PRODUCTION, MARKETING AND UTILIZATION OF MILK AND MILK PRODUCTS IN KARNATAKA – AN ECONOMIC ANALYSIS

THESIS SUBMITTED TO THE
ICAR-NATIONAL DAIRY RESEARCH INSTITUTE, KARNAL
(DEEMED UNIVERSITY)
IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF

MASTER OF SCIENCE
IN
AGRICULTURAL ECONOMICS

BY

REVAPPA M REBASIDDANAVAR
B.Sc. (Ag. Maco.)

DIVISION OF DAIRY ECONOMICS, STATISTICS & MANAGEMENT
ICAR-NATIONAL DAIRY RESEARCH INSTITUTE
(DEEMED UNIVERSITY)
KARNAL – 132001 (HARYANA) INDIA

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Approved by:

15/09/2020

(Dr Anupam K. Dixit)
EXTERNAL EXAMINER

Dr. AJAY VERMA
MAJOR ADVISOR

Members of Advisory Committee

1. **Dr. Ajmer Singh**
   Principal Scientist, DESM Division

2. **Dr. Sendhil. R**
   Scientist, IIWBR, Karnal

3. **Dr. Raju. R**
   Scientist, CSSRI, Karnal

15/09/2020

4. **Dr. K. Ponnusamy**
   Principal Scientist, Dairy Extension Division
   (Joint Director's, Nominee)

DIVISION OF DAIRY ECONOMICS, STATISTICS AND MANAGEMENT
ICAR-NATIONAL DAIRY RESEARCH INSTITUTE
(DEEMED UNIVERSITY)
KARNAL-132001 (HARYANA), INDIA

Dr. Ajay Verma
Principal Scientist
ICAR-IIWBR

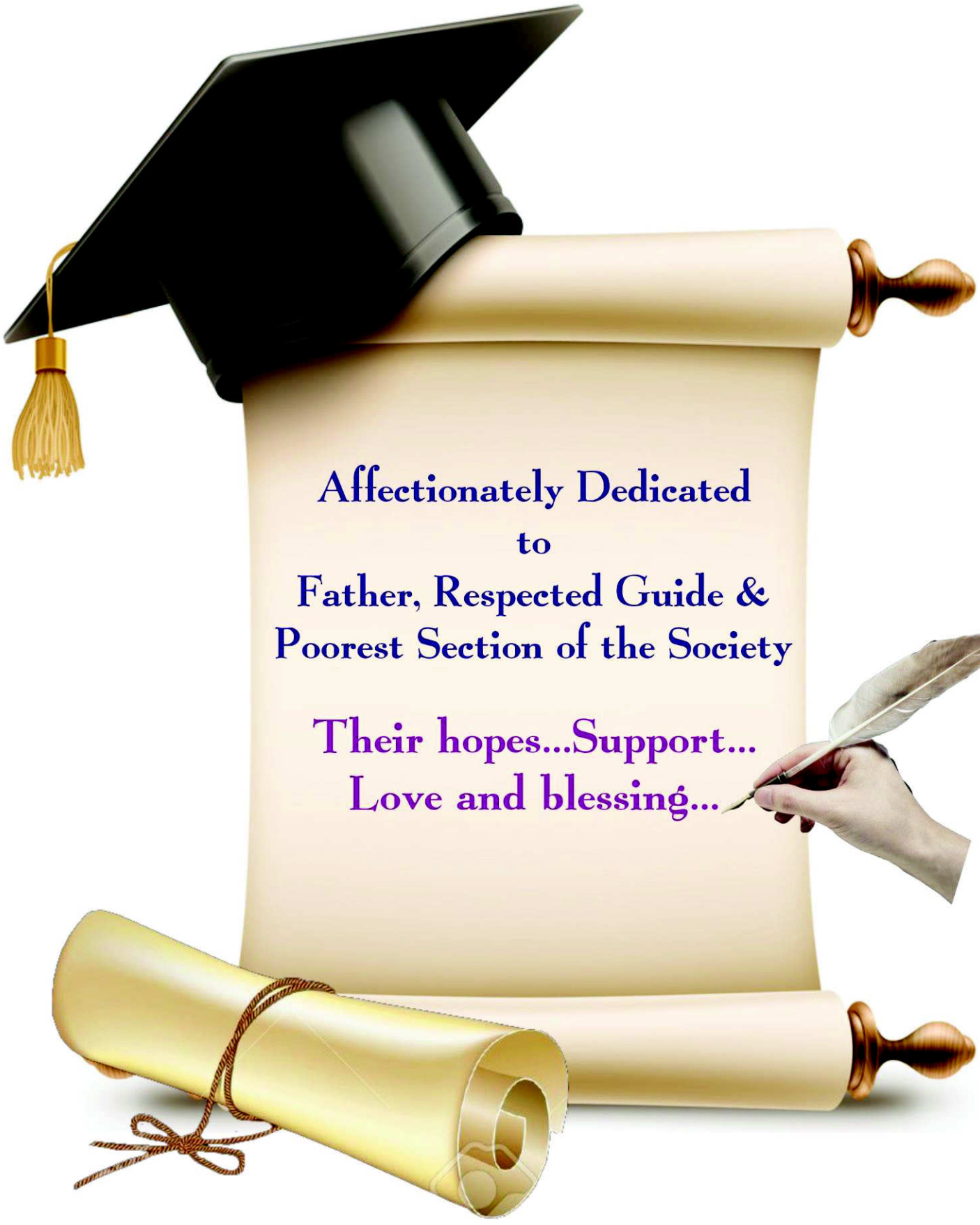
CERTIFICATE

This is to certify that the thesis entitled "**PRODUCTION, MARKETING AND UTILIZATION OF MILK AND MILK PRODUCTS IN KARNATAKA - AN ECONOMIC ANALYSIS"** submitted by **Mr. REVAPPA M REBASIDDANAVAR** towards the partial fulfillment of the award of the degree of **MASTER OF SCIENCE IN AGRICULTURAL ECONOMICS** of the **ICAR-NATIONAL DAIRY RESEARCH INSTITUTE (DEEMED UNIVERSITY)**, Karnal, Haryana, India, is a bonafide research work carried out by him under my supervision and no part of the thesis has been submitted for any other degree or diploma.

(AJAY VERMA)

MAJOR ADVISOR

Dated: 31.07.2020


Affectionately Dedicated
to
Father, Respected Guide &
Poorest Section of the Society
Their hopes...Support...
Love and blessing...

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"Gratitude is the most exquisite form of memory"

Research is a notion of evolution. It illuminates our patience, comprehension and commitments. My work is just a step in this direction…a la a drop in the ocean of knowledge, albeit, in the same spirit.

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End to every kind of work is inevitable. Though acknowledging is an endless task, I wind up by saying endless thanks to all those I can remember here and also to those I may have left unknowingly and any omission does not imply a lack of gratitude, on my part.

ರೇವಪ್ಪ ರೇಬಸಿದ್ದನವರ

Place: Karnal **(REVAPPA M REBASIDDANAVAR)**

Dated: / /2020

PRODUCTION, MARKETING AND UTILIZATION OF MILK AND MILK PRODUCTS IN KARNATAKA - AN ECONOMIC ANALYSIS

MSc. Scholar
Revappa M Rebasiddanavar

Major Advisor
Dr. Ajay Verma

ABSTRACT

Milk and milk products are liked by human beings as major source of cheap and nutritious food to millions of people. Rearing of livestock have been established as an alternate source of income for rural families in India. The present study was carried out on **"PRODUCTION, MARKETING AND UTILIZATION OF MILK AND MILK PRODUCTS IN KARNATAKA - AN ECONOMIC ANALYSIS".** The clearly defined objectives for the study area were (1) estimate production levels of milk and milk products (2) calculate the cost and returns of milk production (3) analyze the marketed surplus and factors affecting it and the marketing efficiency of milk (4) to determine the utilization pattern of milk and milk products by different end-users.

