design, is a collection of information on more than one case and at a single point in time to collect quantitative or qualitative information with questionnaires and interviews. (Bryman & Bell 2015.)

There is also a role of moral values in the research process, and it is a topic of concern. Ethical issues arise from how the people should be treated on whom the research is conducted and what activities should or should not be engaged in. However, it is obvious for a professional to follow the code of ethics which should be considered on priority while conducting research. Researcher knowingly or unknowingly should not harm anybody's sentiments. Researchers should be aware of ethical values in business research. The major concern is ethical issues that arise in relations between researcher and participants in the course of research. (Bryman & Bell 2015.)

One of the ethical issues that need to be addressed in this research is harm, which can be physical, psychological or emotional injury to a person. Therefore, it becomes a moral duty or responsibility of researcher to carefully assess the possibility of any harm to participants. Hence researcher must take precautions to ensure that nobody directly or indirectly gets harmed in the research project. This condition is applicable to non-participants also, who are in majority. (Bryman & Bell 2015.)

Another ethical issue that needs to be addressed in this research is informed consent, which means that participants are fully aware of the purpose, procedures and risks of the research, and voluntarily agree to participate. Researcher should obtain written consent from participants before collecting data from them. Researcher should also inform participants about their right to withdraw from the research at any time without any penalty. (Bryman & Bell 2015.)

A third ethical issue that need to be addressed in this research is privacy and confidentiality, which mean that participants have control over what information they share with the researcher and how it is used, and that participants' identities are protected from disclosure to others. Researcher should respect participants' privacy and confidentiality by not asking sensitive or personal questions, not revealing their names or other identifying details, and storing and disposing data securely. (Bryman & Bell 2015.)

3.1 Reporting techniques

This section will explain how the data collected from the online questionnaires will be reported using different techniques such as tables, charts and narratives.

Tables are useful for presenting numerical or categorical data in a concise and organized way. Tables can show the frequency, percentage, mean, median, mode, standard deviation, correlation, or other statistics of the data. Tables can also show the cross-tabulation or comparison of two or more variables. Tables should have a clear title, a caption that explains the content and source of the data, and labels for the rows and columns. Tables should be numbered sequentially and referred to in the text. (Bryman & Bell 2015.)

Charts are useful for visualizing numerical or categorical data in a graphical way. Charts can show the distribution, trend, pattern, relationship, or difference of the data. Charts can be of different types, such

as bar charts, pie charts, line charts, scatter plots, histograms, or box plots. Charts should have a clear title, a legend that explains the symbols or colours used, and labels for the axes or segments. Charts should be numbered sequentially and referred to in the text. (Bryman & Bell 2015.)

Narratives are useful for describing qualitative data in a textual way. Narratives can show the themes, categories, patterns, meanings, or interpretations of the data. Narratives can be based on direct quotes from the participants or paraphrases of their responses. Narratives should have a clear introduction, body and conclusion that relate to the research questions and objectives. Narratives should also use citations to support the claims or arguments made. (Bryman & Bell 2015.)

3.2 Reliability and validity

Reliability and validity are different but related concepts that are used to evaluate the quality of research. Reliability refers to the consistency of a measure, meaning that it produces the same results on repeated tests. Validity refers to the accuracy of a measure, meaning that it measures what it claims to measure. Both reliability and validity indicate how well a method and technique are used to measure. (Bryman & Bell 2015.)

The goal of this research is to find out the growth and challenges of dairy sector. Therefore, I have opted for quantitative research in this study. Quantitative research is based on data collection and analysis, and it can test hypotheses and establish relationships between variables using statistical techniques.

When selecting a design, there might be various reasons and factors that influence the decision, including the ability of the researcher. The next step in the research process is to plan the measurement of concepts. Concepts are the points around which the research is conducted, such as organizational size, productivity, organizational performance, technology, etc. It is important for the researcher to clearly define the concepts, because the same concept may mean different things to different people. Hence, the researcher defines the concepts to make his or her intention clear to others or to measure a concept that can be quantified. (Bryman & Bell 2015.)

If a concept is to be employed in quantitative research, it will have to be measured. Once they are measured, concepts can be in the form of independent or dependent variables. Measurement is a very

important part of research because it provides consistency and precision. However, it is not enough to have a reliable measurement; it also has to be valid. (Bryman & Bell 2015.)

Reliability refers to the consistency of a measure of a concept. A measure is reliable if it produces the same results when it is repeated under the same conditions. However, there are three important factors to check whether a measure is reliable. The first factor is stability. A measure is stable if it is resistant to change over time. This means that the results do not fluctuate when the same sample is measured at different points in time. The second factor is internal reliability. A measure has internal reliability if it consists of multiple indicators that are consistent with each other. This means that the indicators measure the same aspect of the concept and produce similar results. The third factor is inter-observer consistency. A measure has inter-observer consistency if it produces the same results when different observers use it. This means that the results are not influenced by subjective judgments or interpretations of different observers. (Bryman & Bell 2015.)

Validity refers to the accuracy of a measure of a concept. A measure is valid if it measures what it claims to measure. There are several ways of establishing validity. The first way is face validity. A measure has face validity if it appears to measure what it intends to measure at face value. This means that the measure looks reasonable and logical to other people who review it. The second way is criterion validity. A measure has criterion validity if it correlates with another measure that has already been established as valid. This means that the new measure can be compared with a traditional or standard measure of the same concept. The third way is predictive validity. A measure has predictive validity if it can predict future outcomes or behaviors related to the concept. This means that the measure can forecast what will happen in certain situations or conditions. The fourth way is construct validity. A measure has construct validity if it reflects the theoretical construct or idea behind the concept. This means that the measure captures all the relevant aspects and dimensions of the concept. The fifth way is convergent validity. A measure has convergent validity if it correlates with other measures that assess the same concept using different methods. This means that the measure can be compared with alternative measures of the same concept. (Bryman & Bell 2015.)

Although indicators help to measure precise changes, using multiple indicators to measure a single change is a method of improving reliability and validity. It is possible that a single indicator will incorrectly classify many individuals. This may be due to the wording of the questions or misunderstanding. Since one indicator might cover only one aspect of the concept, a single indicator would be missing

other aspects of the concept. Therefore, if the researcher asks a number of questions, he or she gets a wider range of aspects of the concept. (Bryman & Bell 2015.)

3.3 Main concentration of quantitative research

The research will be conducted using a quantitative research approach, which focuses mainly on four aspects: measurement, causality, generalization and replication. This chapter will cover all these aspects.

Measurement is the process of quantifying the data collected and analyzed in the research. It provides advantages such as representing minor differences, ensuring consistency, and addressing the issues of reliability and validity. Reliability refers to the consistency of a measure, meaning that it produces the same results on repeated tests. Validity refers to the accuracy of a measure, meaning that it measures what it claims to measure. Both reliability and validity are important indicators of the quality of research. (Bryman & Bell 2015.)

Causality is the relationship between a cause and its effect. The main concern of quantitative research is explanation, hence it is more focused on why things are the way they are than on how things are. Quantitative research can test hypotheses and establish causal relationships between variables using statistical techniques. (Bryman & Bell 2015.)

Generalization is the extent to which the findings from a sample can be applied to a larger population. It is an important element of the study because it helps the researcher to learn from a small scale and relate it to a bigger picture. Quantitative research can generalize the findings using probability sampling methods and inferential statistics. (Bryman & Bell 2015.)

Replication is the repetition of a study in different situations to determine if the basic findings of the original study can be reproduced. It is an important aspect of research because it enhances the reliability and validity of the results. Quantitative research can facilitate replication by using standardized methods and techniques that can be easily replicated by other researchers. (Bryman & Bell 2015.)

3.4 Quantitative sampling

Sampling methods are the ways of selecting a part of a population for the purpose of conducting research. Different sampling methods have different advantages and disadvantages, depending on the research objectives, resources, and population characteristics. In this chapter, we will discuss some common sampling methods for quantitative research, and how they can affect the quality and quantity of responses. (McCombes 2019.)

One of the main distinctions between sampling methods is whether they are probability or non-probability. Probability sampling methods involve random selection of units or individuals from the population, ensuring that each unit has a known and equal chance of being included in the sample. Probability sampling methods allow us to make statistical inferences about the population based on the sample data, and to estimate the sampling error or the degree of uncertainty in our estimates. (McCombes 2019.)

Some examples of probability sampling methods are simple random sampling, stratified random sampling, cluster random sampling, and systematic random sampling. These methods differ in how they divide and select units or individuals from the population. For example, simple random sampling selects units or individuals by using a random number generator or a lottery system, while stratified random sampling divides the population into subgroups or strata based on some relevant characteristic and then selects units or individuals from each stratum randomly. (McCombes 2019.)

Non-probability sampling methods involve non-random selection of units or individuals from the population, based on convenience, judgment, or other criteria. Non-probability sampling methods do not allow us to make statistical inferences about the population based on the sample data, and we cannot estimate the sampling error or the degree of uncertainty in our estimates. (McCombes 2019.)

Some examples of non-probability sampling methods are convenience sampling, voluntary response sampling, quota sampling, and purposive or judgmental sampling. These methods differ in how they choose units or individuals from the population based on their availability, willingness, characteristics, or relevance. For example, convenience sampling selects units or individuals that are easily accessible or available to the researcher, while quota sampling selects units or individuals by ensuring that certain quotas or proportions of units or individuals with specific characteristics are met. (McCombes 2019.)

One of the challenges of quantitative research is how to quantify or measure the responses obtained from the sample. Quantification involves assigning numerical values to the responses based on some scale or coding system. For example, if we ask respondents to rate their satisfaction with a product on a scale from 1 (very dissatisfied) to 5 (very satisfied), we can quantify their responses by assigning them numbers from 1 to 5 accordingly. Quantification allows us to perform statistical analysis on the data and draw conclusions about the population. (Greener & Martelli 2018.)

However, quantification also depends on the quality and quantity of responses obtained from the sample. If the responses are incomplete, inaccurate, inconsistent, or biased, they may not reflect the true opinions or behaviors of the population. Therefore, it is important to consider some factors that may affect the response rate and quality of quantitative research. (Greener & Martelli 2018.)

One factor is the sample size, which refers to the number of units or individuals included in the sample. A larger sample size may increase the precision and accuracy of our estimates, but it may also increase the time and cost of data collection. A smaller sample size may reduce the time and cost of data collection, but it may also decrease the precision and accuracy of our estimates. A researcher should determine an appropriate sample size based on their research objectives and resources. (Greener & Martelli 2018.)

Another factor is the sampling method, which refers to how we select units or individuals from the population to be in the sample. As discussed above, different sampling methods have different advantages and disadvantages for quantitative research. A researcher should choose a sampling method that suits their research design and population characteristics. (Greener & Martelli 2018.)

A third factor is the survey design, which refers to how we design and administer our survey instrument or questionnaire to collect data from the sample. A good survey design should be clear, concise, relevant, unbiased, and easy to complete. A poor survey design may confuse, bore, offend, or discourage respondents from answering honestly or completely. A researcher should test and refine their survey design before conducting the actual data collection. (Greener & Martelli 2018.)

A fourth factor is data quality control, which refers to how we check and verify the data collected from the sample for errors, missing values, outliers, or inconsistencies. Data quality control helps to ensure that the data is reliable and valid for analysis and interpretation. A researcher should perform data

quality control during and after data collection, and use appropriate methods to handle or correct any data issues. (Greener & Martelli 2018.)

One of the ways to measure the response rate of quantitative research is to use the following formula:

$$\text{Actual response rate} = \frac{(\text{number of usable responses})}{(\text{total sample} + \text{unsuitable or countable responses})} \times 100 \quad (1)$$

where the actual response rate is calculated from the percentage of usable responses out of the total number of units or individuals contacted for the research, excluding those who are unsuitable or uncountable for some reason, such as being ineligible, deceased, or duplicated. A higher actual response rate indicates a higher quantity and quality of responses obtained from the sample. (Sarker & AL-Mu-aalemi 2022.)

3.5 Data collection

Data collection is a process of gathering data from various sources to find answers to research problems or probabilities to evaluate possible outcomes. Hence, data is obtained from primary and secondary sources. Primary data is collected for the first time by the researcher, which are obtained from questionnaires and observations. However, secondary data is which have been collected already by others. They are often collected from various sources such as articles or journals that had been published. Therefore, secondary data is also required because when researchers collect primary data themselves, the prospect of this happening should be less pronounced. (Bryman & Bell 2015.)

For this research work, Punjab was purposively selected as the state for the study. The Punjab has 23 zones, each comprising several districts. Hence, a sample of population was selected, which represented the entire group. Since the number of people involved was too large and it was impractical to survey every member, a simple random sampling procedure was adopted to select one zone from each district. From each selected zone, household consumers and dairy farmers were selected by stratified random sampling based on their income level and herd size. The study ensured that the samples selected represented all relevant characteristics and features of the population.

The primary data was collected through two structured questionnaires that were designed to address the research objectives. The first questionnaire was for household consumers who buy and consume milk products in Punjab. The second questionnaire was for dairy owners who produce and sell milk products in Punjab. Both questionnaires consisted of closed-ended and open-ended questions that measured the respondents' perceptions, attitudes, preferences, satisfaction and expectations regarding the dairy sector in Punjab.

The consumer questionnaire consisted of 11 questions that were divided into three sections. The first section asked about the demographic information of the consumers, such as their gender, age, and education level. The second section asked about their dairy product consumption habits, such as the types and frequency of dairy products they preferred to buy, and the factors that influenced their preferences for branded or non-branded dairy products. The third section asked about their dairy product satisfaction level, such as whether they were satisfied with the product, and what aspects of the product they were satisfied or dissatisfied with, such as price, taste, quality, nutritional value, and freshness. The consumer questionnaire aimed to identify the consumer behavior and satisfaction regarding the dairy sector in Punjab, and to test the hypothesis that consumer preferences are influenced by price, taste, quality, and nutritional value of dairy products.

The dairy owner questionnaire consisted of 27 questions that were divided into four sections. The first section asked about the demographic information of the dairy owners, such as their gender, age, education level, and experience in the dairy business. The second section asked about their dairy production practices, such as the number and type of animals on their farm, the methods of feeding, milking, storing, transporting, selling, and pricing milk products, and the practices of dealing with sick or injured animals, improving herd genetics, and getting training or guidance. The third section asked about their dairy marketing and income situation, such as how they sold their milk products, how they determined the price of their milk products, whether they were satisfied with the price of their milk products, whether there was any change in their income from dairy business over time, and whether there was any minimum support price (MSP) for milk. The fourth section asked about the opportunities and challenges that they faced in their dairy business, such as what opportunities they saw for their dairy business, and what challenges they faced in their dairy business. The dairy owner questionnaire aimed to identify the change in milking methods, the opportunities and challenges faced by the dairy industry in India, and to test the hypothesis that milking methods affect milk production quantity and quality.