Desired information from the total of 100 dairy households of Karnataka state enveloping 2 major districts and 4 villages was elicited by well tested questionnaire following personal interview approach during the year 2019-20. Total milk production in the study area was 22.12 lakh liters per day (LLPD), Mandya district was found to be the dominant producer, contributed about 80 percent of the total milk production of study area (17.52 LLPD) and Dharwad district augmented (4.60 LLPD). Total level of milk production in Karnataka was found to be 158.86 LLPD, more than half of the milk production contributed by crossbred which produced 108.8 LLPD. Total milk produced by buffalo and local cow was found to be 3.66 and 47.20 LLPD, respectively.

The study observed variations in cost of milk production across the different categories of herd sizes and animal species. Overall cost of milk production per liter was highest for local cow (₹28.56) followed by buffalo (₹26.66) and then crossbreds (₹19.30), respectively. On an average, returns from milk production per liter was highest in case of buffalo (₹11.51) followed by crossbred (₹8.26) and local cow (₹2.98) respectively.

Overall marketed surplus of milk was highest for large herd size category households (84.15 per cent) followed by medium (82.63 per cent) and small category households (80.76 per cent). Producer's share in consumer's rupee was observed 100 per

cent in case of Channel-I because no milk marketing agencies were present in this channel.

Milk production was estimated to be 33.80 liter per day in case of small herd size farmers, up to 45.18 liter per day by medium herd size farmers and 66.26 liter per day by farmers of large herd size category. About 37.55 per cent of retained milk consumed by families as fresh milk and milk products (Curd & Ghee) were prepared from remaining milk i.e. 62.45 per cent. Milk utilization in form of liquid milk was observed to constitute highest consumption proportion by rural consumers i.e. (65.55%), followed by curd (17.43%), ghee (12.44%), sweets (2.48%), lassi (1.12%) and butter (2.10%) respectively.

Conclusions:

Following conclusions can be drawn:

- Crossbred contributed the maximum quantity of milk for the Karnataka state though bovine stock dominated by local cow as far as species were concerned.
- Per liter returns from milk production was highest in case of buffalo (₹11.51) followed by crossbred (₹8.25) and (₹2.98) by local cow Net returns were also remunerative for all the species of animals across the herd size category of households. This draws attention of policy planners to chalk out the future plans to further increase the milk production enabling farmers to double their income.
- Marketed surplus of milk was highest for large herd size category households (84.15%) followed by medium (82.63 %) and small category households (80.76 %).
- Highest marketing efficiency was observed in Channel-V i.e., Producer–Co-operatives–Consumer while least values seen in Channel-IV (Producer - Milk Vendor - Creameries - Consumer). This suggested that the producers should dispose of their milk through those channels in which minimum marketing agencies were involved i.e. Channel–V was observed to be the best channel to ensure higher returns to the milk producer.

MSc. Scholar **Major Advisor**

कर्नाटक में दूध एवं दुग्ध उत्पादों का उत्पादन, विपणन एवं उपयोग–एक आर्थिक वि लेशण

एमएससी. छात्र
रिवप्पा एम. आर

मुख्य सलाहकार
डा. अजय वर्मा

सारोंश

दूध एवं दुग्ध उत्पादों को लाखों लोगों द्वारा सस्ते एवं पौशणिक आहार के प्रमुख स्त्रोत के रूप में पसन्द किया जाता है। भारत में ग्रामीण परिवारों के लिए आय के वैकल्पिक स्त्रोत के रूप में प ुपालन उद्योग की संस्थापना की गई है। प्रस्तुत अध्ययन 'कर्नाटक राज्य में दूध तथा दुग्ध उत्पादों के उत्पादन, विपणन एवं उपयोग–एक आर्थिक वि लेशण' पर किया गया था। अध्ययन क्षेत्र के लिए स्पश्ट रूप से परिभाशित उद्दे य थे (1) दूध एवं दुग्ध उत्पादों का अनुमानित उत्पादन (2) दुग्ध उत्पादन की लागत एवं लाभ (3) दूध की विपणन दक्षता तथा इसे प्रभावित करने वाले कारकों तथा विपणन अधि ोश का वि लेशण (4) विभिन्न अन्तिम उपयोगकर्ताओं द्वारा दुग्ध एवं दुग्ध उत्पाद पैटर्नों के उपयोग का निर्धारण करना।

वर्श 2019–20 के दौरान, सुपरीक्षित प्र नावली तथा व्यक्तिगत साक्षात्कार के द्वारा 2 प्रमुख जिलों तथा 4 गाँवों के कुल 100 डेरी परिवारों से वांछित जानकारी प्राप्त की गई। अध्ययन क्षेत्र में कुल दुग्ध उत्पादन 22.12 लाख लीटर प्रतिदिन (एलएलपीडी) था, मांडया जिला प्रमुख उत्पादक पाया गया जिसने अध्ययन क्षेत्र के कुल दुग्ध उत्पादन का लगभग 80 प्रति ात (17.52 एलएलपीडी) का योगदान दिया तथा धाखाड़ जिले ने (4.60 एलएलपीडी) का संवर्धन किया। कर्नाटक जिले में दुग्ध उत्पादन का कुल स्तर 158.86 एलएलपीडी पाया गया, दुग्ध उत्पादन के आधे से अधिक भाग संकर प ुओं द्वारा उत्पादित किया गया जो कि 108.8 एलएलपीडी था। भैंस तथा देसी गाय द्वारा उत्पादित कुल दुग्ध क्रम ाः 3.66 तथा 47.20 एलएलपीडी पाया गया।

इस अध्ययन में प ु समूह के आकार तथा प ुओं की प्रजातियों की विभिन्न श्रेणियों में दूध उत्पादन की लागत में विविधता देखी गई। स्थानीय देसी गाय के दुग्ध उत्पादन की प्रति लीटर लागत सबसे अधिक (28.56रू) थी उसके बाद क्रम ाः भैंस (₹ 26.66) तथा संकर प ुओं का (₹ 19.30) स्थान रहा। औसत प्रतिलीटर दूध उत्पादन का लाभ भैंस के दूध से अधिकतम (रू 1151) था उसके प चात् क्रम ाः संकर गाय (₹. 8.26) तथा दे ाी गाय (₹ 2.98) का स्थान रहा।

दूध अधि ोश का कुल विपणन बड़े वर्ग के श्रेणी के परिवारों (84.15 प्रति ात) का अधिकतम था, इसके बाद मध्यम (82.63 प्रति ात) तथा लघु वर्ग के परिवारों का (80.76 प्रति ात) रहा। उपभोक्ता के रूपये में उत्पादक की हिस्सेदारी चैनल में 100 प्रति ात देखी गई क्योंकि इस चैनल में कोई भी दूध विपणन एजेन्सी मौजूद नहीं थी।

छोटे किसानों में दुग्ध उत्पादन 33.80 लीटर आकलित किया गया, मध्यम किसानों में यह 66.26 लीटर तथा बड़े किसानों में 45.18 लीटर तक रहा। परिवार की कुल दैनिक दुग्ध की खपत का 37.55 प्रति ात भाग तरल दूध के रूप में रहा तथा दूध की बड़ी मात्रा दही तथा घी बनाने में अर्थात् 62.45 प्रति ात रहा। तरल दूध के रूप में दूध का उपयोग ग्रामीण उपभोक्ताओं में अधिकतम (65.55%) रहा इसके बाद क्रम ाः दही (17.43%), घी (12.44%) मिठाइयां (2.48%) लस्सी (1.12%) तथा मक्खन (2.1%) का स्थान रहा।

निश्कर्श

उपरोक्त परिणामों से निम्नलिखित निश्कर्श निकाले जा सकते है :

- कर्नाटक राज्य के लिए दुग्ध उत्पादन की अधिकतम मात्रा में संकर प ाुओं का योगदान रहा यद्यपि स्थानीय गायों पर हावी था।
- भैंसों का दुग्ध उत्पादन प्रतिलीटर लाभ अधिकतम (₹11.51) था उसके बाद संकर गायों का(₹. 8.25) तथा देसी गायों का (₹.2.98) था परिवारों के प ा समूह के आकार की श्रेणी में प ाुओं की सभी प्रजातियों के लिए भाुद्ध लाभ भी पारिश्रमिक था। इससे किसानों को अपनी आय दुगनी करने के लिए दूध उत्पादन को बढ़ाने के लिए भावी योजनाओं को आगे बढ़ाने के लिए नीति नियोजकों का ध्यान आकर्शित करता है।
- बड़े प ा आकार वाले में दूध का विपणन अधि ोश (₹84.15 प्रति ात) अधिकतम था उसके बाद मध्यम आकार के परिवारों (82.63 प्रति ात) तथा लघु परिवारों (80.76 प्रति ात) का स्थान रहा।
- चैनल–अर्थात् उत्पादक–सहकारी समितियां–उपभोक्ता में विपणन क्षमता अधिकतम पाई गई जबकि चैनल–IV (उत्पादक–दुग्ध विक्रेता–मक्खन बनाने वाले–उपभोक्ता में न्यूनतम मूल्यों को देखा गया। इसने सुझाव दिया कि उत्पादकों को उन चैनलों के माध्यम से अपने दूध का निपटान करना चाहिए जिसमें न्यूनतम विपणन एजेन्सियां भाामिल थी अर्थात् चैनल को दूध उत्पादक को अधिक लाभ सुनि ित करने के लिए सबसे अच्छा चैनल माना गया था।

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ABBREVIATIONS

GDP	Gross Domestic Product
NDDB	National Dairy Development Board
DAHD&F	Department of Animal Husbandry Dairying and Fishery
SAU	Standard Animal Units
DCS	Dairy Co-operative Societies
PMCC	Private Milk Collection Centers
CRC	Capital Recovery Cost
AI	Artificial Insemination
MMP	Milk and Milk Products
GSDP	Gross State Domestic Product
GVA	Gross Value Added
MPCS	Milk Producers' Co-operative Societies
MU	Milk Union
SDF	State Dairy Federation
LLPD	Lakh Liter Per Day
FPO	Farmer Producers' Organization
KMF	Karnataka Milk Federation
KDDC	Karnataka Dairy Development Corporation
GOK	Government of Karnataka

CHAPTER –1

Introduction

CHAPTER-I

INTRODUCTION

Agriculture has been established as an important pillar to support Indian economy along with livelihood to large number of people. Total agriculture contributes about 16.5 percent to the economy and 49 percent of the people are involved in the agriculture and allied sector (GOI, 2020). In our country, the dairy industry played an essential role in the socio-economic development of millions of rural households. Livestock contributed 16 percent to the income of small farm households as against 14 percent for all rural households. Livestock provides livelihood to two-third of rural communities and employs about 8.8 percent population of India. The livestock sector contributes 4.1 percent to Indian Gross Domestic product (GDP) and shares 25.6 percent of the total Agriculture GDP. Dairying ensures the livelihood of 70 million farm families.

Livestock is a source of subsidiary income for many families in India, especially the resource-poor farmers who maintain few animals. Milch animals, including cows and buffaloes provide regular income to the farmers through the sale of milk. The country has one of the largest stock of buffaloes & cows and contributes 21 percent to global milk production and able to register an annual growth rate of 4.5 percent. The availability of 394 gram of milk per day per capita had been possible in country by record milk production of 187.7 million tonnes during 2018-19 as compared to 294 grams per day the average milk availability in the world. (Dairy of Animal Husbandry, Dairying & Fisheries, GOI, 2020)

Twenty-two state federations in country operate with 170 district-level milk unions along with more than 76,000 village-level co-operative societies and 11 million milk producer members. An average of 15 million liters of milk each day collected by these agencies. Total milk production in Karnataka state is to the tune of 4.10 metric tons i.e. 11^{th} largest milk-producing state, constituting about 5 percent of the country's total milk production. Further, Karnataka ranks 3rd in India in the procurement of milk by the Milk Producers' Co-operative Societies (MPCSs). MPCSs functions at the village level, as a link between farmers and co-operative milk unions, remain active throughout the year to help the farmers to produce more milk. In Karnataka, about 1.33 crore households seeking employment, out of which approximately 60 percent of households got the

employment in dairy sector directly or indirectly (Census, 2011). Milk co-operatives play a significant role in proving supplement income and employment to these households.

Future production prospects depend heavily on productivity gains, primarily through improved breeding and feeding practices. Demand for feeds and improved genetic traits may offer opportunities for increased milk trade. The first of the dairy co-operatives of Karnataka started in 1955 in the Kudige, Kodagu District of Karnataka. Karnataka Dairy Development Corporation (KDDC) was founded in 1974 to implement a dairy development project to run in the state funded by the World Bank. In 1984 the organization was renamed as KMF.

Fourteen milk unions under Karnataka Milk Federation have performing activities of dairy sector viz veterinary services, procurement of milk by morning and evening, chilling, processing of milk, distribution of milk, establishment of cattle feed plants, maintain Nandini sperm station, ensure liquid nitrogen supply, training centers etc. Primary Dairy Cooperative Societies (DCS) procure milk from 1500 members and distribute it to the consumers in various urban and rural markets in State. KMF sells products such as raw milk, curds, fermented products, milk powder, ghee, butter, ice cream, frozen desserts, milk sweets, chocolates, and flexi milk pack. More than 75 percent of the consumer rupee is passed on to the producers ensured by cooperatives. Recently 97 percent of the dairy co-operative societies have registered profit. KMF involved in several financial assistance programs of Government of Karnataka (GOK) viz. Nandini Dairy Farmers Welfare Trust, Ksheera Bhagya, program of distributing milk to more than 1 crore children of school and Anganwadi.

The success of dairy enterprises demands estimation of the input-output relationship efficiently. It is well known fact that shelf life of milk is very low especially under rural set-up, like other horticultural products. It forces the farmer to ensure early dispose of milk within a short period of time to prevent losses. Most of the small dairy farmers compelled for distress sales of milk to protect their minimum price. Large variation has been observed in production and consumption of milk & products from one state to state as well as from one region to another region.

It is really matter of concern that unorganized sector in our country handled about 80 percent of the total milk collection. Organized sector needs large number of farmers membership to support them for increased milk productivity and fair price of their produce. This would be possible by strong linkages with the hard efforts of extension

services in our country. The present study would be of help to understand how to make the dairy sector more competitive as well as profitable particularly to dairy farmers with increased productivity of livestock by better management practices.

Scope of the Study

Production, marketing and utilization of milk have expressed a significant role in enhancing employment opportunities at the same time to cater to the milk requirements of the consumers. The milk production gets tremendous encouragement only from the premium returns, which is possible through effective marketing strategies. Milk produced in selected areas can be distributed easily to demanded places of the society since milk is required throughout the state although the significant production is confined to few pockets. Hence, the production and marketing of milk and milk products assume equal importance for the development of the dairy sector in the state. The present study on **"Production, Marketing and Utilization of milk and milk products in Karnataka- An economic analysis"** was undertaken with specific objectives as:

1. To estimate production levels of milk and milk products in the study area of Karnataka.
2. To calculate the cost and returns of milk production.
3. To analyze the marketed surplus and factors affecting it and the marketing efficiency of milk in the study area.
4. To determine the utilization pattern of milk and milk products by different end-users.

Limitations of the study

The study is based on the primary data collected from 100 sample dairy farmers by personal interview method. As the farmers did not maintain proper records of dairy farming, provided information by memory recall, cause to it possibility of recall error. However, efforts were taken to minimize such bias by cross-checking with the secondary data source while collecting observation. The study is purely microeconomic and findings of the study would be confined only to area under consideration.

CHAPTER –2

Review of Literature

CHAPTER-II
REVIEW OF LITERATURE

A review of past research helps in identifying the conceptual, methodological issues relevant to the study. It would enable the researcher the use of suitable analysis and meaningful interpretation. A brief review of the earlier research work related to the present study is presented in this chapter. Thus, keeping the objectives of the present investigation in view, the reviews are presented in the following sub-heads.