The questionnaires also addressed the research objectives of this study. The research question was to analyze the service quality, consumer behavior and growth prospects of the dairy sector in India, with a focus on Punjab. The questionnaires helped to collect data that could answer the research question and also to provide recommendations for improving the dairy sector based on milk production and consumption.

Table 2 shows some examples of the questions from the consumer questionnaire. Table 3 shows some examples of the questions from the dairy owner questionnaire. The complete questionnaires are presented in appendix 1 (consumer questionnaire) and appendix 2 (dairy owner questionnaire).

TABLE 2. Examples of questions from consumer questionnaire

Question	Type
Which dairy product do you prefer to buy? (You can choose more than one option)	Multiple choice
Which factors influence your preference?	Single choice
Are you satisfied with the product?	Single Choice

TABLE 3. Examples of questions from dairy owner questionnaire

Question	Type
How do you milk your animals?	Single choice
How do you determine the price of your milk and milk products?	Single choice
What are the challenges that you face in your dairy business? (You can choose more than one option)	Multiple choice

The validity and reliability of the questionnaires were ensured by following several steps. First, the questionnaires were based on a thorough literature review of previous studies on the dairy sector in India and Punjab. Second, the questionnaires were reviewed to fit the objectives of the thesis. Third, the questionnaires were revised based on the feedback and results from the pre-test. Fourth, the questionnaires were administered to the selected respondents using standardized procedures.

The data collection method that I used for my thesis was online questionnaire, which is a type of survey that uses structured questions to collect quantitative data from respondents. The advantages of using online questionnaire were that it was low-cost, fast, convenient, and easy to analyse. The limitations of using online questionnaire were that it depended on the internet access, literacy, and willingness of the respondents, and that it could not capture the depth and richness of qualitative data.

The ethical issues or challenges that I faced or anticipated during the data collection process were related to informed consent, confidentiality and privacy of the respondents and their data. I obtained informed consent from all respondents before administering the questionnaires and explained the purpose, scope and benefits of the study. I also assured them that their participation was voluntary and they could withdraw at any time without any consequences. I maintained confidentiality by not requiring people to fill their email or name. Moreover, all responses were private so it will not influence other people's responses. I ensured privacy of their data by using Google Forms, which is a secure online platform that stores and organises the data automatically.

The data collection procedure that I followed for my thesis involved three steps: designing the questionnaire, recruiting the facilitators, and distributing the questionnaire. First, I designed the questionnaire using Google Forms, which allowed me to create different types of questions, such as multiple choice and checkboxes. Second, I recruited three facilitators who helped me to collect data from both the urban and rural regions of Punjab. The facilitators were trained by me on how to communicate with the respondents and explain the research objectives and the questions. Third, I distributed the questionnaire to the facilitators via email. The facilitators then administered the questionnaire to a sample of 110 dairy owners and 75 consumers in rural area and 75 consumers in urban area. The respondents were supervised by the facilitators who made sure that the questions were answered correctly and completely. I had access to all data entered in the Google Forms so it was easy to know when I had enough data.

4 RESULTS

This section presents and discusses the results of the data analysis based on the primary data collected from the consumers and dairy owners in Punjab. The study conducted three surveys using questionnaires through Google Forms, collecting data from 75 consumers in urban area, 75 consumers in rural area, and 110 owners in rural area. The results of the data analysis are presented in this chapter. The chapter is divided into two sections: (1) Consumer data from rural and urban areas, (2) Owners' data from rural areas.

4.1 Consumer data from rural and urban areas

This section will provide a summary of the demographic characteristics and responses of the consumers who participated in the survey regarding consumption, satisfaction and availability of dairy products.

4.1.1 Demographic information of consumers

The data in figure 2 shows that the majority of the consumers in urban area were female (56%). Also, most of the consumers in rural areas were female (96%).

Figure 3 compares the distribution of consumers' age groups in urban and rural areas. The figure shows that the most common age group among the consumers in both areas is 35-40 years, which accounts for 48% of the urban consumers and 45% of the rural consumers. The figure also shows that the second most common age group among the urban consumers is 30-35 years, which represents 29% of them, while the second most common age group among the rural consumers is 40 and above, which represents 19% of them. The figure also shows that the least common age group among the urban consumers is 40 and above, which accounts for only 9% of them, while the least common age group among the rural consumers is 30-35 years, which accounts for only 21% of them. The figure also shows that the urban consumers have a slightly higher proportion of younger consumers (25-30 years) than the rural consumers, with 13% and 15% respectively.

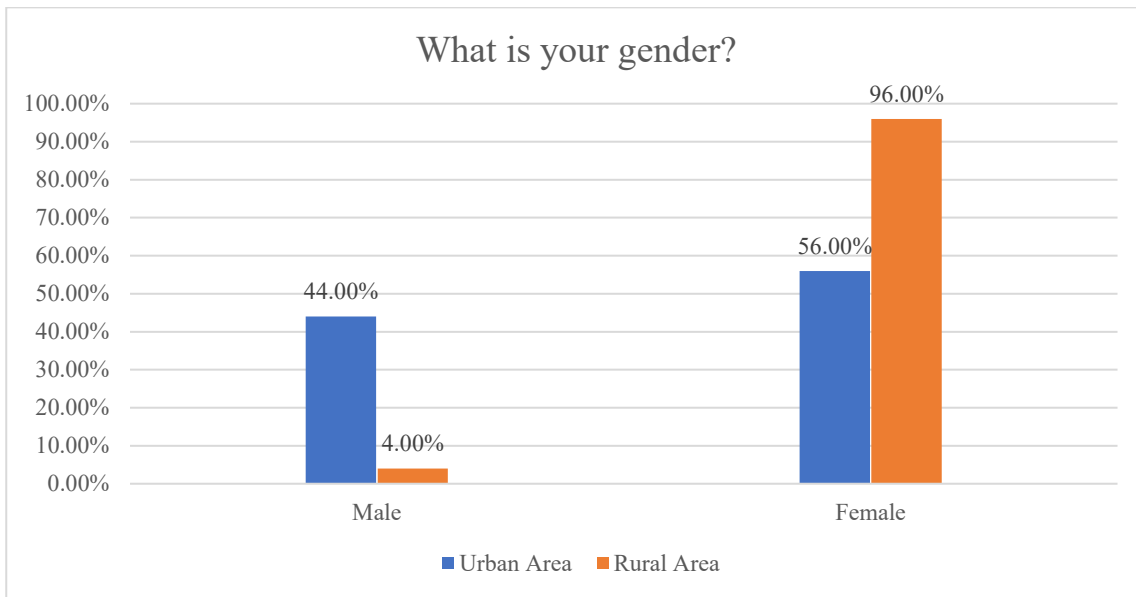


FIGURE 2. Gender related demographic information of consumer.

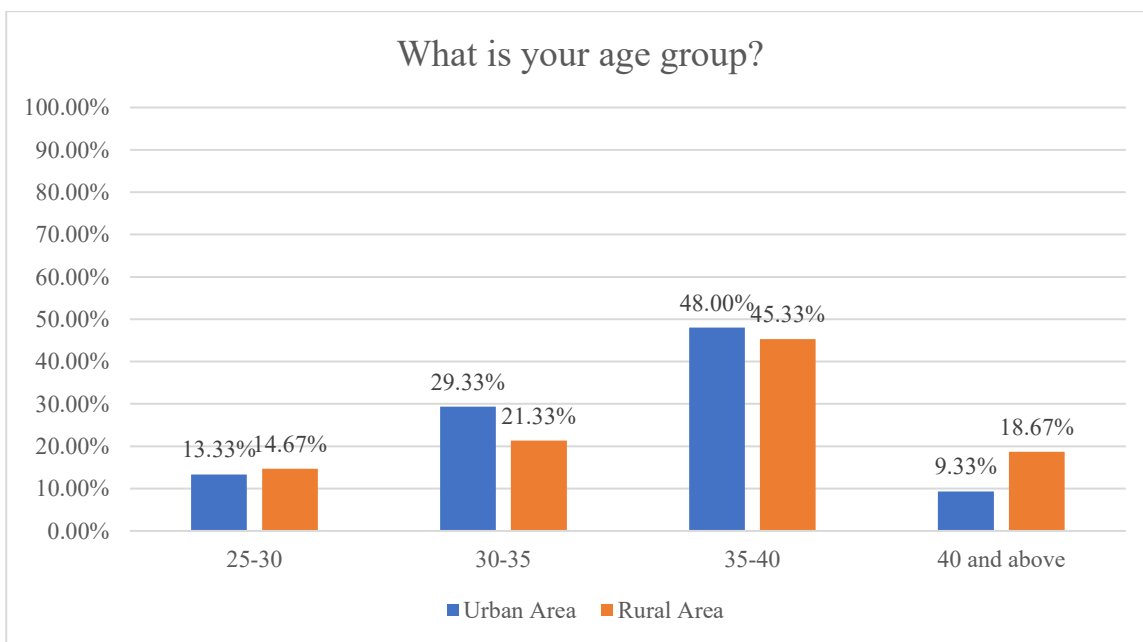


FIGURE 3. Age related demographic information of consumers.

4.1.2 Dairy product consumption of consumers

Figure 4 compares the preferences of consumers in urban and rural areas for different dairy products. The figure shows that milk is the most preferred dairy product among both urban and rural consumers, with 100% and 98% of them choosing it respectively. The figure also shows that curd is the second

most preferred dairy product among urban consumers, with 80% of them choosing it, while butter is the second most preferred dairy product among rural consumers, with 92% of them choosing it. The figure also shows that cheese is the third most preferred dairy product among both urban and rural consumers, with 61% and 65% of them choosing it respectively. The figure also shows that butter is the least preferred dairy product among urban consumers, with only 38% of them choosing it, while curd is the least preferred dairy product among rural consumers, with only 89% of them choosing it.

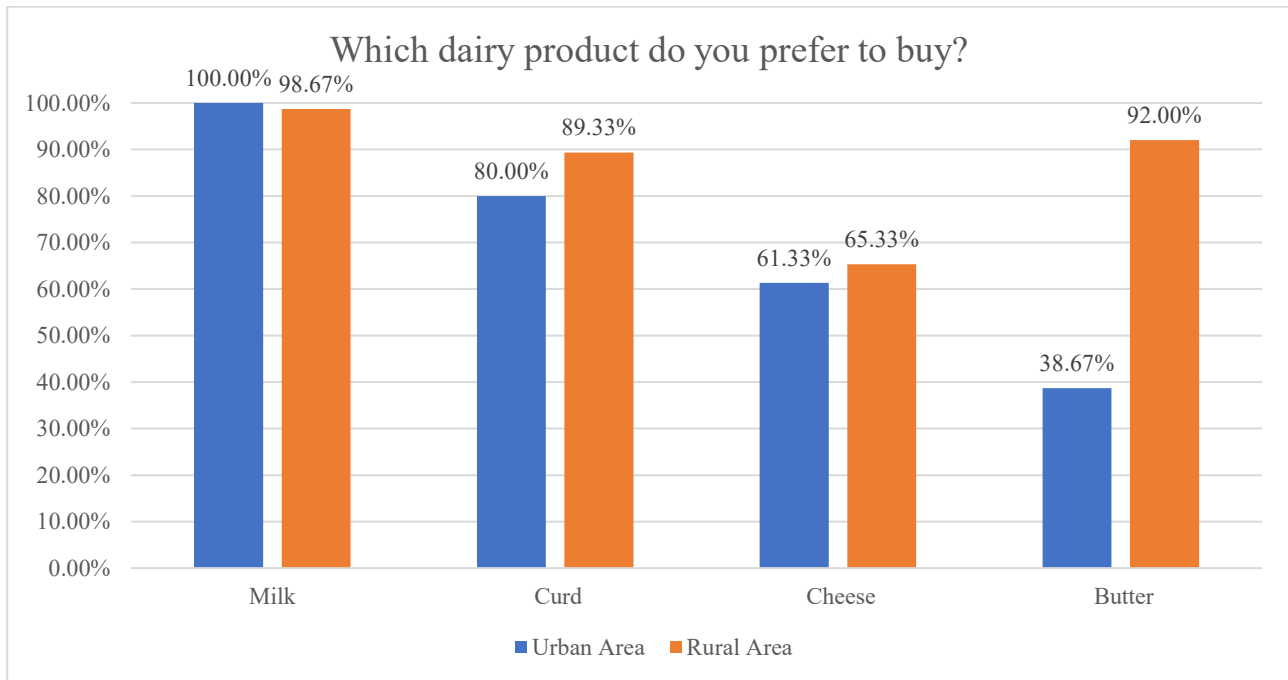


FIGURE 4. Dairy product purchase preference by consumers.

Figure 5 shows that a majority of consumers in urban area (68%) bought dairy products daily and a minority (32%) bought them weekly, while all consumers in rural area (100%) bought dairy products daily. Figure 6 shows that most consumers in urban area (91%) preferred branded products and only a few (9%) preferred non-branded products, while none of the consumers in rural area (0%) preferred branded products.

Figure 7 compares the reasons for buying branded or non-branded dairy products among urban and rural consumers. The figure shows that the main reasons for urban consumers to buy branded products are quality, availability, and advertisement, which are chosen by 86%, 91%, and 49% of them respectively. On the other hand, the main reasons for rural consumers to buy non-branded products are availability and quality, which are chosen by 100% and 93% of them respectively. The figure also shows that none of the rural consumers choose advertisement as a reason for buying non-branded products.

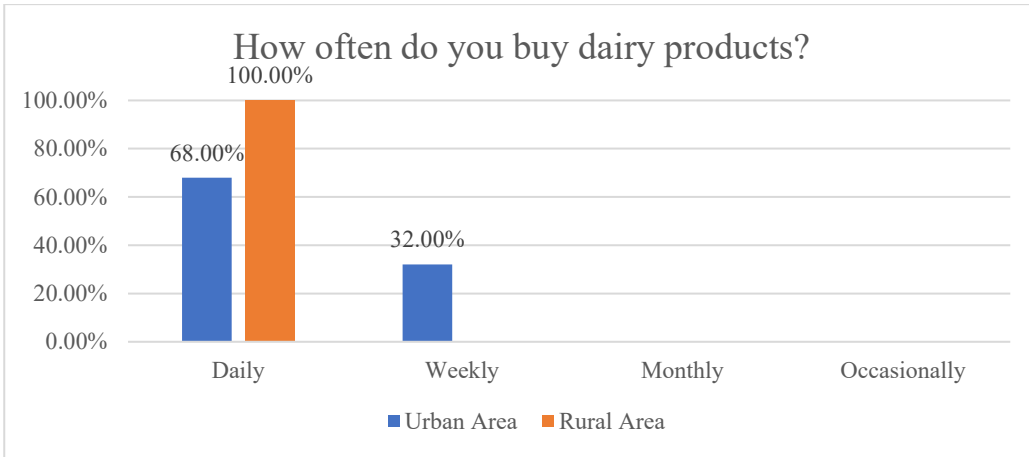


FIGURE 5. Frequency of buying dairy products by consumers.

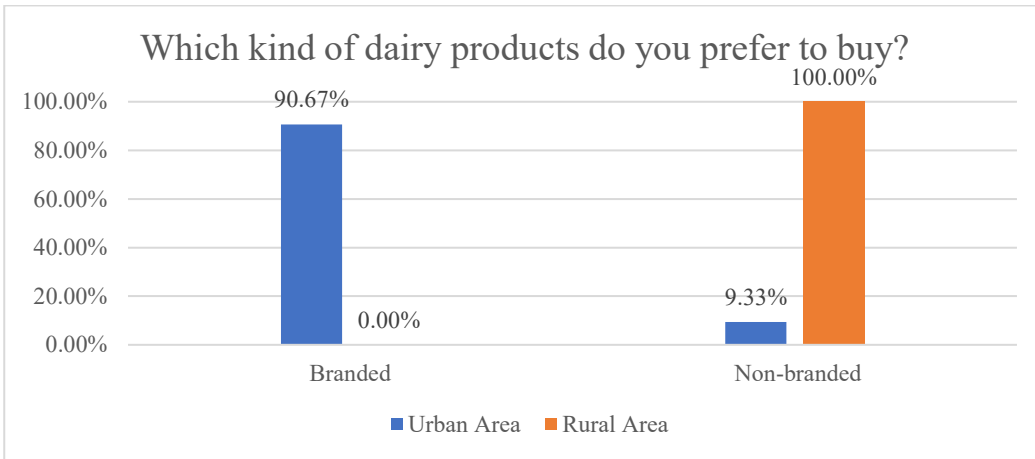


FIGURE 6. Dairy products preference by consumers.

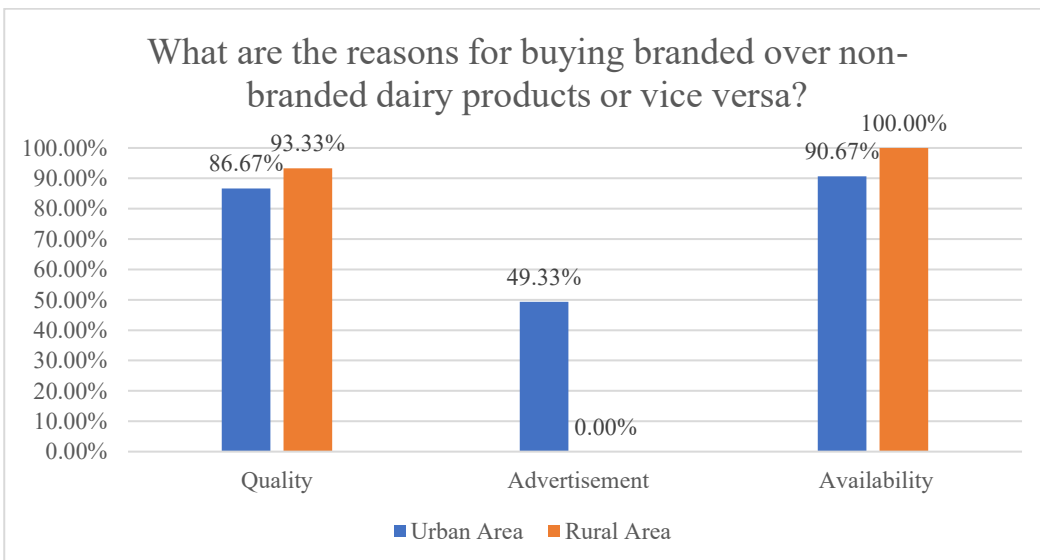


FIGURE 7. Reasons for buying branded dairy products over non-branded ones by consumers.

4.1.3 Dairy product satisfaction of consumers

Figure 8 compares the satisfaction and dissatisfaction of consumers in urban and rural areas with the overall dairy products. The figure shows that most urban consumers (85%) are satisfied with the overall products, while a few (15%) are not. The main reasons for dissatisfaction among the unsatisfied urban consumers are high price (55%) and low quality (45%). The figure also shows that all rural consumers are satisfied with the overall products, and none of them report any dissatisfaction.

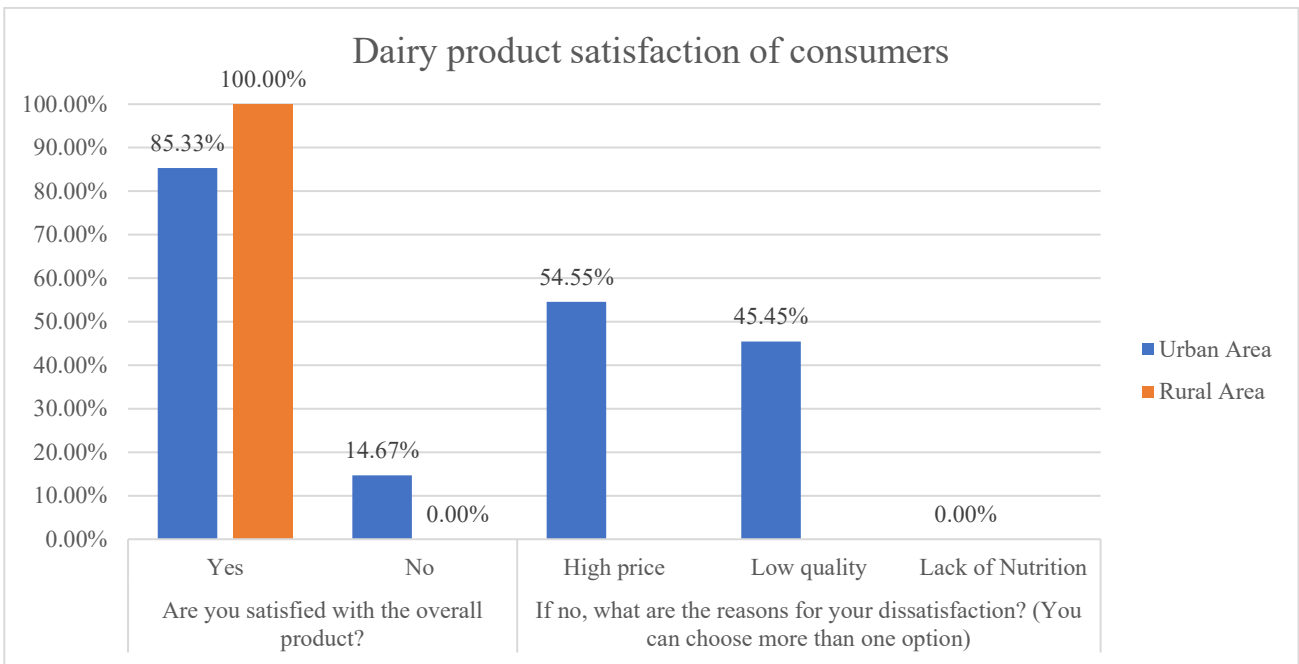


FIGURE 8. Dairy product satisfaction rate and dissatisfaction reasons of consumers

4.1.4 Dairy product availability to consumers

Figure 9 shows that most of the consumers in urban area had access to dairy products (81%), but some of them faced barriers such as distance (7%), transportation (7%), supply shortage (7%), or demand surplus (19%). On the other hand, all the consumers in rural area had access to milk and milk products.

As shown in figure 10, some of the consumers in urban areas faced shortage of dairy products at some point (21%), while consumers in rural areas have not faced shortage most of the time (91%).

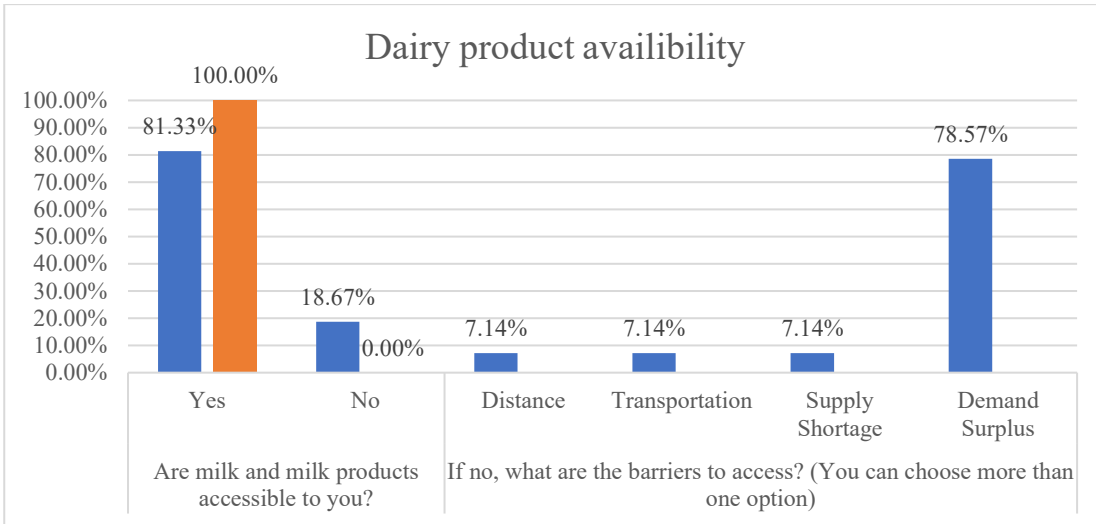


FIGURE 9. Dairy product availability and unavailability to consumers

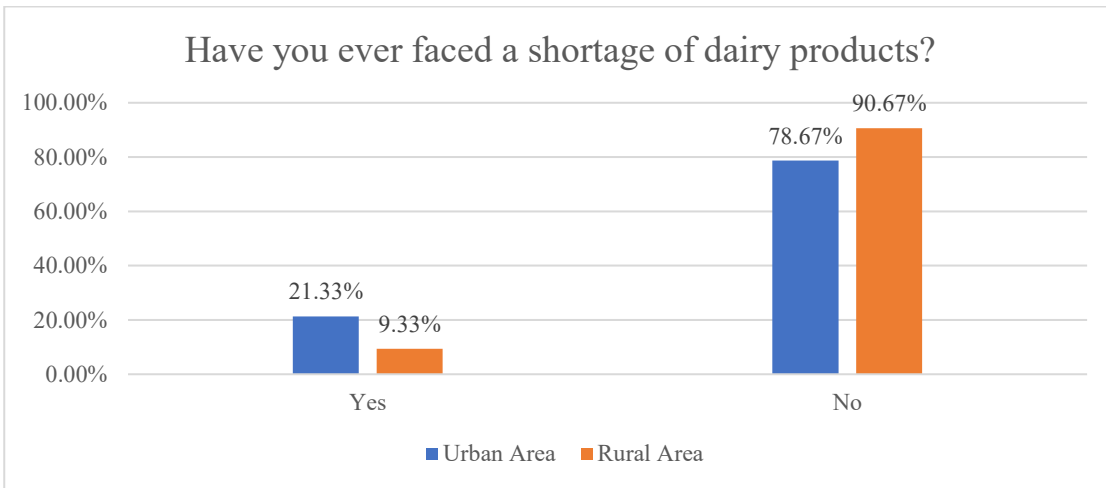


FIGURE 10. Shortage of dairy products to consumers.

4.2 Owners’ data from rural areas

This section will provide a summary of the demographic characteristics, dairy production practices, marketing and income, opportunities and challenges of dairy owners in the rural area of Punjab who participated in the survey.

4.2.1 Demographic information of dairy owners

The result from the survey showed that all of the dairy owners in rural area were male. According to figure 11, most of the owners were young and middle-aged, with 68% of them being between 25 and

35 years old. The figure reveals that the most common age group among the dairy owners is 25-30 years, which represents 36% of them. The figure also shows that 32% of the dairy owners belong to the 30-35 years age group, 18% of them belong to the 35-40 years age group, and 14% of them belong to the 40 and above age group.

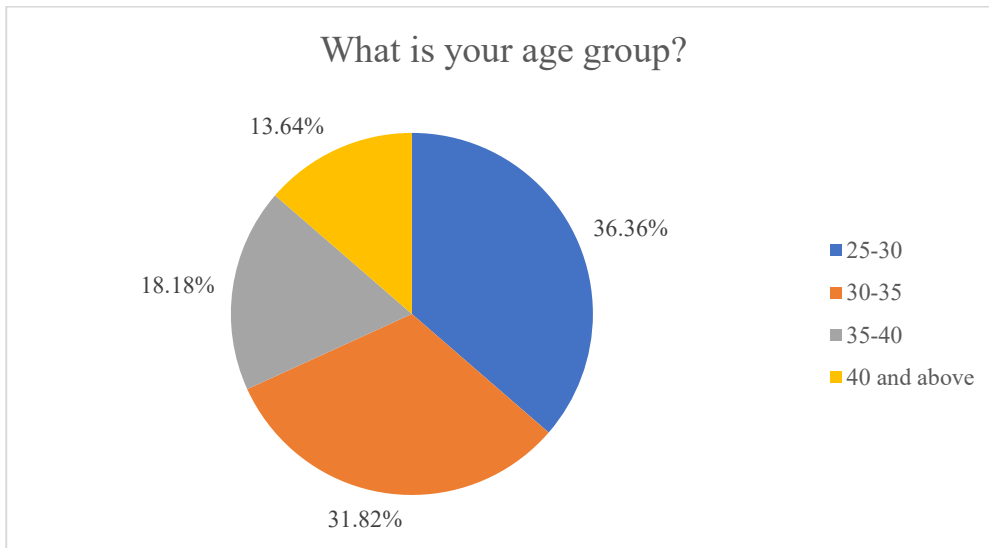


FIGURE 11. Age related demographic information of dairy owners.

Figure 12 illustrates the educational level of the dairy owners. The figure shows that the highest proportion of the dairy owners are graduate and above, with 46% of them having this level of education. The figure also shows that 21% of the dairy owners have completed higher secondary education, which is the second highest proportion. The figure also shows that 14% of the dairy owners have finished primary education, 10% of them are illiterate, and 9% of them have completed secondary education. The figure indicates that most of the dairy owners are well-educated, with 66% of them having higher secondary or graduate education.

Figure 13 compares the duration of dairy business experience among the dairy owners. The figure shows that the most common duration is 6-10 years, which is reported by 49% of the respondents. The figure also shows that 39% of the respondents have been in the dairy business for more than 10 years, which indicates that they have a long-term involvement and commitment in the sector. The figure also shows that only 12% of the respondents have been in the dairy business for less than 5 years, which suggests that they are new entrants or beginners in the sector. Among them, only 3% have been in the dairy business for less than 1 year, which means that they have just started their business.