2.1 The production levels of milk and milk products

2.2 The cost and returns of milk production

2.3 The marketed surplus and factors affecting it and the marketing efficiency of milk

2.4 The utilization pattern of milk and milk products by different end-user

2.1 The production levels of milk and milk products

Vashishta and Katiha (1988) in the study on comparative economics of milk production from different breeds of dairy animals in Kangra district of Himachal Pradesh reported that the profit margin from desi cow, pure breed cows, buffaloes and pure breed buffaloes worked out that ₹0.35, ₹0.45, ₹0.45, ₹0.26 respectively on small farms the corresponding figures for large farms were ₹0.57, ₹0.49, ₹0.48 and ₹0.80 respectively. The authors also reported that crossbreed cows gave higher returns due to their higher milk yield and feed conversion efficiency.

Gupta and Patel (1988) conducted a study on the marketing surplus of milk in rural Karnal district of Haryana and reported that the marketing surplus was the lowest for all household categories in the summer season. The per cent of the market surplus was the lowest in the winter season for large, small and medium-sized farmers, while it was the lowest in the rainy season for landless workers and upper medium-sized farmers. The study also stated that milk production had a positive and substantial effect on market surplus and a negative impact on family size.

Kaur *et al.* (1989) analyzed the marketed surplus of milk in the rural areas of Ludhiana district of Punjab. The study found that the average daily milk production, consumption and marketed surplus was estimated to be ₹24.57, ₹14.11 and ₹10.46 liters per household per day respectively. Authors reported that the marketed surplus of milk

was 72 per cent of the total milk production. The marketed surplus of milk was disposed through milk vendors (45.50 %), milk-fed (41.90 %), directly to consumers (6.90 %) and halwaies (6.70 %).

Devraj and Gupta (1994) in a study on the economics of milk production in Churu district of Rajasthan observed that the cost of milk production of lactating buffaloes and local cows were ₹3.96 and ₹4.02 per liter respectively. The study also revealed that the green fodder and concentrate were the most significant inputs influencing the milk yield.

Sangu (1995) studied the impact of dairy cooperative societies on production, consumption and a marketed surplus of milk in the Meerut district of UP among member and non-member households. Average milk production among member and non-member households was 7.74 and 6.91 kg per day respectively, of which 26.72 and 25.78 per cent was retained for home consumption and rest was sold. Milk production increased with the size of holdings.

Chand (1997) conducted a study on the marketed surplus of milk in Kurukshetra district of Haryana state. Results showed that milk production and marketed surplus in absolute terms were lower in the summer season, while relative milk marketed surplus in the summer season was higher as compared to the rainy and winter seasons. By and large, the per cent of the marketed surplus was found to be approximately 56.00 per cent of the total milk produced, which showed an increasing trend across the study areas herd size categories. Dairy cooperatives and milk vendors obtained the majority of the surplus that was marketed.

Dixit (1999) conducted a study on the bovine economy in Mandya district of Karnataka state observed that the net income, family labour income and net returns in the case of local cows were negative in all categories. while net returns were negative for all categories in case of buffalo. The author reported positive net returns only for crossbred cows.

Rajadurai (2002) conducted a study on the economics of milk production in the Madurai district of Tamil Nadu. It was reported that out of the total marketed surplus of milk farmers were selling 89.11 per cent of their marketed surplus to milk producer's cooperative society (MPCS) followed by tea shops (9.82 %) and consumers (1.07 %). The larger portion of milk marketing to society (MPCS) was due to financial and technical assistance to members.

Das (2004) carried out a study on the economic efficiency of milk production and marketed surplus in rural areas of Burdwan district of West Bengal and revealed that 43.02 per cent of milk was collected by milk vendors followed by milk producer's cooperative society (23.37 %), consumers (19.66 %) and others (10.95 %). Thus, the unorganized sector found to be dominated in milk marketing.

Singh Rishikanta (2006) in a study on the economics of milk production and marketed surplus of milk in the Imphal district of west Manipur revealed that marketed surplus of milk was estimated to be 96.00 per cent and the remaining 4.00 per cent was consumed at home.

Singh (2008) conducted a study on the economic analysis of milk production in Varanasi district of Uttar Pradesh and reported a marketed surplus is 54 per cent of milk and 46 per cent of milk consumed at home. Milk disposal pattern showed that 64 per cent of the marketed surplus to milk vendors followed by shops (33.00 %) and consumers (2.00 %).

Tariq *et al.* (2009) studied the marketing of milk and the limitations on the supply chain in Pakistan. Only 3-5 per cent of the total milk production was marketed through the formal channels in the region. The key factors affecting the milk marketing were conventional subsistence level of milk production, low milk productivity, lack of the infrastructure such as inadequate transportation and the inaccessible to the cold storage facilities.

Thakur (2010) conducted a report on the economics of milk production and marketing in Samastipur district of Bihar. The study recorded that daily per household of milk output ranges from 5.68 liters for small farmers to 26 liters for large farmers. Milk and milk products intake grew as household's income and education levels changed. On the other hand, the price of milk in farm households was negatively associated with the intake of milk and milk products.

Ghule (2010) conducted a study on the economics of milk production and its disposal pattern on commercial dairy farms in Ahmednagar district of Maharashtra. The study revealed that the marketed surplus of milk as a proportion of the total milk production was highest in case of large farmers (96.96 %), followed by medium farmers (94.81 %) and small farmers (94.48 %).

Khoveio (2011) carried a study on the economics of milk production, marketed surplus and its disposal pattern in Nagaland. The study revealed that the overall marketed milk surplus was found to be 12.26 liters which accounted for 85.83 per cent of the total milk produced. The milk disposal pattern showed that 59.18 per cent of the marketable surplus was disposed of directly to local consumers and the remaining 40.82 per cent to MPCS.

Sharif (2014) studied the economic analysis of milk production at different rates of groundwater extraction areas in southern Karnataka recorded that farmers age, land holdings and herd size had a significant negative impact on farm-specific technical efficiency scores.

Priscilla (2017) studied economic analysis of dairy cooperatives in Manipur state. The impact of dairy cooperatives was assessed by the Propensity Score Matching (PSM) Technique. The average annual net income per household of the members after matching were ₹13779.66, ₹13779.66 and ₹13610.82 for Nearest Neighbors, Kernel, and Caliper techniques, respectively. The average man days generated for member households were ₹162.85, ₹162.85 and ₹162.64 man-days through Nearest neighbor, Kernel, and Caliper techniques, respectively.

Bhawar (2019) conducted a study on production, marketed surplus, and disposal pattern of milk in the Northern Dry Zone of Karnataka. The study revealed that the overall average daily milk production per household per day was found to be 17.68 liters, which varied from 9.61 liters in the case of small farmers to 26.73 liters in the case of large farmers. The per cent of the marketed surplus of milk was found to be highest in marginal farmers (81.82 %) while, it was lowest in large farmers (74.41 %)

Athare P (2019) observed that the per liter cost of milk production for crossbred cow was ₹ 22.06, the return per liter of milk production was highest for large farmers (₹ 5.80) in case of members of the society. The average maintenance cost for buffalo not varied much between members (₹ 186.27) and non-members (₹188.14).

2.2 The cost and returns of milk production

Ram Anantha (1983) studied milking economics in the arid area of Western Rajasthan and observed that feed costs were the most significant segment. The cost of labour in the processing of buffalo milk was followed by cost components such as amortization, and interest. The average cost of labour was as high as 79.00 per cent.

Tripathi *et al.* (1986) conducted dairy business economic analyzes for Bundelkhand region of Uttar Pradesh and found that the yearly maintenance costs were ₹ 1004.03 and ₹ 637.09 for buffaloes and cows. The study also recorded ₹ 1.17 as the cost of milk production and ₹ 1.53 per liter, respectively for cows and buffalos. The net farm earnings on both species were the same, i.e., ₹ 323.35.

Acharya *et al.* (1987) researched the competitive advantage in irrigated and unirrigated areas of Ganganagar district of Rajasthan for cows and buffalo milk. The study stated that ₹ 2175 and ₹ 2132 were the annual care costs of a cow, and ₹ 2662 and ₹ 2544 in buffalo area irrigated and unirrigated, respectively. In both the regions, buffalo milk production was observed as double of a cow milk. Farm production from dairy farming was relatively higher in irrigated than unirrigated region.