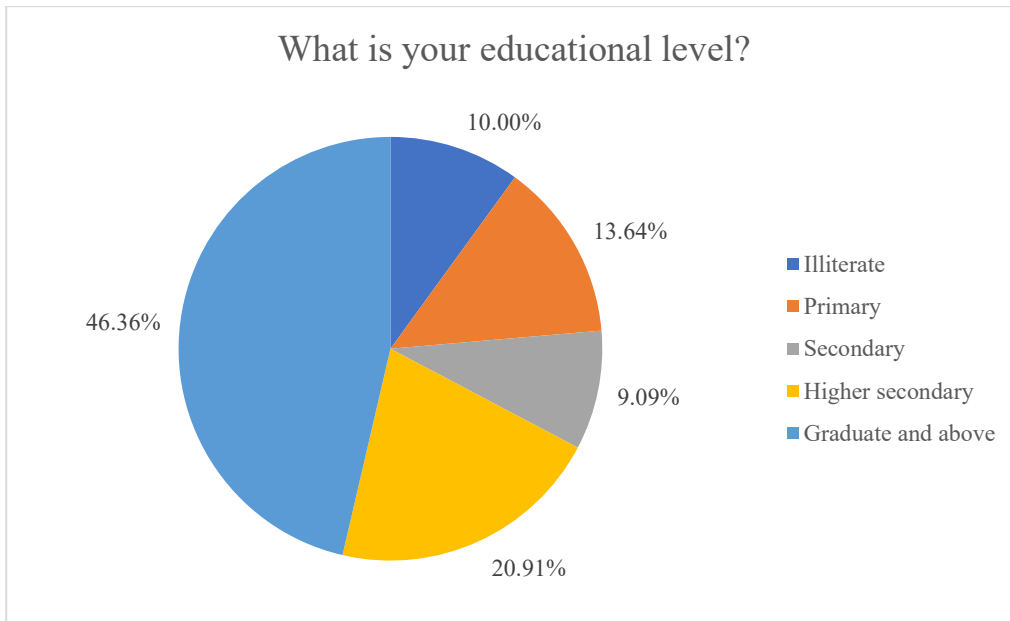


FIGURE 12. Educational level of dairy owners

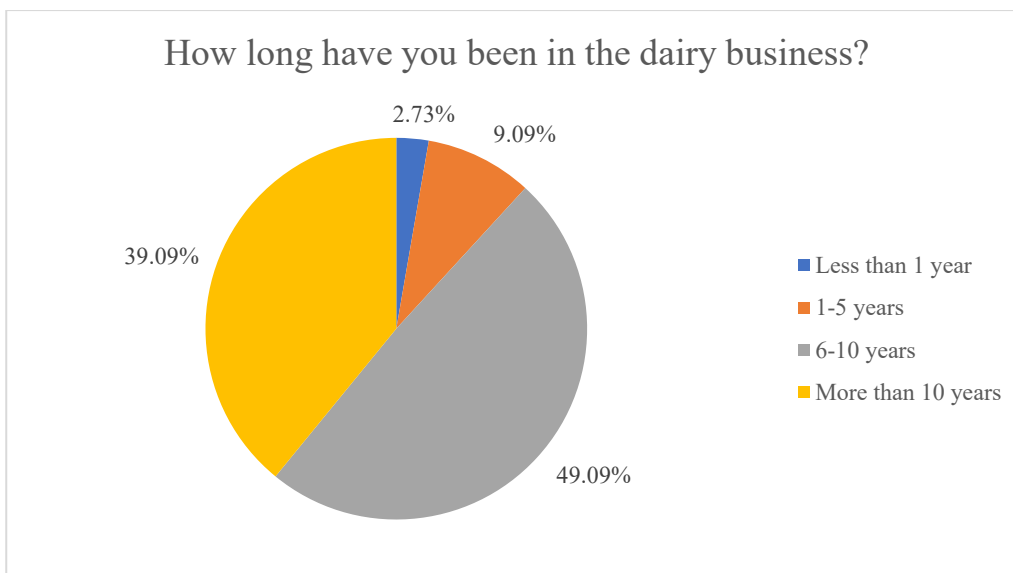


FIGURE 13. The duration dairy owners have been running the business.

Figure 14 depicts the distribution of the number of animals on the dairy owners' farms. The figure shows that the most frequent herd size among the farmers is 10 to 20 animals, which represents 49% of the responses. This indicates that most of the farmers have a small-scale dairy operation with a moderate number of animals. The figure also reveals that 34% of the farmers have a very small herd size of less than 10 animals, which suggests that they have a subsistence or hobby farming system with low productivity and income. The figure also displays that only 17% of the farmers have a large herd size of more than 20 animals, which implies that they have a commercial or intensive farming system with

high productivity and income. Among them, 11% have 21 to 50 animals and 6% have more than 50 animals on their farms.

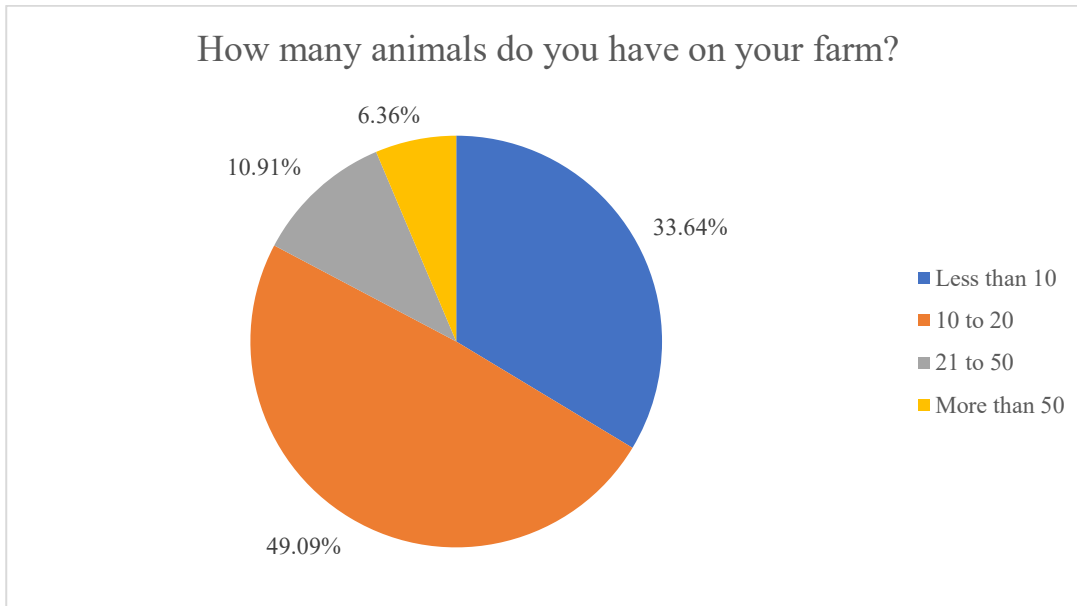


FIGURE 14. Animal quantity in dairy owner's farm

Figure 15 shows the types and preferences of animals used by the dairy owners for their dairy business. The survey showed that the dairy owners have cows and buffaloes on their farms. The figure indicates that the majority of the dairy owners (65%) prefer to use buffaloes for producing dairy products, while the rest of them (35%) prefer to use cows. The figure suggests that buffaloes are more popular than cows among the dairy owners for their milk production.

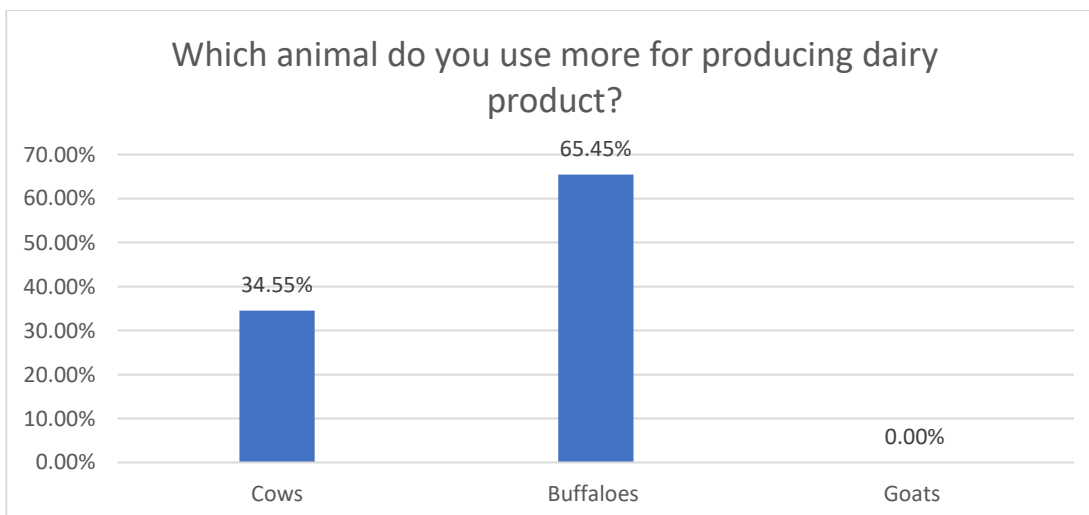


FIGURE 15. The type of animal used to produce dairy products and their quantity.

4.2.2 Dairy production practices of dairy owners

This section shows that dairy owners in rural area used various methods of feeding, milking, storing, transporting, selling, and pricing their milk products. Figure 16 reveals that the most common type of feed used by the farmers is green fodder, which is given to their animals by 66% of the respondents. The least common type of feed used is concentrate feed, which is given to their animals by only 9% of the respondents. Figure 17 shows that most farmers rotate their feed weekly (85%), while some do it bi-weekly (15%). None of the farmers change their feed monthly.

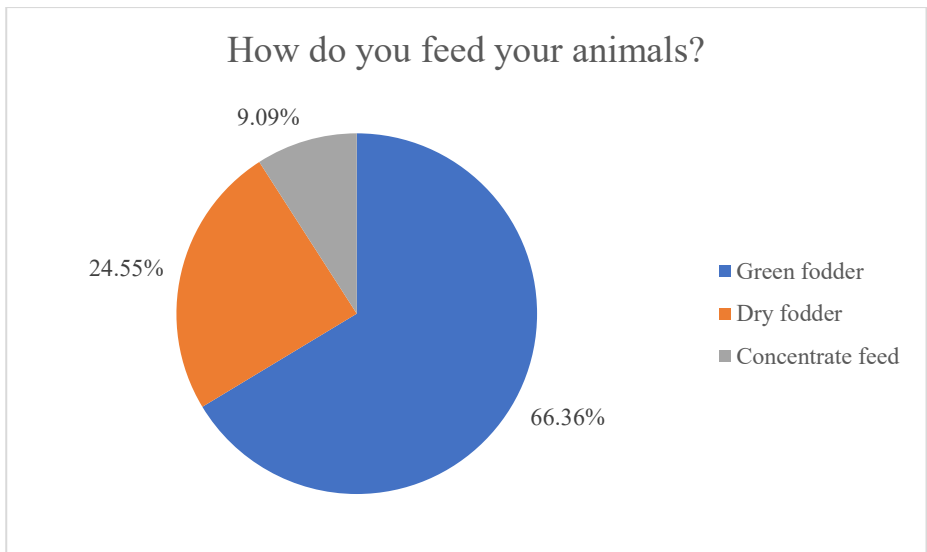


FIGURE 16. Animal food used by dairy owners.

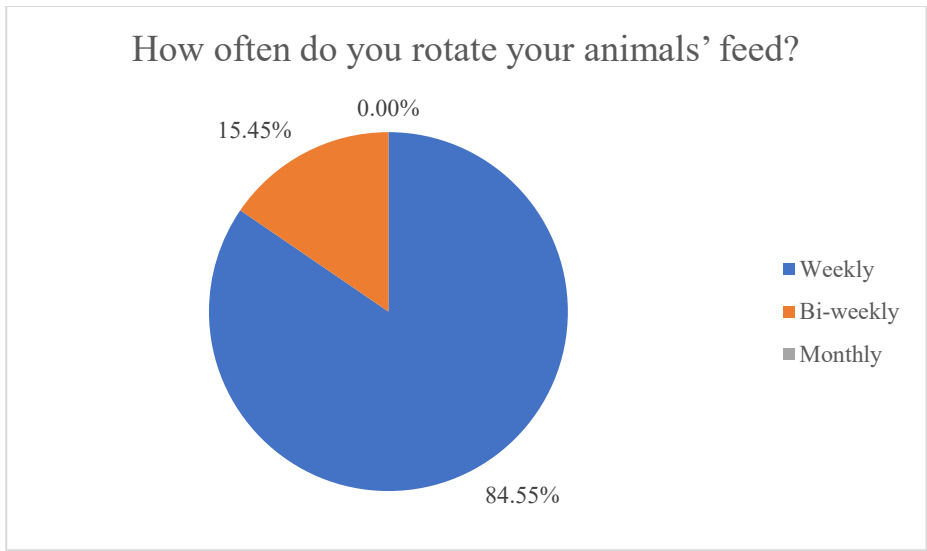


FIGURE 17. Dairy production practice in terms of animals' feed rotation.

Figure 18 presents the responses of dairy owners to three questions regarding their milking practices. It shows that most farmers rely on traditional or low-tech methods for both milking and storing their milk. Specifically, 95% of the farmers milk their cows by hand and 71% of them store their milk in cans or containers. However, a small proportion of the farmers have adopted modern equipment and facilities for milking and storing their milk. According to the figure, 5% of the farmers use a machine for milking and 29% of them use bulk milk coolers or chillers for storing their milk. The chart also indicates that the most common frequency of milking is twice a day, which accounts for 85% of the responses.

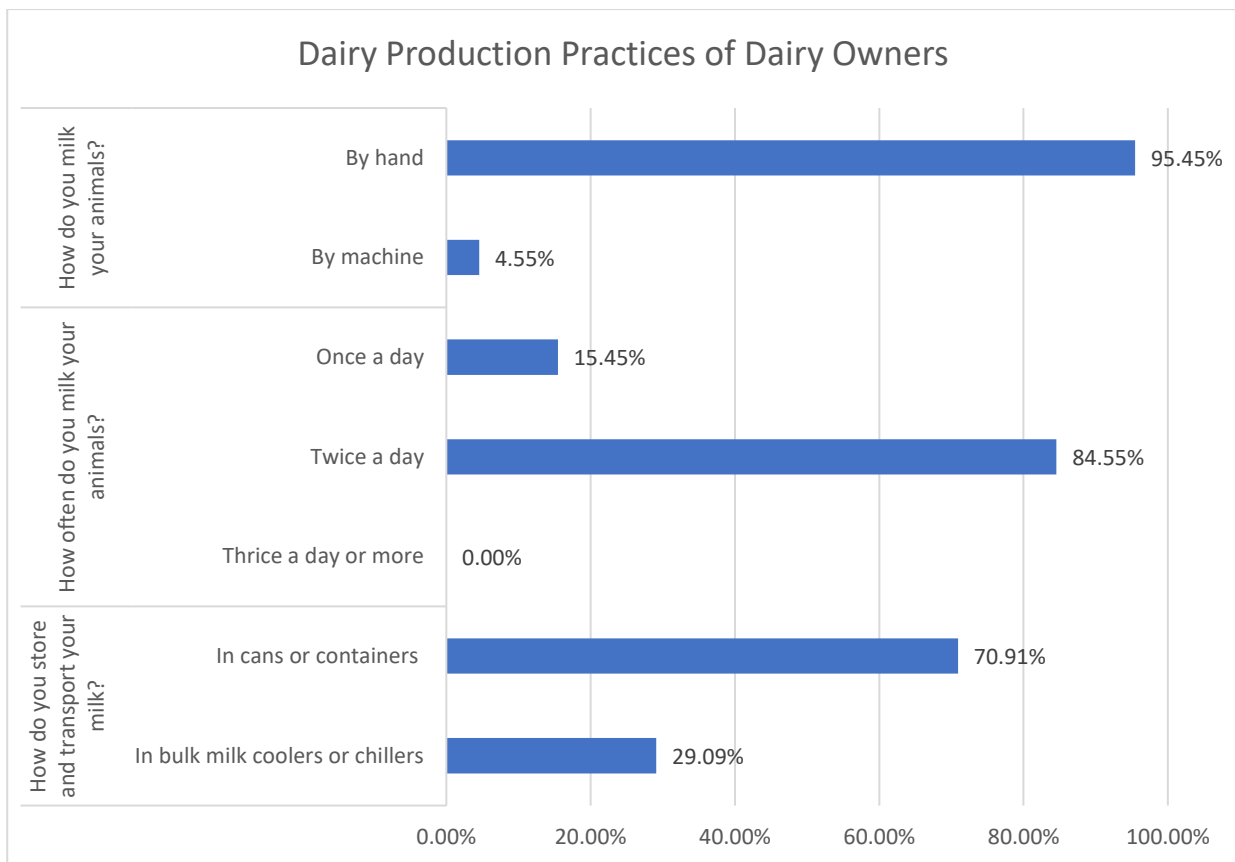


FIGURE 18. Dairy production practices in terms of milking, its frequency and storing methods

Figure 19 displays how the dairy owners would deal with a surplus of milk and find new buyers, how they would handle sick or injured animals on their farms, and how they would improve their herd's genetics. The chart shows that the most popular option for finding new buyers for excess milk is to sell it to cooperative society, which is chosen by 54% of the respondents. The second most preferred option is to sell it to restaurants, which is selected by 32% of the respondents. The least favored option is to sell it to current shop keepers, which is picked by only 15% of the respondents. The chart also shows that all the dairy owners would call a veterinarian to deal with sick or injured animals on their farms,

and none of them would try to treat them by themselves. The chart also shows that the majority of the dairy owners (65%) would use artificial insemination to improve their herd's genetics, while the rest of them (35%) would rely on natural breeding.

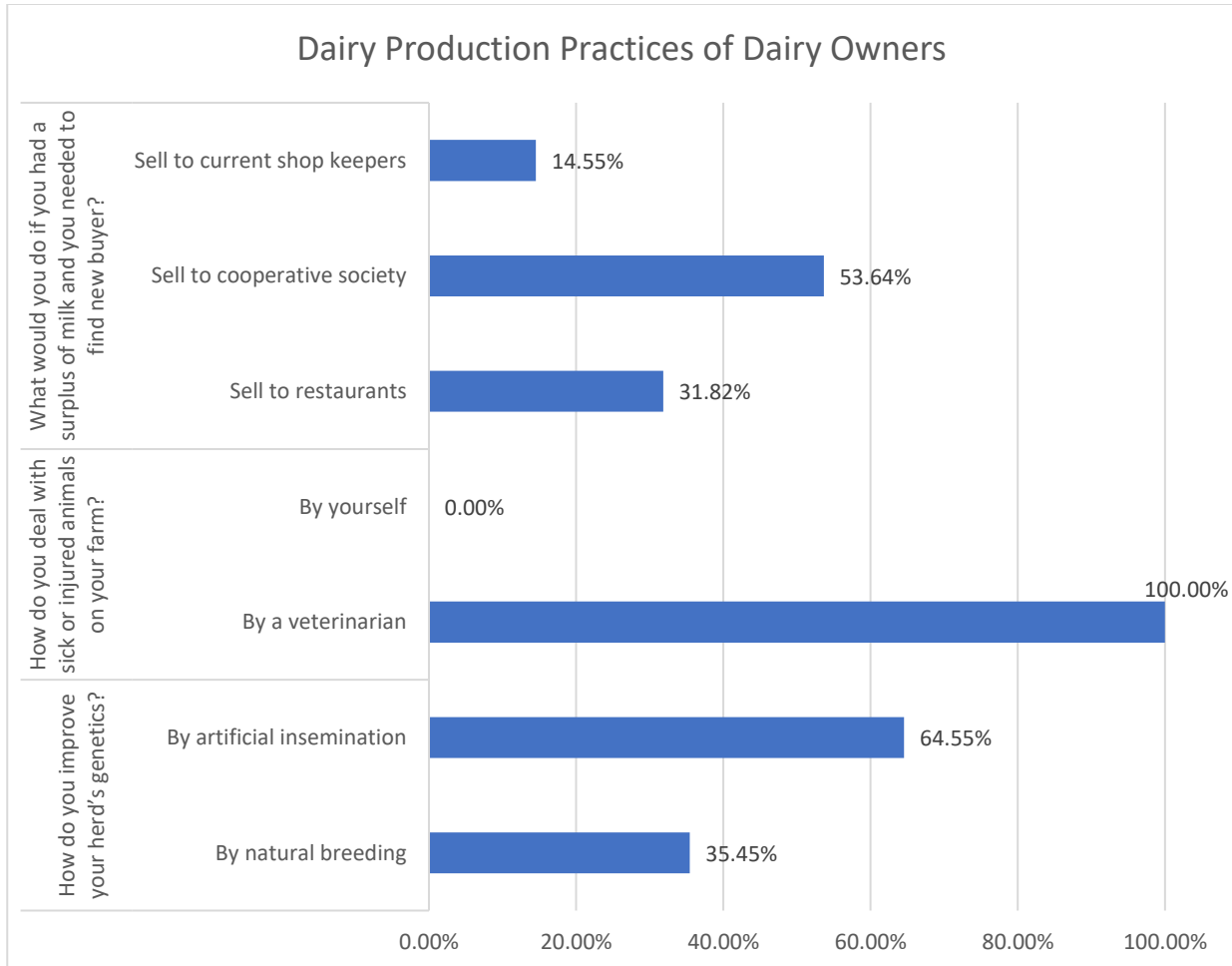


FIGURE 19. Responses to three questions about owners' dairy management practices in case of surplus and animal treatment

Figure 20 illustrates the extent of training or guidance received by the dairy owners and the benefits they derived from it. The chart shows that almost all the dairy owners (94%) have received some form of training or guidance regarding infrastructure, breed, nutrition, health, hygiene, etc. for their dairy farms. Only a few of them (6%) have not received any training or guidance in these areas. The chart also shows that all the dairy owners who have received training or guidance have reported that they are benefitted from it.

Figure 21 demonstrates the impact of dairy business on the income, fodder availability, and minimum support price for milk of the dairy owners. The chart shows that almost all the dairy owners (97%)

have experienced a rise in their income since they started dairy business. Only a few of them (3%) have not seen any increase in their income. The chart also shows that most of the dairy owners (90%) have sufficient fodder available for their animals. However, some of them (10%) face a shortage of fodder for their animals. The chart also shows that none of the dairy owners have any minimum support price for milk like other agricultural commodities such as wheat and rice from the government. All of them (dairy owners) have to sell their milk at market prices, which may vary depending on demand and supply.

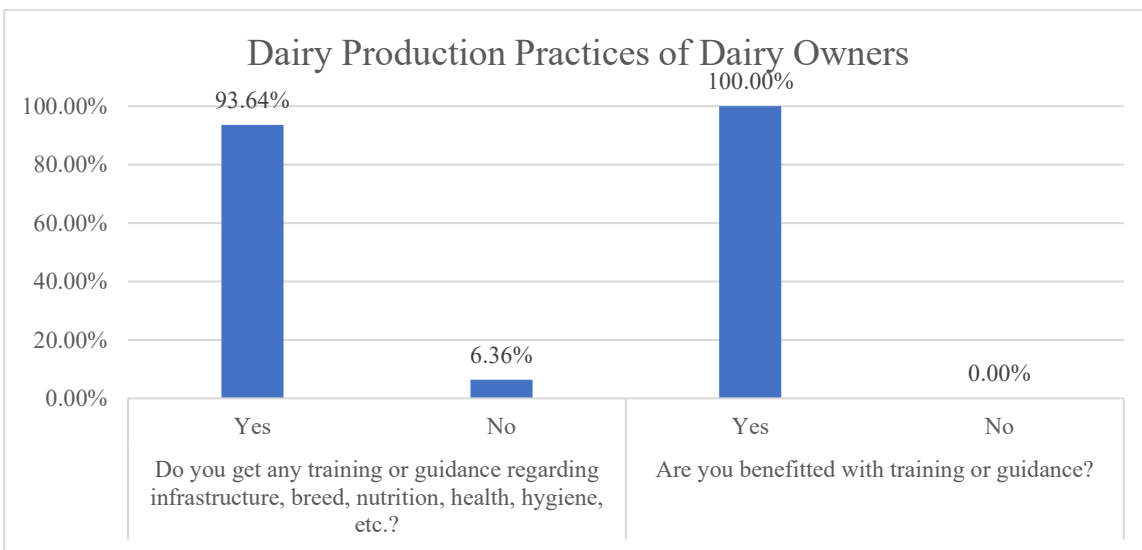


FIGURE 20. Information about dairy owners undertaking training and benefits.

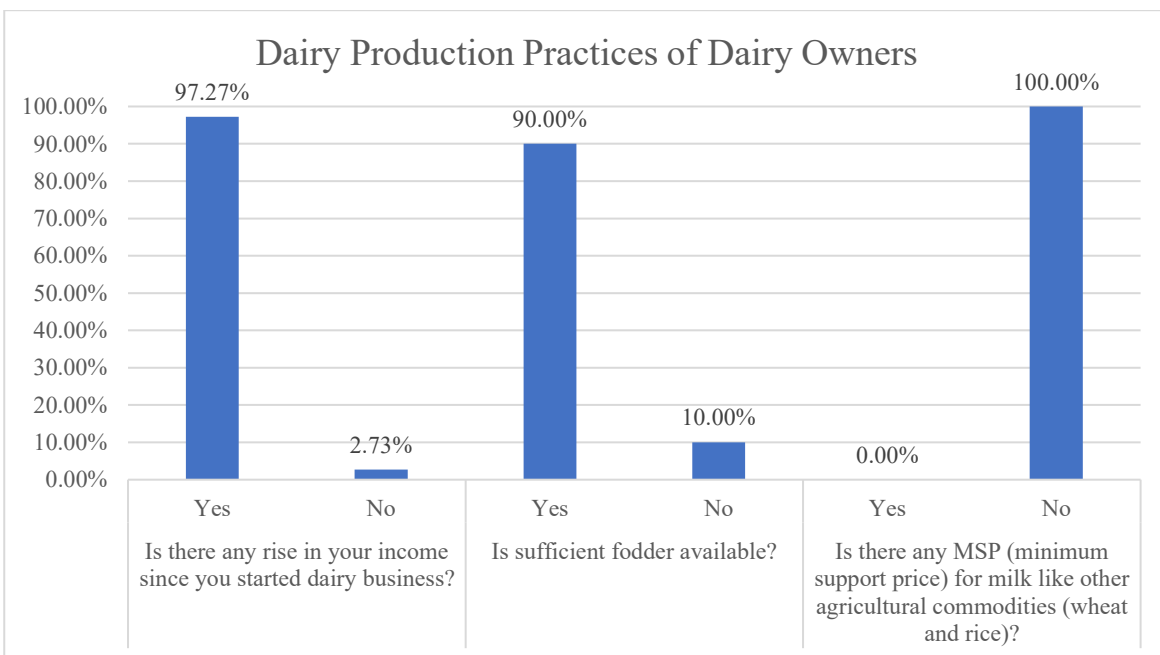


FIGURE 21. Responses of dairy owners to rise in income, fodder availability and minimum support price for milk.

4.2.3 Dairy marketing and income of dairy owners

Figure 22 depicts the different ways of selling dairy products used by the dairy owners. The chart shows that the most common way is to sell to cooperative societies or federations, which is chosen by 50% of the respondents. The chart also shows that 27% of the respondents sell to local retailers or traders who act as intermediaries between farmers and consumers. The chart also shows that 23% of the respondents sell to consumers directly without any middlemen which may also require more time and effort.

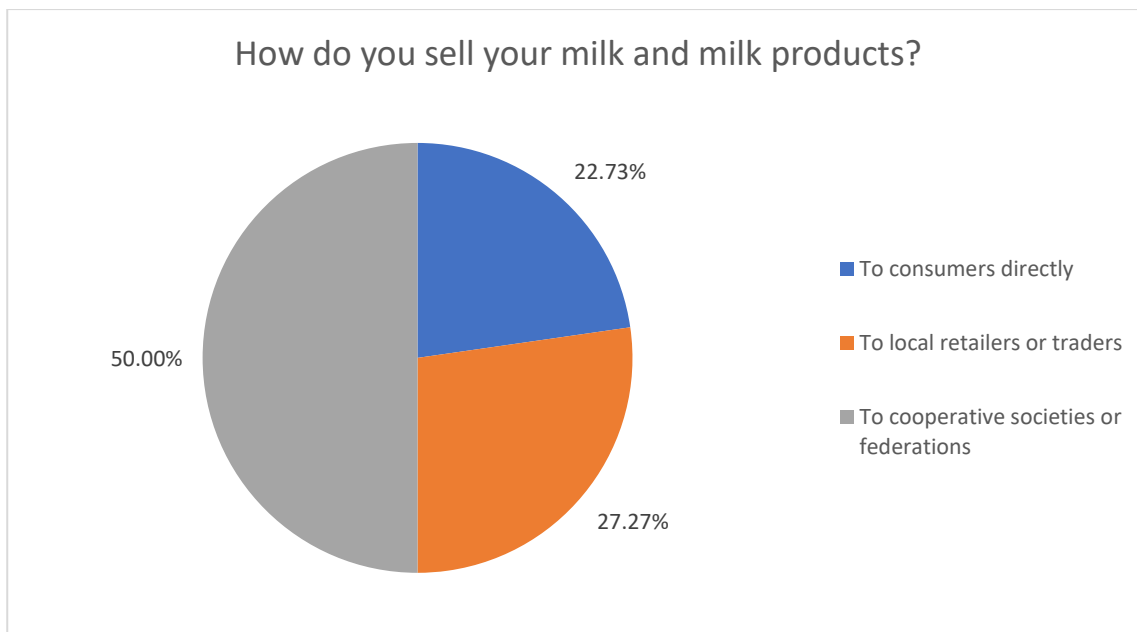


FIGURE 22. The frequency of selling dairy products using three different means by dairy owners

Figure 23 illustrates the different factors that influence the pricing of milk and milk products by the dairy owners. The chart shows that the most important factor is government or cooperative policies, which is followed by 45% of the respondents. The chart also shows that 32% of the respondents base their prices on quality and quantity, while 14% of the respondents determine their prices based on market demand and supply. The chart also shows that only 9% of the respondents rely on negotiation with buyers and agree on a price based on mutual interest or benefit.