Vashist and Katiha (1988) studied the milk production from various dairy cattle breeds in Kangra district. The profit margins (₹ per kg milk) for the sheep, pure breed goats, buffaloes and half-breed buffaloes for small farms were ₹ 0.35, 0.45, 0.45 and 0.26, respectively, and corresponding value for large farms were ₹ 0.57, 0.49, 0.48 and 0.80 respectively. Crossbred cows yielded higher yields.

Gangwar *et al.* (1989) studied 280 farms in the three agro-climatic regions, i.e., arid South-West, semi-arid and rainy regions in Haryana state. The average cost of milk production for large farms in all three areas, i.e., ₹ 2.62, ₹ 2.60 and ₹ 2.70, respectively, whereas large figures were found for irrigated region. Overall, the net milk return per liter was ₹ 0.09.

Shiyani *et al.* (1989) studied the economics of milk production in in the Kheda district of Gujarat state noticed the cost of milk production per liter for buffalo was ₹ 2.55, while the net expense amounted to ₹ 2.45, resulting in total returns of ₹ 0.37 milk per liter. Also found that the overall maintenance cost for buffalo was ₹ 4020 with concentrate costs accounted nearly for 38.64 per cent of total cost.

Goswami and Rao (1992) studied milk output economics in the Meghalaya district of Eastern Chasi hills. Authors found the fodder and concentrates spending accounted for the majority of the expense of milk production in all the dairy farming categories. Overall milk rate increased with milk production, whereas costs of milk production decreased with increased holding size.

Grover *et al.* (1992) conducted a 20-year review of 400 operating holdings of villages Bhatinda district of the Punjab, estimated total maintenance costs ₹ 5270.86 for buffalo and ₹ 4680.60 for cows yearly. Recorded an average annual milk production per buffalo was 1216 and for cow 926 liters. Net annual loss of milk per animal was ₹ 1016.07 for buffaloes and ₹ 1901.53 for cows. Larger loss observed for more keeping size.

Siwach *et al.* (1993) calculated the economics of buffalo holding in Rohtak district of Haryana, reported that milk production costs was 3.08 ₹ per liter. The average annual maintenance costs for buffalo was about ₹ 6495. Feed costs represented 55 per cent of the overall cost. Study suggested that the rearing of buffalo was cost-effective only 1208 liters per annum milk yield observed.

Ram *et al*. (1993) researched the economic analysis of milk output on weaker sections of households in western Uttar Pradesh and noted the average cost of maintenance and milk yield per day were ₹ 15.81 and 4.41 liters of buffalo. The dairy production cost per liter was worked out to be ₹ 3.07.

Devraj and Gupta (1994) studied milk production economics in the Churu district of Rajasthan, the cost of milk production was ₹ 3.96 and ₹ 4.02 per liter, buffalos and local cows. The research also found green forage and concentrates were most important inputs affect milk yield.

Sharma and Singh (1994) carried out a report on the milk production by various dairy breeds in humid temperate zones of Himachal Pradesh and found the average maintenance cost per annum for crossbred cows, local cows, Murrah and local buffaloes were ₹ 3624.55, 1981.95, 4161.00 and ₹ 2584.20, respectively. Net annual return on dairy animals was highest for Murrah buffalo (₹ 2072.87) followed by crossbred cows (₹ 1613.64), local buffaloes (₹ 925.55) and local cows (₹ 127.62).

Kalra *et al*. (1995) researched the economic analysis of milk production and disposal in rural Haryana and recorded maintenance costs were ₹ 19.11 for buffaloes, ₹20.23 for crossbred cows and ₹ 14.22 for local cows per day. The milk rate for buffalo, crossbred and local cows were ₹ 4.95, 3.53 and 6.91 per liter, respectively. Also found that local cows dairy production incurred a net loss of ₹ 3.82 per day.

Gupta and Agarwal (1996) noted lowest milk production costs for crossbred cows ₹ 4.68 per liter in Himachal Pradesh. Also recorded a relatively small net income from

dairying. Among the types of animal raising households, the landless labourers gained the highest net yield of crossbred whereas for upper medium-sized farmers buffalo and cows were economical.

Panghal *et al*. (1997) studied effects of the different kinds of agro-climatic regions of Haryana on the milk production. Concluded total milk production was less in dryland compared to the irrigated area. The labour costs decreased with a rise in farm size across various regions. Observed the cost of green and dry forage was nearly equal dry area that may be due to the shortage of green forage in the region.

Sinha (1997) carried out a study on the economic analysis of dairy companies in Nalanda district of Bihar state, observed average net cost of milk production from was ₹ 7.19 and ₹ 6.06 per liter for buffalo and crossbred, respectively. Higher returns of buffalo milk production associated with lower milk production compared with that of crossbred cows. The analysis revealed the feed cost was a key component of the cost of production, followed by labour costs in all of the household divisions and for different milk animals.

Chandra (1998) studied milk production economics in Farrukhabad district of Uttar Pradesh. Recorded the higher net returns for medium-sized farmers (₹ 12.50) and lowest for smallholders (₹ 3.90). For the landless labourers negative values were observed negative. The gross cost to large farmers was the highest (₹ 56.40) and the lowest for small farmers (₹ 47.70).

Dixit (1999) carried out a study on the bovine economy in the Mandya district of Karnataka state and noted net employment & revenue were negative for local cows and buffalo. Net returns and net profit were positive only for crossbred cows while for total bovines being pessimistic.

Kumar *et al*. (1999) studied an economic analysis of Sanjay milk and milk products and disposal trend in Kumaon hills. It was found the share of the livestock sector was 26.25 for farmer's total income. The cost of milk per liter was ₹ 5.36 for local cows and ₹ 2.38buffaloes. Constraints faced by the farmers were lacked sufficient feed, fodder and economic opportunity related to the commercialization of livestock products.

Singh (2001) studied the production of milk in the Karnal district of Haryana state. Day maintenance costs for crossbred cows were the highest (₹ 7.86 per liter), and mean milk yield was also the highest for crossbred cows. Crossbreds had the lowest cost of

milk production per liter. The variable cost represented more than 90.00 per cent of the total cost.

Rajadurai (2002) from a study in Madurai district on the economics of milk production in Tamil Nadu reported total feed costs covered two-thirds of the household's gross expense. The labour cost per day was the largest for small categories of households. Milk production costs per liter were the highest for local costs attributed to their poor productivity. Net returns per employee was highest for a crossbred cow.

Gandhi (2002) studied the pricing policy and cost of milk production in the Coimbatore district of Tamil Nadu and reported that the maintenance cost of crossbred cow and buffalo was 10231 and 11340 per year respectively. The net returns of milk production per liter were 7.18 and 9.90 for crossbred cow and buffalo, respectively. The overall net profit per annum from crossbred cows ranged from 1932 to 1642 for the small and medium categories. Concluded that the rearing of crossbred cows was more profitable than buffaloes due to higher productivity.

Arun (2003) studied the economics of milk production and marketed surplus in the Vellore district of Tamil Nadu and observed that the feed cost accounts for 68 per cent of the gross cost for overall categories of dairy farmers whereas total variable cost accounted for around 91 per cent of the gross cost. And it was also reported that the cost of milk production per liter, in general, was lowest for crossbred cows as compared to buffaloes and local cows.

Kumar and Pandian (2003) studied the cost of milk production in a milk-shed area of Tamil Nadu and reported that the total per day maintenance cost of a crossbred cow, buffalo and indigenous cow were 72.80, 33.72 and 33.03, respectively. The variable cost accounted for 92.31, 95.33, and 96.18 per cent of the total cost, respectively. Further reported that the cost of milk production was lower in crossbred cows, followed by buffaloes and indigenous cows.

Mangesh (2003) reported the milk production economics, and milk disposal trend in Wardha district of Maharashtra, average regular animal care costs were ₹ 29.53, ₹ 38.58 and ₹ 37.63 for crossbred goats, buffaloes and local goats, respectively. Total feed charges accounted for 76.57, 72.11 and 76.53 for crossbred goats, goats and buffalos respectively, while overall variable cost accounted roughly 93.03, 87.80 and 89.32 per

cent of gross costs, respectively. Gross returns were deemed negative for all milk animals except for crossbred goats for large farmers.