Figure 24 shows the satisfaction and dissatisfaction of dairy owners with their milk prices and the reasons for their dissatisfaction. Most dairy owners (77%) are satisfied with their prices, while a few

(23%) are not. The main reason for dissatisfaction is low price compared to production cost (52%), followed by unfair or unequal pricing (36%), delayed or irregular payment (20%), and unstable or fluctuating price (16%).

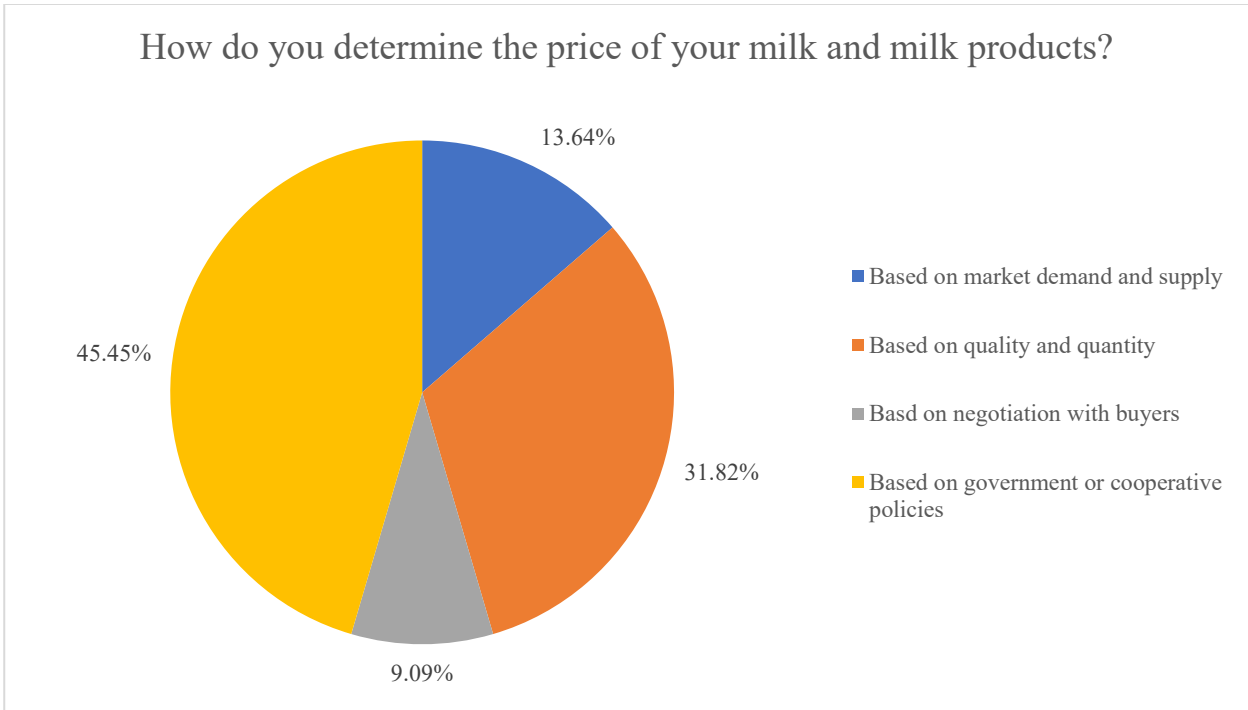


FIGURE 23. Different factors that affect the pricing of dairy products by the dairy owners

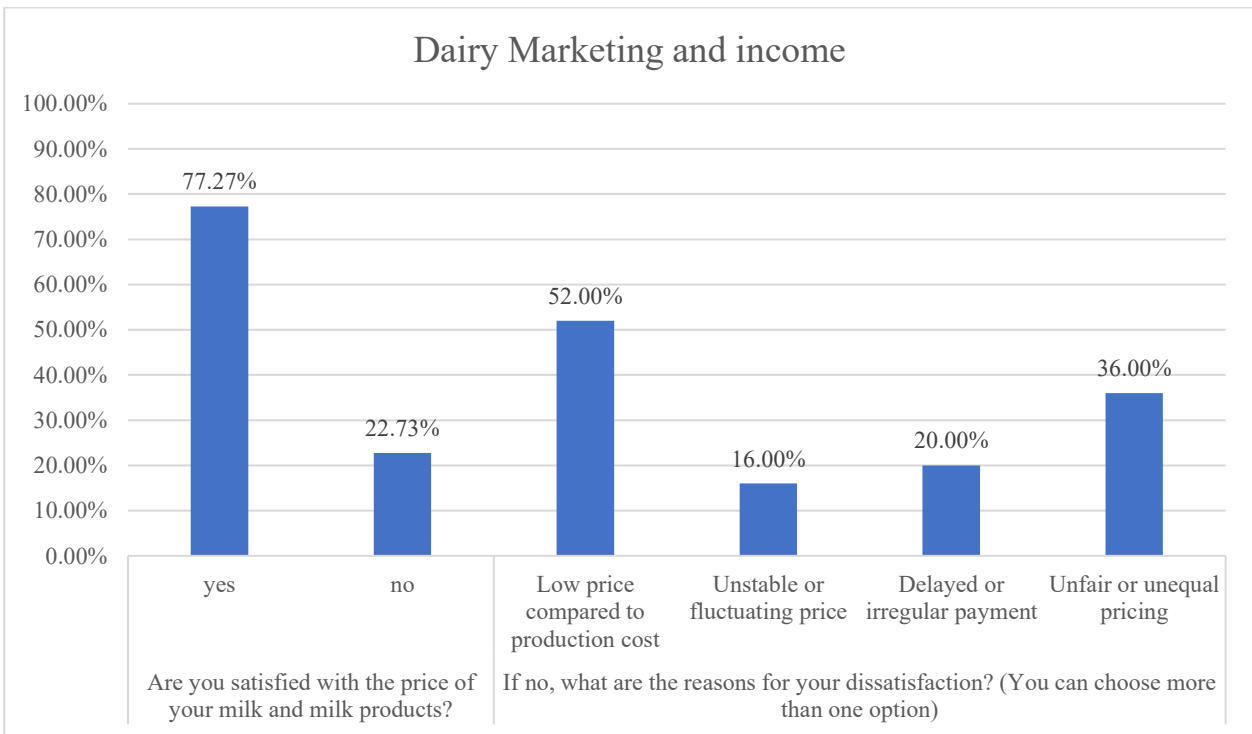


FIGURE 24. Information regarding the dairy product price set by dairy owners and dissatisfaction.

Figure 25 displays the changes in income from dairy business over time reported by the dairy owners. The chart shows that the income from dairy business has increased for 45% of the respondents, remained stable for 19% of the respondents, and decreased for 35% of the respondents. Among those who reported an increase in income, 20% said that their income increased significantly and 25% said that their income increased moderately. Among those who reported a decrease in income, 21% said that their income decreased moderately and 15% said that their income decreased significantly.

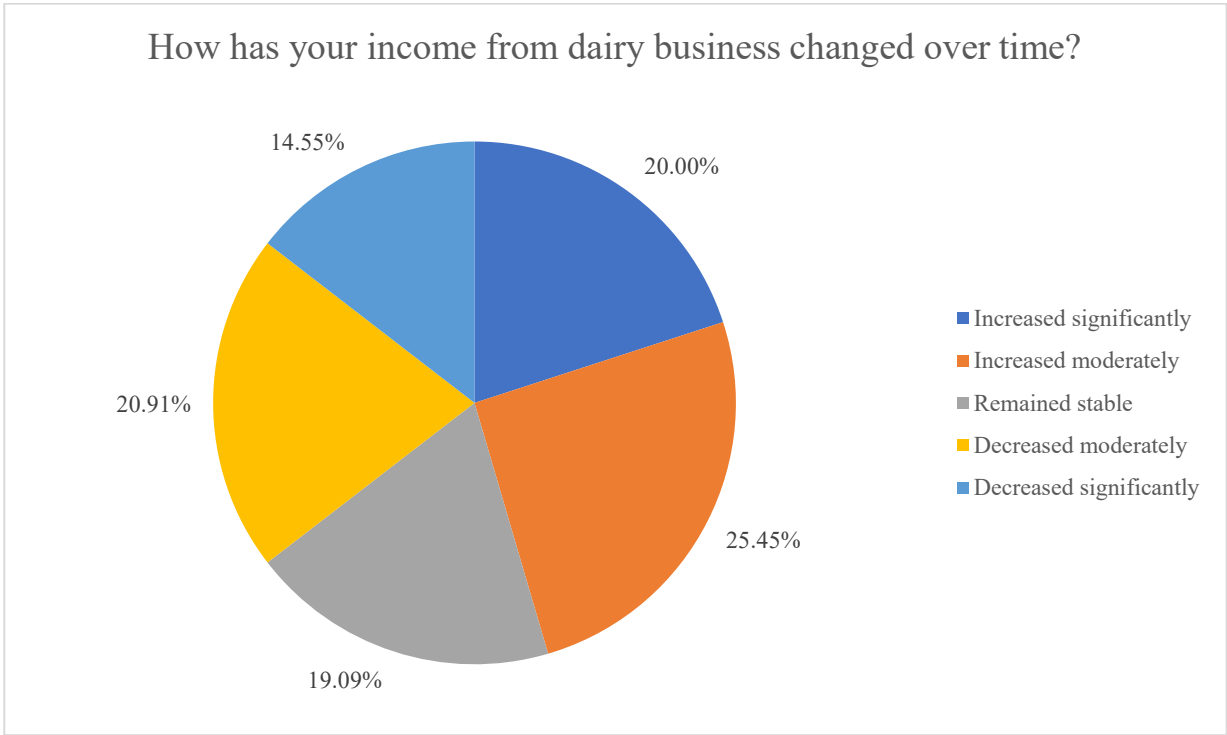


FIGURE 25. Changes in income from dairy business over time

4.2.4 Dairy opportunities and challenges of dairy owners

Figure 26 illustrates the different opportunities that the dairy owners perceive for their dairy business. The pie chart shows that the most popular opportunity is expanding export markets (23%) where dairy owners see a potential for increasing their sales and income by exporting their milk and milk products to other countries. The chart also shows that 21% of the respondents select increasing domestic demand of dairy products where owners expect a growth in their local market due to rising population, income, and consumption of milk and milk products. The chart also shows that 19% of the respondents choose diversifying product portfolio and adding value to milk as an opportunity for their dairy busi-

ness, while 15% of the owners picked receiving training, guidance, extension and other technical services for dairy development. The chart also shows that 11% of the respondents each opt for adopting new technologies and innovations in dairy production, processing and marketing and benefiting from government policies, programs, schemes and initiatives for dairy development as opportunities for their dairy business. Participating in cooperative societies is selected by 10% of the respondents, and accessing financial services is selected by 9% of the respondents.

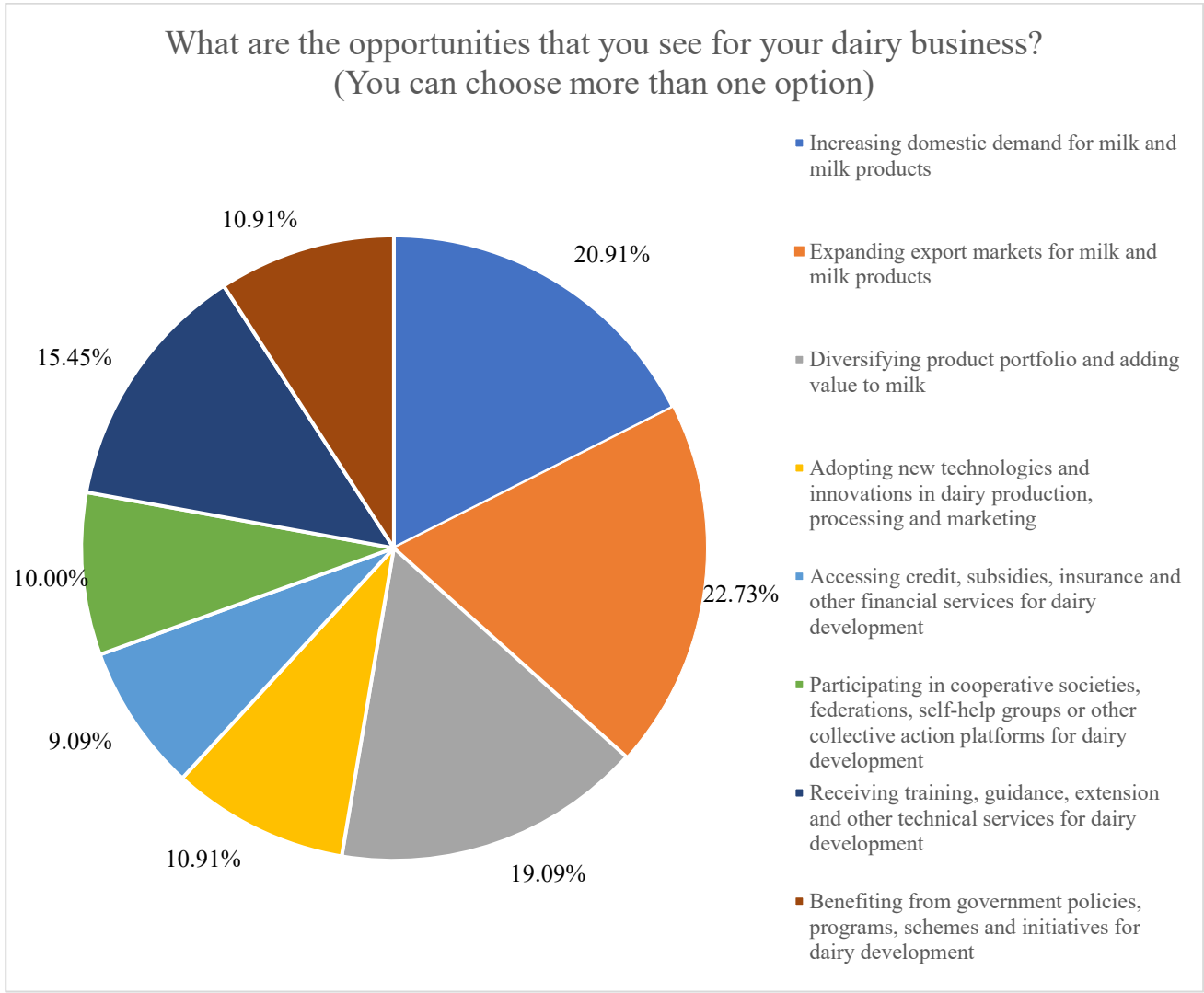


FIGURE 26. Opportunities that the dairy owners see in their business.

Table 4 shows the challenges that dairy owners face in their business. The biggest challenge is high or increasing competition (27%). Other challenges are low or unstable milk production and high or rising costs (10% each), low or fluctuating milk price (9%), and lack of or limited access to marketing, financial, government, processing, training, and cooperative services (5% to 6% each). Only a few dairy owners face the challenge of lack of or limited access to new technologies (5%).

TABLE 4. Challenges faced by dairy owners in their business

Questions	Category	Frequency	Percentage
What are the challenges that you face in your dairy business? (You can choose more than one option)	Low or unstable milk production quantity and quality	12	10.91 %
	Low or fluctuating milk price and delayed or irregular payment	10	9.09 %
	Low or uncertain milk demand and supply	6	5.45 %
	Lack of or limited access to milk marketing channels and linkages	7	6.36 %
	Lack of or limited access to milk processing and value addition facilities	6	5.45 %
	Lack of or limited access to new technologies and innovations in dairy production, processing and marketing	5	4.55 %
	Lack of or limited access to credit, subsidies, insurance and other financial services for dairy development	7	6.36 %
	Lack of or limited participation in cooperative societies, federations, self-help groups or other collective action platforms for dairy development	5	4.55 %
	Lack of or limited access to training, guidance, extension and other technical services for dairy development	6	5.45 %
	Unfavorable or inconsistent government policies, programs, schemes and initiatives for dairy development	7	6.36 %
	High or rising costs of milk inputs and services	12	10.91 %
	High or increasing competition from other dairy producers, processors or marketers	30	27.27 %

5 DISCUSSION

In this section, the results from the questionnaires that I conducted on 150 consumers and 110 dairy owners are discussed, providing deeper understanding of the consumer perspective and the ownership patterns of the dairy sector in Punjab. The chapter is divided into three sections: (1) Consumer data from rural and urban areas, (2) Owners' data from rural areas and (3) Limitations and suggestions for improvement.

5.1 Consumer data from rural and urban areas

The results of this study reveal some interesting insights into the demographic characteristics and preferences of consumers in urban and rural areas of Punjab. One of the main findings is that there is a significant gender disparity among consumers, especially in rural areas, where almost all of them are female. This suggests that there may be some socio-cultural factors that influence the consumption of dairy products in rural Punjab. In urban areas, the gender distribution is more balanced, with over half of the consumers being female. Another finding is that the most common age group among consumers in both areas is 35-40 years, indicating that this demographic may be a primary target for dairy product marketing efforts.

Consumer preferences for different dairy products are influenced by various factors, including quality, taste, health benefits, convenience, price, and availability. It was revealed that milk is universally preferred, with nearly all consumers selecting it. However, differences emerge in secondary choices, with urban consumers leaning towards curd and rural consumers preferring butter. The results also show that the consumers' preferences and choices were related to their satisfaction and availability of dairy products. For example, the urban consumers preferred to buy branded products because they perceived them as having higher quality, availability, and advertisement, which in turn increased their satisfaction. However, some of them also faced barriers to access dairy products due to distance, transportation, supply shortage, or demand surplus. The rural consumers preferred to buy non-branded products because they perceived them as having higher quality and availability, which in turn increased their satisfaction. They did not face any barriers to access dairy products.

Consumer satisfaction is a critical aspect of dairy product consumption. The results show that rural consumers are unanimously satisfied with the products, indicating that they have no major issues or complaints. On the other hand, urban consumers are mostly satisfied, but a small proportion of them are not. The main reasons for their dissatisfaction are high price and low quality, which may affect their purchase decisions and loyalty. This suggests that price sensitivity and quality perception are crucial factors that may impact consumer satisfaction and loyalty in urban areas. Therefore, dairy product producers and marketers should consider these factors when designing and promoting their products for urban consumers.

Accessibility to dairy products is essential for consumer satisfaction and consumption. The results show that rural consumers have no problem in accessing dairy products, as they can obtain them from local sources such as vendors, cooperative societies, or federations. These sources ensure that there is enough supply and demand for dairy products in rural areas, and that consumers do not face any shortage or surplus. On the other hand, urban consumers face various challenges in accessing dairy products, such as distance, transportation, supply shortage, or demand surplus. These challenges may affect the availability and affordability of dairy products in urban areas, and may also influence consumer satisfaction and loyalty. Therefore, these findings suggest that there is a need for improving infrastructure and distribution networks in urban areas to enhance product availability and accessibility for urban consumers.

5.2 Owners' data from rural areas

The results of this study reveal the demographic characteristics of dairy owners in rural Punjab, who constitute the main workforce of the dairy industry in the region. The results show that the dairy owners are exclusively male, which may indicate the existence of gender norms and barriers that prevent women from participating in the sector. The results also show that the dairy owners are mostly young and middle-aged, with over two-thirds of them being between 25 and 35 years old. This suggests that the dairy sector attracts and retains young entrepreneurs who may have more innovative and progressive ideas and practices. The results also show that the dairy owners are well-educated, with almost half of them having graduate or above education. This implies that the dairy sector requires and benefits from a high level of knowledge and skills, which may enhance the quality and productivity of the industry. The results also show that the dairy owners have varying levels of experience, herd size, and farming system. The most common duration of experience is 6-10 years, which indicates that most of

the owners have a moderate level of involvement and commitment in the sector. The most common herd size is 10-20 animals, which indicates that most of the owners have a small-scale dairy operation with a moderate level of income and output. The most common farming system is subsistence or hobby farming, which suggests that most of the owners have low levels of productivity and profitability. These findings indicate that there is a diversity of dairy business models and practices among the owners, which may reflect their different goals, preferences, and constraints.

The results of this study reveal the production practices employed by dairy owners in Punjab, who are the main actors in the dairy industry in the region. The results show that the dairy owners have a strong preference for buffalo over cow ownership, which may reflect the higher demand and profitability of buffalo milk and its products. Buffalo milk is known for its higher fat content and suitability for making various dairy products, such as butter, ghee, cheese, and yogurt. The results also show that the dairy owners use various methods and practices for feeding, milking, storing, transporting, selling, and pricing their milk products. The results show that the dairy owners mostly rely on traditional or low-tech methods, especially for milking and storing their milk. Most of them milk their animals by hand and store their milk in cans or containers, which may affect the quality and safety of their products. However, a small proportion of them have adopted modern equipment and facilities, such as machine milking and bulk milk cooling, which may improve their efficiency and product quality. The results also show that the dairy owners have different strategies for dealing with surplus milk, sick or injured animals, and herd genetics. The most common option for finding new buyers for excess milk is to sell it to cooperative society, which may offer better prices and services than other buyers. The most common option for handling sick or injured animals is to call a veterinarian, which may ensure proper diagnosis and treatment. The most common option for improving herd genetics is to use artificial insemination, which may increase the chances of getting desirable traits and breeds. These findings indicate that the dairy owners have some awareness and access to modern technologies and practices that may enhance their productivity and profitability.

The results of this study reveal the marketing practices and income revenue of dairy owners in Punjab, who are the main actors in the dairy industry in the region. The results show that the dairy owners use different ways of selling their milk and milk products, such as cooperative societies, local retailers, or direct consumers. The results also show that the dairy owners use different factors to determine their prices, such as quality, quantity, government policies, market demand and supply, or negotiation with buyers. The results also show that the dairy owners have different levels of satisfaction and dissatisfaction with their prices, and different reasons for their dissatisfaction, such as low price, unfair pricing,

delayed payment, or unstable price. The results also show that the dairy owners have experienced different changes in their income from dairy business over time, such as increase, decrease, or stability. These findings indicate that the dairy owners face various challenges and opportunities in marketing their products and generating income from their business. These findings also suggest that there is a need for improving the marketing infrastructure and support systems for the dairy owners, such as providing better access to markets, ensuring fair and stable prices, facilitating timely and regular payments, and enhancing product quality and competitiveness.

The results of this study reveal the opportunities perceived by dairy owners for their dairy business, which may influence their future plans and actions. The results show that the dairy owners identify various opportunities that may enhance their productivity, profitability, and competitiveness in the dairy sector. The results show that the most attractive opportunity is expanding export markets, which may offer higher prices and demand for their milk and milk products. However, this opportunity may also require meeting international standards and regulations, as well as investing in transportation and logistics. The results also show that the second most appealing opportunity is increasing domestic demand of dairy products, which may result from rising population, income, and consumption of milk and milk products in the country. This opportunity may also require improving product quality and variety, as well as catering to changing consumer preferences and needs. The results also show that other opportunities perceived by the dairy owners include diversifying product portfolio and adding value to milk, receiving training, guidance, extension and other technical services for dairy development, adopting new technologies and innovations in dairy production, processing and marketing, benefiting from government policies, programs, schemes and initiatives for dairy development, participating in cooperative societies, and accessing financial services. These opportunities may involve different levels of risk, cost, and benefit for the dairy owners, depending on their resources, capabilities, and goals. These findings indicate that the dairy owners have a positive outlook and a proactive attitude towards their dairy business, and that they are aware of the potential opportunities that may help them grow and succeed in the sector.

The results outlined challenges faced by dairy owners in their business, which may affect their performance and profitability in the dairy sector. The results show that the dairy owners encounter various challenges that may hamper their production, marketing, and income generation activities. The results show that the most severe challenge is high or increasing competition from other dairy producers, processors, or marketers, which may reduce their market share and bargaining power. The results also

show that other challenges include low or unstable milk production quantity and quality, low or fluctuating milk price and delayed or irregular payment, high or rising costs of milk inputs and services, lack of or limited access to various services and facilities for dairy development, such as marketing channels, processing facilities, new technologies, financial services, technical services, cooperative societies, and government policies. These challenges may create various difficulties and risks for the dairy owners, such as low productivity, low profitability, low quality, low demand, low price, high cost, high uncertainty, high dependency, and low satisfaction. These findings indicate that the dairy owners face a complex and dynamic business environment that requires them to adopt effective strategies and practices to overcome these challenges and enhance their competitiveness and sustainability in the sector.

5.3 Limitations and suggestions for improvement

One of the limitations of my study is that it is based on a sample of 150 consumers (75 urban and 75 rural) and 110 dairy owners from Punjab, which may not be representative of the entire population of consumers and dairy owners in India. Another limitation is that it relies on self-reported data from the respondents, which may be subject to bias, error, or dishonesty. A third limitation is that it uses cross-sectional data, which may not capture the dynamic and longitudinal changes in the dairy sector and consumer behavior over time.

To overcome these limitations, future studies could use a larger and more diverse sample of consumers and dairy owners from Punjab in India. They could also use more objective and reliable methods of data collection such as observation, experimentation, or secondary data analysis. They could also use longitudinal data to track the trends and patterns of the dairy sector and consumer behavior over a longer period of time. In the modern time period, the consumer is more aware of the dairy products than in the past. Now they are more focused on the better quality of milk and milk products. The urban consumer prefers branded products rather than non-branded ones because they are more educated and influenced by the advertisement of dairy products. They also have a better variety and choice available in the local market compared to the past. Meanwhile, it is the duty of the local government to maintain the demand and supply chain properly in the market so that the consumer, especially the urban consumer, can get the milk and milk products easily at a reasonable price rate.

The results of this study suggest some recommendations for improving the dairy sector in India from the perspectives of both dairy owners and consumers. For dairy owners, they should improve the quality and safety of dairy products by adopting good practices of animal husbandry, hygiene, sanitation, testing, packaging, labeling, etc., as these factors influence the consumer satisfaction and loyalty. The results show that most urban consumers (85.33%) are satisfied with the overall products, while a few (14.67%) are not. The main reasons for dissatisfaction among the unsatisfied urban consumers are high price (54.55%) and low quality (45.45%). Therefore, improving quality and safety may increase consumer satisfaction and loyalty, as well as demand and price. They should also diversify their product portfolio and add value to milk by producing different types of dairy products such as cheese, butter, yogurt, etc., as these products have higher demand and profitability than plain milk. The results show that milk is the most preferred dairy product among both urban and rural consumers, with 100% and 98% of them choosing it respectively. However, other dairy products such as curd, cheese, and butter also have considerable preferences among consumers, especially in urban areas. Therefore, diversifying product portfolio and adding value to milk may enhance competitiveness and income for dairy owners. They should also adopt new technologies and innovations in dairy production, processing and marketing such as artificial insemination, milking machines, bulk milk coolers or chillers, online platforms or apps, etc., as these tools can enhance their efficiency, quality, and competitiveness in the market. The results show that only a small proportion of the dairy owners have adopted modern equipment and facilities for milking and storing their milk.

According to the results, 5% of the farmers use a machine for milking and 29% of them use bulk milk coolers or chillers for storing their milk. The results also show that only 5% of the dairy owners have used new technologies and innovations in dairy production, processing and marketing. Therefore, adopting new technologies and innovations may improve productivity and profitability for dairy owners. They should also access credit, subsidies, insurance and other financial services from government or private agencies for investing in dairy development, as these services can help them overcome the financial constraints and risks in their business. The results show that one of the challenges faced by dairy owners is high or rising costs of milk inputs and services (10.91%), which may affect their profitability and sustainability. The results also show that only 9% of the dairy owners have accessed financial services for their business. Therefore, accessing financial services may enable them to invest in inputs, equipment, facilities, etc., that may improve their business performance. They should also participate in cooperative societies, federations, self-help groups or other collective action platforms for dairy development, as these platforms can help them access resources, markets, services, and benefits collectively. The results show that one of the opportunities perceived by dairy owners is participating

in cooperative societies (10%), which may offer better prices and services than other buyers. The results also show that one of the challenges faced by dairy owners is high or increasing competition from other dairy producers, processors, or marketers, which may lead to a saturated market and reduced profitability. To address this, dairy owners could benefit from strategies that differentiate their products and services, such as developing niche markets, enhancing product quality, and improving customer relationships. Additionally, the study's findings suggest that dairy owners should engage in continuous learning and skill development to keep up with industry trends and consumer demands. By doing so, they can better position themselves to take advantage of emerging opportunities and mitigate the impact of the challenges they face.