Das (2004) carried out a report on the milk's economic performance development, and marketing surplus in Burdwan District Rural Areas (West Bengal) reported the maintenance cost per day of buffalo, crossbred, and local cows were 35.20, 40.20 and ₹ 32.28, respectively. The total net milk yield per liter for a crossbred cow was high (₹ 1.28 per liter) followed by buffalo (₹ 0.34 per liter).

Bardhan *et al.* (2004) studied economic analysis of milk production from indigenous cows in Udham Singh Nagar district of Uttaranchal. Feed and fodder cost comprised a substantial part of total expenditure for all categories of farmers. The proportion of feed cost to total maintenance cost was 57.32 per cent. The overall labour cost constituted 19.50 per cent of total expenditure. The veterinary cost and depreciation accounted for 2.25 per cent and 8.42 per cent of the total cost of maintenance, respectively.

Reddy *et al*. (2004) conducted a study on costs of milk production under different agro-climatic regions in the semi-arid regions of Andhra Pradesh (AP), Tamil Nadu (TN) and Karnataka (KA). The average daily maintenance cost of a crossbred cow in AP, TN and KA was ₹ 38.99, 49.36 and 48.88, respectively. The estimated per liter cost of milk production was highest in TN (7.20) followed by KA (5.84) and AP (5.48). The feed cost accounted for 64.00 per cent of the total cost of milk production in AP while it was 72.00 per cent in TN and 74.00 per cent in KA.

Desai (2005) undertook a study on milk production and disposal pattern of milk in a rural area of the Bidar district of Karnataka. The study observed that feed cost was the major cost followed by labour cost in all the species. Reported highest net return (3.72 per liter of milk) from the crossbred cow followed by buffalo while in local cow it was negative. Green fodder was underutilized among all the milch animals while concentrating underutilized in the case of crossbred cows, and it was efficiently used in the local cow.

Kumar and Rai (2006) studied the economics of milk production in Andaman and Nicobar Islands from local and crossbred cows maintained by different categories of farms. The study revealed that there was a negative correlation between the percentage of local cows and farm size, while, it found was positive in the case of crossbred cows. The

cost of milk production per liter was lower for local cows (5.79) than the crossbred cows (7.65).

Chauhan and Sharma (2006) conducted a study on economic analysis of milk production in a tribal area of the Udaipur district of Rajasthan and observed that the average daily milk yield of a local cow and buffalo was 1.49 and 2.38 liters, respectively. The average maintenance cost per day for local cow and buffalo were estimated to be ₹ 21.24 and ₹ 29.26, respectively. Concentrate feed was a significant variable influencing milk production positively both in the case of local cows and buffaloes.

Khan (2006) studied the economic analysis of milk production systems in a new alluvial zone of West-Bengal and reported that per liter cost of milk production was lowest for crossbred cow (8.78) and highest for local cow (22.36). Net return per liter of milk was highest for buffalo (5.89), and a negative return was found in case of a local cow.

Sirohi *et al*. (2007) conducted a study on the economics of milk production in Haryana, reported that the daily gross maintenance cost of crossbred cows and buffaloes showed a notable variation (6 and 7 %) between milch and lactating animals as well as across different productivity levels. These variations primarily attributed to the difference in expenditure on feed inputs, which accounted for about 52 to 48 per cent in the case of the crossbred cow. The magnitude of returns also showed differences and varied directly with the productivity level, which was 9.00 per cent for milch animals as against 35.00 per cent for lactating animals in the case of crossbred cows. Whereas, in the case of buffalo, only lactating animals obtained a positive net margin (33.00%). At the field level, the rearing of crossbred cow and buffalo was considered to be an economically sustainable proposition only if their average daily productivity during lactation was greater than 9 and 6 liters.

Singh (2008) carried out an economic analysis of milk production in the Varanasi district of Uttar Pradesh. The study reported that on an average, a milking buffalo produced 4.15 liters of milk per day, which was highest (5.12 liters) for large farmers and lowest (3.62 liters) for small farmers and a milking cow produced 3.03 liters of milk per day, which was highest (4 liters) for small and lowest (2.16 liters) for a marginal category. Overall net returns from milking buffalo were found to be 1.05 per day. Marketed surplus accounted for 54.00 per cent of the total milk produced.

Gule (2010) conducted a study on the economics of milk production and disposal pattern on commercial dairy farms in Ahmednagar district of Maharashtra. It was reported that the cost of milk production (liter) worked out to 12.49, 12.58 and 11.48 on small, medium and large farms. Also revealed that the average cost of milk production for crossbred was 12.78 whereas, for buffalo, it was 26.78. Net return per liter of milk was 1.57, 1.36 and 3.30 on small, medium and broad categories of farmers, respectively.

Thakur (2010) calculated the economics of milk production and marketing of milk in Samastipur district of Bihar and concluded that the cost of producing a liter of milk was 17.13, 12.88 and 14.05 for buffalo, crossbred cow and local cow, respectively. The higher cost of milk production in the case of buffalo could mainly be attributed to the higher feed and fodder expenditure.

Khoveio (2011) in a studied on the economics of milk production, marketed surplus and its disposal pattern in Nagaland, reported that the average daily net maintenance cost per milch were 85.96 and 42.40 for crossbred and local cows respectively. The maintenance cost of crossbred cow was found to be relatively higher in small herd size categories (91.93) followed by large category (87.00) and medium category (43.33).

Nagrale (2011) conducted a study on the economics of milk production in the Vidarbha region of Maharashtra state, and it was found that the average per liter cost of milk production for local cows, crossbred cows and buffaloes were ₹ 21.66, 12.24 and 17.42, respectively. The overall net return from local cows, crossbred cows and buffaloes were ₹ 1.88, 6.10 and 8.71, respectively.

Devi *et al.* (2013) studied on prosperity of woman dairy farmers through dairying from Karnataka and it was observed that the feed cost was the largest item which varied from 45.00 to 70.00 per cent of total production cost, the labour cost stretched between 15.00 and 20.00 per cent of the total cost and the fixed cost was a small component of the total cost, and it was varied from 5.00 to 15.00 per cent.

Vishnoi *et al*. (2014) studied the economics of milk production in the Nainital district of Uttarakhand. The study implied that the cost of production per liter of milk, for the local cow, crossbred cow and buffalo were ₹ 27.61, 19.17 and 27.19, respectively, in the plain region. The net returns were negative for the local cow, while, crossbred cow and buffalo yielded positive net returns. In the case of hill region, the cost of milk production per liter of milk, for a local cow, crossbred cow and buffalo were computed at

₹ 26.47, 19.23 and 26.88, respectively. The net returns were negative for the local cow while it was positive for crossbred cow and buffalo.

Sharif and Dixit (2015) estimated the cost of milk production of different species of milch animals under different levels of groundwater regions in Karnataka. The study indicated that the cost of milk production per liter of milk was highest from local cows ranged between 24.04 (safe region) and 29.51 (critical region) while it was least in crossbred cows ranging between 16.68 and 19.38. The net returns per liter of milk were positive for crossbreds (3.12 in overexploited and 5.82 in the safe region) while marginally negative net returns in local cows.

Makarabbi (2016) studied the economics of milk production in Belagavi district of Karnataka and reported that the per liter cost of milk production for local cow worked out to be 28.15 and 28.91 for members and non-members of dairy cooperatives, respectively. The corresponding figures for crossbred cow milk production cost were 20.73 for members and 21.10 for non-members of the cooperative dairy society. Similarly, the per liter cost of buffalo milk production was 26.82 for members and 27.08 for non-members. Most of the studies reported that the cost of milk production was higher for local cows, followed by buffaloes and crossbred cows. Feed cost was the major component of the total cost of milk production. As regards the productivity of different milch animal species, it was higher in the case of crossbred cows followed by buffaloes and local cows. The investigation into food grains conducted in India to date had shown that large farmers are more likely to contribute to market surplus. The milk production by small farmers adds more marketable surplus as there is little emphatic evidence for the contribution.