One of the interesting findings of this study is that the youth are taking up the dairy business as owners and have a positive outlook on the dairy sector in Punjab. The results show that most of the dairy owners in rural Punjab are young and middle-aged, with over two-thirds of them being between 25 and 35 years old. This suggests that the dairy sector attracts and retains young entrepreneurs who may have more innovative and progressive ideas and practices. I assume that the reason most owners are young is also related to how they start the business as they do inherit their family dairy business from my experience and have managed it very well. The results also show that most of the dairy owners have experienced an increase in their income from dairy business over time, which indicates that they have a profitable and sustainable business model. However, this does not imply that only the younger age group has seen a rise in their income, as the study did not measure the income change by age group separately which is one of the limitations. The results also show that the dairy owners are aware of the opportunities and challenges in their dairy business, and they are willing to adopt new technologies and innovations in dairy production, processing and marketing. They are also keen to participate in cooperative societies, federations, self-help groups or other collective action platforms for dairy development. They are also eager to receive training and guidance from government or private agencies for improving infrastructure, breed, nutrition, health, hygiene, etc. These findings indicate that the dairy owners have a positive attitude and a proactive behavior towards their dairy business, and that they are ready to embrace change and improvement in the sector.

The youth are the future of the dairy sector in Punjab, and they need more support and encouragement from various stakeholders to overcome the challenges and seize the opportunities for further growth and development. They should have easy access to credit, subsidies, insurance and other financial ser-

vices for investing in dairy development. Moreover, they should receive market information and linkages to consumers, retailers, traders, cooperatives or federations for selling their milk products at fair and remunerative prices. All these factors play a vital role in improving the dairy sector in the country.

6 CONCLUSION

This master's thesis aimed to study the consumer behaviour and dairy sector development in Punjab, India, by collecting and analyzing primary data from 150 consumers (75 urban and 75 rural) and 110 dairy owners in the region. The main aim of the thesis was to focus on the dairy sector of the Punjab state and the opportunities and challenges faced by the dairy sector of Punjab in India. In addition, the thesis analyzed the service quality, consumer behaviour and growth prospects of the dairy sector. This thesis was mainly concerned with the dairy owners and consumers of the urban and rural areas of the Punjab state in India. In this study, I found that the urban and rural consumers had different preferences, satisfaction, and availability of dairy products. I also found that the dairy owners in rural Punjab had various methods, practices, resources, and outcomes in their dairy business. They faced various opportunities and challenges in terms of production, processing, marketing and income generation.

In this thesis, I discussed the milk production in the past, which was very low in quantity and people of the country did not get enough milk and its products before the Operation Flood. But the nation launched the Operation Flood in 1970 under the valuable leadership of Dr. Verghese Kurien, who is called the Father of White Revolution. The NDDB started Operation Flood in 1970 and afterward the nation achieved huge success in milk production and started a new era in the field of dairy sector. Now India is one of the leading global milk producers in the world. In addition, one of the big advantages of Operation Flood was that the consumers of both urban and rural areas across the country got better quality and safe milk for their families. The dairy sector plays a vital role in the growth of rural economy of the country. Mostly rural people of the country were farmers and did dairy business for their livelihoods and got extra income, which supported millions of rural families who were directly involved in dairy business.

The thesis also highlighted the contribution of the National Dairy Development Board (NDDB), which was established in 1965 to improve and develop the dairy sector in India. The thesis acknowledged that the NDDB has done great work but still needs to do a lot more work because India is a big country and a major population is living in the rural parts. They are farmers as well as dairy owners who need proper facilities and support from the local government in their dairy business. Nowadays, the NDDB has been more concentrating on providing better training programs, better facilities of retail sales and better quality of testing materials to the village level cooperatives. This will provide great help to the dairy owners to produce top class quality milk, which fulfills the needs of consumers' expectations.

Consumers need better quality milk in the market and food safety is also a key factor. Therefore, the NDDB started a quality logo of the quality mark, which is valid for three years and companies have to follow the rules and conditions, which ensure the quality level of dairy products. Therefore, all these steps will improve quality and significant growth of dairy products and also enhance the consumer behaviour towards the quality and utility of dairy products in the country. In addition, the country has launched a new Food Safety and Standards Act in 2006 to control the quality and safety of milk and its products. With significance, the country has noticed an increase in milk production per animal and its quality, which provides better health benefits for the nation's consumers. The thesis stated that consumers need better quality of milk and milk products. The thesis differentiated between two categories of consumers: rural-based and urban-based. We found that rural consumers are more satisfied than urban consumers because milk is easily available in rural areas, where most of the villagers were the dairy owners themselves. Urban consumers are not satisfied with the availability of the milk, as well as the quality and high price of milk and milk products. Sometimes prices go very high due to the poor demand and supply of milk in the market. Therefore, they want better quality of milk at a reasonable price rate. The thesis suggested that this can be achieved by fulfilling the demand and proper supply chain of milk and its products in the markets. This is the responsibility of the local government to maintain the demand and supply chain properly with the help of dairy owners, so that milk is easily available in the market for the urban consumers.

The thesis also discussed the growth of milk production in India and the role of the organized and unorganized sectors. The thesis stated that 80% of milk production is operated by the unorganized sector and only 20% is contributed by the cooperatives and private dairies. The organized sector has been developing progressively and is expected to increase its share of milk production from 30% to 65% by 2021-22. The thesis suggested that the government should focus more on covering more areas in the organized sector as compared to the unorganized sector.

The thesis concluded that there are still many challenges in the dairy sector in India, but there are also many opportunities. The thesis praised the cooperative society and NDDB for doing a great job in the dairy sector, but also urged them to work harder in their field. The research also pointed out the problem faced by the dairy owners, who were not getting the minimum support price (MSP) on their milk production from the local government. Therefore, the government should make new action plans according to the needs of the dairy owners and provide better financial services for dairy development. The thesis claimed that this would help the dairy owners produce better results and fulfill the demand and supply of the dairy products without facing the problem. Furthermore, the local government

should provide the skill knowledge to the dairy owners on how to use the technologies and innovations in dairy production, processing and marketing, so they can improve their dairy business according to the need of the modern time. The thesis recommended that the government should address these issues and provide better financial services to the dairy owners, such as better credit facilities to purchase the dairy equipment. The refrigeration at the village level is very low in the country and faces high temperatures and humidity that cause spoilage and wastage of milk and dairy products. Hence, there is a need for the government to invest in the cold chain infrastructure, as well as in the logistics area, to reduce the heavy wastage of milk and its products. Therefore, they can run their dairy business smoothly and also produce more milk and fulfill the requirement of the demand and supply chain in the local market. Therefore, the urban consumers can get milk easily without facing the shortage problem of milk and its products in the market.

The thesis also stated that there are many opportunities in the dairy sector, especially in modern times when India is emerging as a producer and exporter of milk and its products in the international market. Now the country will export its dairy products to China, Bangladesh, Thailand, Singapore, Malaysia, Japan and other gulf countries. Nowadays, the Indian government is more focused on providing better quality and value products to the consumers and getting a strong reputation in the international market. And also delivering good quality dairy products to the domestic customers with popular brands like Verka and Amul, which have established a good faith value among the local customers, as well as worldwide. Therefore, the consumers are more satisfied with the dairy products as compared to the past, which is a good indication for the growth of the dairy industry. Hence, in this way, I achieved one of the major aims of the thesis work, which is that consumers are getting better service and quality dairy products in the market.

The dairy industry plays a significant role in the country's economy, contributing 5% to the national GDP growth rate and providing direct employment to 80 million dairy farmers. The thesis mentioned that the dairy sector is one of the biggest industries of the country and it offers huge employment opportunities to the people, especially the young population of rural Punjab, who are self-employed and educated. They have been doing farming and dairying with their parents for a long time and are well aware of the opportunities and challenges in their business. They are willing to adopt new technologies and innovations in dairy production, processing and marketing. The local government, with the help of NDDB, has started many training programs at the rural level and produced very positive results in the field of dairy sector. Therefore, we can say that the future of the dairy industry is bright in Punjab (India).

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Dear respondent,

I am a master's student of business administration at Centria University of Applied Sciences in Finland. I am conducting a research on the opportunities and challenges of the dairy sector in India: An analysis of service quality, consumer behavior and growth prospects. This questionnaire is a part of my thesis.

The purpose of this questionnaire is to collect information from you as a consumer of milk products. Your responses will help me understand your preferences, satisfaction and expectations regarding the dairy sector in Punjab.

The questionnaire will take approximately 10 minutes to complete. Your participation is voluntary and you can withdraw at any time without any consequences. Your responses will be kept confidential and anonymous, and will be used only for academic purposes.

I appreciate your time and cooperation in answering this questionnaire.

Best Regards,

Sandeep Sran

Centria University of Applied Sciences

Master's of Business Management

Section 1: Demographic Information

Please provide some basic information about yourself.

1. What is your gender?
 - Male
 - Female

2. What is your age group?
 - 25-30
 - 30-35
 - 35-40
 - 40 and above

Section 2: Dairy Product Consumption

Please answer some questions about your consumption of dairy products.

1. Which dairy product do you prefer to buy? (You can choose more than one option)
 - Milk
 - Curd
 - Cheese
 - Butter

2. How often do you buy dairy products?
 - Daily
 - Weekly
 - Monthly
 - Occasionally

3. Which kind of dairy products do you prefer to buy?
 - Branded
 - Non-branded

4. What are the reasons for buying branded or non-branded dairy products? (You can choose more than one option)
- Quality
 - Advertisement
 - Availability

Section 3: Dairy Product Satisfaction

1. Are you satisfied with the overall product?
- Yes
 - No
2. If no, what are the reasons for your dissatisfaction? (You can choose more than one option)
- High price
 - Low quality
 - Lack of nutrition

Section 4: Dairy Product Availability

Please answer some questions about the availability of dairy products.

1. Are milk and milk products accessible to you?
- Yes
 - No
2. If no, what are the barriers to access? (You can choose more than one option)
- Distance
 - Transportation
 - Supply shortage
 - Demand surplus

3. Have you ever faced a shortage of dairy products?

Yes

No

Thank you for completing this questionnaire. Your responses are valuable for my research.

Dear respondent,

I am a master's student of business administration at Centria University of Applied Sciences in Finland. I am conducting a research on the opportunities and challenges of the dairy sector in India: An analysis of service quality, consumer behavior and growth prospects. This questionnaire is a part of my thesis.

The purpose of this questionnaire is to collect information from you as a dairy owner. Your responses will help me understand your practices, problems, expectations and suggestions regarding the dairy sector in Punjab.

The questionnaire will take approximately 10 minutes to complete. Your participation is voluntary and you can withdraw at any time without any consequences. Your responses will be kept confidential and anonymous, and will be used only for academic purposes.

I appreciate your time and cooperation in answering this questionnaire.

Best Regards,

Sandeep Sran

Centria University of Applied Sciences

Master's of Business Management

Section 1: Demographic Information

Please provide some basic information about yourself and your dairy farm.

1. What is your gender?
 - Male
 - Female

2. What is your age group?
 - 25-30
 - 30-35
 - 35-40
 - 40 and above

3. What is your educational level?
 - Illiterate
 - Primary
 - Secondary
 - Higher secondary
 - Graduate or above

4. How long have you been in the dairy business?
 - Less than 1 year
 - 1-5 years
 - 6-10 years
 - More than 10 years

5. How many animals do you have on your farm?
 - Less than 10
 - 10-20
 - 21-50
 - More than 50

6. What kind of animals do you have on your farm? (You can choose more than one option)
- Cows
 - Buffaloes
 - Goats
7. Which animal do you use more for producing dairy product? (You can choose only one option)
- Cows
 - Buffaloes
 - Goats

Section 2: Dairy Production Practices

Please answer some questions about your dairy production practices.

1. How do you feed your animals?
- Green fodder
 - Dry fodder
 - Concentrate feed
2. How often do you rotate your animals' feed?
- Weekly
 - Bi-weekly
 - Monthly
3. How do you milk your animals?
- By hand
 - By machine
4. How often do you milk your animals?
- Once a day
 - Twice a day
 - Thrice a day or more

5. How do you store and transport your milk?

- In cans or containers
- In bulk milk coolers or chillers

6. What would you do if you had a surplus of milk and you needed to find new buyer?

- Sell to current shop keepers
- Sell to cooperative society
- Sell to restaurants

7. How do you deal with sick or injured animals on your farm?

- By yourself
- By a veterinarian

8. How do you improve your herd's genetics?

- By artificial insemination
- By natural breeding

9. Do you get any training or guidance regarding infrastructure, breed, nutrition, health, hygiene, etc.?

- Yes
- No

10. Are you benefitted with training or guidance?

- Yes
- No

11. Is there any rise in your income since you started dairy business?

- Yes
- No

12. Is sufficient fodder available?

- Yes
- No

13. Is there any MSP (minimum support price) for milk like other agricultural commodities (wheat and rice)?

Yes

No

Section 3: Dairy Marketing and Income

Please answer some questions about your dairy marketing and income.

1. How do you sell your milk and milk products?

To consumers directly

To local retailers or traders

To cooperative societies or federations

2. How do you determine the price of your milk and milk products?

Based on market demand and supply

Based on quality and quantity

Based on negotiation with buyers

Based on government or cooperative policies

3. Are you satisfied with the price of your milk and milk products?

Yes

No

4. If no, what are the reasons for your dissatisfaction? (You can choose more than one option)

Low price compared to production cost

Unstable or fluctuating price

Delayed or irregular payment

Unfair or unequal pricing

5. How has your income from dairy business changed over time?

- Increased significantly
- Increased moderately
- Remained stable
- Decreased moderately
- Decreased significantly

Section 4: Dairy Opportunities and Challenges

Please answer some questions about the opportunities and challenges that you face in your dairy business.

1. What are the opportunities that you see for your dairy business? (You can choose more than one option)

- Increasing domestic demand for milk and milk products
- Expanding export markets for milk and milk products
- Diversifying product portfolio and adding value to milk
- Adopting new technologies and innovations in dairy production, processing and marketing
- Accessing credit, subsidies, insurance and other financial services for dairy development
- Participating in cooperative societies, federations, self-help groups or other collective action platforms for dairy development
- Receiving training, guidance, extension and other technical services for dairy development
- Benefiting from government policies, programs, schemes and initiatives for dairy development

2. What are the challenges that you face in your dairy business? (You can choose more than one option)

- Low or unstable milk production quantity and quality
- Low or fluctuating milk price and delayed or irregular payment
- Low or uncertain milk demand and supply
- Lack of or limited access to milk marketing channels and linkages

- Lack of or limited access to milk processing and value addition facilities
- Lack of or limited access to new technologies and innovations in dairy production, processing and marketing
- Lack of or limited access to credit, subsidies, insurance and other financial services for dairy development
- Lack of or limited participation in cooperative societies, federations, self-help groups or other collective action platforms for dairy development
- Lack of or limited access to training, guidance, extension and other technical services for dairy development
- Unfavorable or inconsistent government policies, programs, schemes and initiatives for dairy development
- High or rising costs of milk inputs and services
- High or increasing competition from other dairy producers, processors or marketers

Thank you for completing this questionnaire. Your responses are valuable for my research.