Lal (2016) in analysis of productivity and efficiency of milk production among dairy farmers in Sirsa cooperative milk shed in Haryana revealed average milk yield per day for crossbred was highest (₹9.83 lit/day) followed by buffalo (₹6.04 lit/day) and local cows (₹4.14 lit per day. Per lit per day cost of milk production was lowest for crossbred (₹20.81) followed by buffalo (₹32.43) and highest for local cow (₹33.50). The returns from milk production were highest for crossbred (₹5.20 per lit per day), followed by buffalo (₹3.67) and least for local cow (₹0.20 per lit per day)

Patibandla L. (2018) studied economics of milk production among member and non-member groups in Andhra Pradesh. Average maintenance cost per day for crossbred

was highest for member (₹262.85) as compared to non-members (₹251.61) but per liter cost of milk production for crossbred was highest for non-members (₹24.97) in comparison to a member (₹23.10). The cost per liter of milk production for buffalo was lower in the case of members (₹31.56) in comparison to non-members (₹33.56). Overall milk production was higher for member (₹42.15 lit per day) than that of member farmers (₹24.99 lit per day).

Sirohi *et al.* (2019) standardized the methodology for cost of milk production through consultation with economist, statisticians, animal scientist, stakeholders from central and state department of animal husbandry, dairy cooperatives, etc. The key elements of standardization methodology were application of cost recovery method for assessing the cost of durable farm assets, developing regional standard animal unit for different regions of country, developing methodology for estimation of cost of feed input through grazing and application of scientific approach for estimation of dung output etc.

2.3 The marketed surplus and factors affecting it and the marketing efficiency of milk

Gangwar *et al*. (1989) reported on milk economics development and consumption of various farm sizes in Haryana state. The price of milk earned by all farmers, stated to be ₹ 3.00 per liter, whereas the total cost of milk production for large farms was the highest in all the three, i.e., 2.62, 2.60 and 2.70 ₹, respectively. It was found 62 for domestic consumption, per cent of the total milk provided at the farm was used, whereas 74.00 per cent was used as liquid milk and 26.00 per cent as milk remained products.

Gupta (1992) carried out a report on the pattern of milk disposal in Ropar and Patiala districts of Punjab during the years 1982-84. The dairy farmers clustered into two categories, the domestic and commercial households. Figured out the households consumed around 46, 70 and 51 per cent, respectively, as liquid milk in winter, in summer and rainy seasons. Only 17, 20 and 14 per cent of households have been turned into dairy products. Commercial households chose to market the milk to customers in the summer season, while milkmen in rainy seasons were favored.

Rajendran and Prabaharan (1993) observed milk disposal across various categories of farmers in Dharampuri district of Tamil Nadu found that 8093 liters of a category of large farmers were produced milk per day compared to 4906 liters of milk per day in the category of landless. Also, milk retained for consumption increased with the

increase in the size of holding ground. Authors concluded that, by and large, the dairy farmers in the study region, milk was marketed through the cooperation of the milk producer society, while less than 9 per cent of farmers had milk disposed to neighbours, and tea markets.

Badal (1994) in a study on milk production and its economics disposal pattern in Bihar district of Gopalganj reported sales by milk producers 39 per cent to the tea shops and halwais, 34.78 per cent to the dairy vendors and 26.18 per cent directly to customers. It was discovered at an average review intake of fluid milk per capita per day was 184 ml in the study area.

Shah *et al.* (1995) carried out an analysis in the district of Bulandshahar of Uttar Pradesh found that the surplus milk was marketed in villages, the quantity of milk converted to curd were higher for the markets without adequate resources. Similar patterns of consumption were observed fluid milk, curd, and ghee intake by capita.

Gupta *et al.* (1995) studied per capita consumption of milk in households of Chandigarh noted increased milk consumption with increased income. The amount was 0.597 liters per day and 44.55 per annum. The households used 30.54 per cent as liquid milk, 14.75 per cent as curd and 10.16 per cent for butter.

Chandra (1998) in research on milk production economics in Farukhabad district of Uttar Pradesh's noted a significant proportion of the milk was sold by the milk producers (44.1 %) to vendors, dairy cooperatives (41.95 %), tea shops (9.66 %), users (4.29 %). The surplus milk had been disposed to landless labourers and farmers milk cooperatives.

Rajadurai (2002) conducted economic analysis of milk processing in the Madurai district of Tamil Nadu. Noted (89.17 %) of milk marketed through Milk Producers Co-Operative Society (MPCS), followed by tea shops (9.82 %) and (1.07 %) customers. Milk producers sell their larger proportions milk to cooperative societies.

Vedamurthy (2004) in a study on economic analysis of milk marketing in Shivamogga district of Karnataka reported that 53.69 per cent of total milk was disposed of by unorganized sector. Remaining 46.37 per cent were disposed of to MPCS. Total of 28.05 per cent disposed to vendors, 14.62 per cent to processing plants, 8.44 per cent to consumers and only 2.58 per cent to a tea shop from 53.69 per cent milk disposed to the unorganized sector.

Singh (2006) in a study on milk production economics and marketing surplus in West Imphal district of Manipur, revealed that marked surplus was 96 per cent of total milk produced and 4.00 per cent of the rest was consumed at home.

Surendra (2009) conducted a study on value chain analysis of Merak and Sakten areas of Gujrat state. Study revealed 17.00 per cent of the total quantity of milk was sold in the market, 65.00 per cent was used for consumption and the remaining 18.00 per cent used to process butter and cheese.

Meena and Bhavendra (2015) conducted a study on marketed surplus, consumption and disposal pattern of milk in Banswara district of Rajasthan. Reported that the marketable and marketed surplus of milk constituted about 78.00 and 39.00 per cent of total milk production. Out of the milk retained at home for family consumption, about 40.00 per cent was consumed as a liquid and 60.00 per cent of milk was converted into milk products.

Singh (2016) studied economic analysis of the traditional milk marketing chain in the Karnal district of Haryana and it was reported that out of the total marketable surplus of milk, 67.57 per cent was found to be marketed surplus large portion about 73.01 per cent was contributed by the small herd size category. Of the total marketed surplus of milk about 96.62 per cent was disposed through unorganized traditional marketing routes and remaining was disposed of through organized marketing channels.

Mahida (2017) conducted a study on comparative analysis of the technical efficiency of cooperative member and non-member farmers in Gujarat. Concluded member farmers (83.27 %) were more efficient than the non-member farmers (75.31 %). In both cases of member and non-members, the technical efficiency of farmers with medium size was found to be lower than the farmers with small herd size. The member farmers can increase their output by around 4 liters per day in addition to their actual output, while non-members can increase the same by around 5 liter. Non-farm income, membership in cooperatives and access to information had positive and significant effect on the farmer's technical efficiency, while herd size had negative and significant influence.

2.4 The utilization pattern of milk and milk products by different end users

Rajadurai (2002) carried out a study in the Madurai district of Tamil Nadu on the economics of milk production. Of the total market surplus of milk farmers, 89.11 per cent

of their marketing surplus of milk was reported to be sold to the cooperative society of milk producers (MPCS) followed by tea shops (9.82 %) and consumers (1.07 %). It has been reported that small categories of farmers dispose of larger quantities of marketable surplus to the MPCS followed by the medium category of farmers.

Arun (2003) studied various factors affecting the marketing surplus of milk in the Vellur district of Tamil Nadu, stated that approximately 92 per cent of the milk produced in sample households was commercialized. In the case of landless milk farmers, the market surplus was found to be highest (93.60 %), and lowest (89.50 %) in the marginal farmers. Milk price and milk production had a positive and significant effect, whereas family size had a negative and significant impact on the marketing milk surplus.

Bairwa (2004) conducted a report on milk production, use, and marketing surplus in the rural area Tonk district of Rajasthan. Revealed the marketed surplus accounts for 55 per cent of total milk production. Marketed surplus distribution to milk cooperative societies, customers, halwais, tea stalls, milk vendors and private dairy were 45, 25, 16, 7, 5, and 2 per cent, respectively.

Rajendran and Mohanty (2004) found unorganized sector handled 80.00 per cent of the rural producer milk and 20.00 per cent by organized sector in India. Intermediary involvement, producer's lack of bargaining power and lack of collection, storage, transportation, and processing infrastructure facilities were the major constraints affected the prices obtained by producers. Further challenges would be milk consistency, product creation, infrastructure support and growth in global marketing.

Desai (2005) conducted a study on the economic analysis of milk production and milk disposal in the rural area of Bidar district of Karnataka. Estimated that 56.00 per cent of the total market surplus was sold to the unorganized sector and 46.00 per cent to the organized sector (societies of dairy cooperatives). Unorganized industry included dairy vendors, tea stalls, customers, and product processors.

Reddy (2005) researched the role of livestock in the farm economy in Kolar district of Karnataka. Price was the main factor affecting milk consumption in the short term, and income was the main factor affecting long-term milk consumption. Approximately, 71.00 per cent of total rural milk consumption was in the form of liquid milk, and rest was transformed into products such as butter (70.00 %), ghee (17.00 %) and buttermilk (13.00 %).

Singh (2006) studied the economy of milk production and marketing surplus in the Imphal district of Manipur and reported that 91.00 per cent of the total milk produced was marketed surplus and 9 per cent of the remaining milk retained for consumption purposes at home.

Bidwe *et al.* (2007) conducted a consumer preference study for milk in Buldana district of Maharashtra and reported that the majority (70.00 %) of the family preferred buffalo milk over cow milk. Most of the family had milk consumed in the curd form, followed by ghee and tea/coffee.

Das and Verma (2008) studied the trend of milk and milk products consumption in the North district of Tripura and stated that educated people were spending more on milk and milk products. The age of the household 's principal earner showed no major impact on the intake of milk and milk products.

Agarwal *et al*. (2009) conducted a study on the marketing surplus of milk in different agro-climatic areas of Gujarat and Maharashtra. Reported the marketing surplus of milk in different areas of Maharashtra ranged from 77 to 94 per cent. The marketed surplus of milk was also stated to be higher in all zones of Maharashtra as compared to Gujarat.

Gule (2010) conducted a report on the economics of milk production and its disposal pattern on commercial dairy farms. Marketed surplus as a percentage of total milk production had been reported 94.48, 94.81 and 96.96 per cent, respectively, for small, medium and large farms. The overall marketed surplus contributed across various farm groups were 38.69, 20.68 and 40.63 per cent, respectively on small, medium and large farms.

Meena and Bhavendra (2015) conducted a report on the marketing surplus, milk consumption and disposal trend in Banswara district of Rajasthan. Authors stated that the marketed surplus and consumption of milk constituted around 78.00 and 39.00 per cent of total milk production in the study region. Both were found to increase with an increase in the category of herd size. About 40.00 per cent of the milk retained for domestic consumption was the liquid, and 60.00 per cent was processed to milk products.

Jaiswal (2016) conducted a survey of market surpluses and factors affecting the choice of market outlets in Raipur district of Chhattisgarh. Recorded that of total milk manufacturing; marketed surplus accounted for 63.41 per cent while the rest was used for

household consumption. Of the total marketed surplus, the maximum quantity of milk (58.71 %) was sold to the cooperative dairy societies (DCS) followed by local consumers (23.57 %) and the remaining (17.71 %) were sold to the market.

Singh (2016) studied economic analysis of the conventional milk marketing chain in Karnal district of Haryana. Approximately 96.62 per cent was disposed of through unorganized conventional marketing routes and the remainder was disposed of through organized marketing channels.

Priscilla (2017) studied economic analysis of dairy cooperatives in Manipur state. The impact of dairy cooperatives was assessed by the Propensity Score Matching (PSM) Technique. The average annual net income per household of the members after matching were ₹13779.66, ₹13779.66 and ₹13610.82 for Nearest Neighbour, Kernel, and Caliper techniques, respectively. The average man days generated for member household were ₹162.85, ₹162.85 and ₹162.6 per man days through Nearest Neighbour, Kernel, and Caliper techniques, respectively.

Patibandla L. (2018) studied the impact of dairy cooperatives on the income of rural households in Andhra Pradesh. Heckman two-stage model was used for impact assessment. The study found that cooperatives have a positive and significant impact on the income of the members due to higher procurement price paid by dairy cooperatives. It has also a significant impact on the productivity of milch animals among member farmers due to veterinary services provided by the cooperative society.

CHAPTER –3

Research Methodology

CHAPTER-III

METHODOLOGY

Research methodology is considered as a blue print before undertaking any research. It consists of various analytical steps to elucidate the research investigation. It explains about the sampling design, data collection and analytical procedures or techniques to approach a research problem. The application of various tools and techniques has been selected on the basis of set objectives to ensure applicability of the results. The research methodology of this study is described below in detailed manner under the following sub-headings:

3.1 Sampling Design

3.2 Data Collection

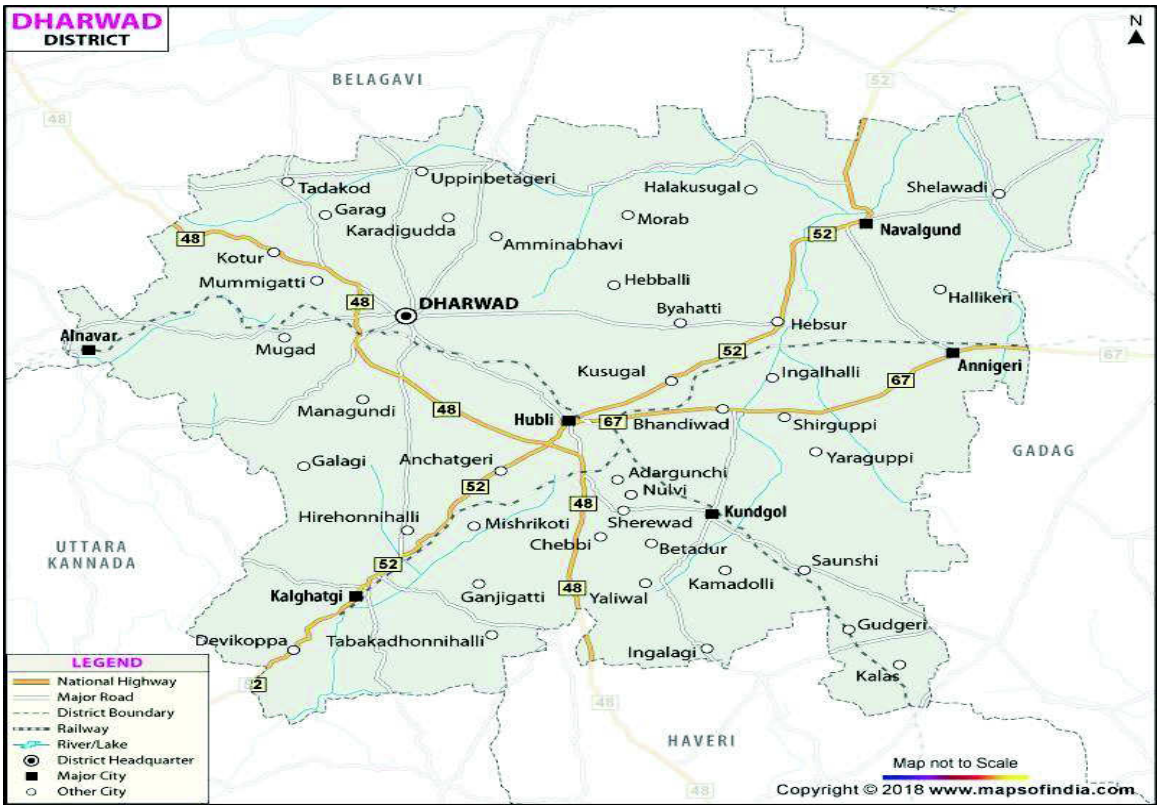
3.3 Analytical Framework

3.1 Sampling Design

The sampling design includes selection of study area *i.e.*, state, districts, blocks and villages and selection of respondents *i.e.* producers, consumers, dairy cooperatives, creameries, vendors and dairy plants.

3.1.1 Selection of the state

As per the tittle of study the Karnataka state has been selected purposively. Eighth largest state in terms of total geographical area 19.049 million ha of Karnataka of. It is situated between 11.31° and 18.45° N latitude and between 74.12° and 78.40° E longitude in the southern plateau. Arabian Sea bordered the state on the west side, on northwest by Goa, on the north by Maharashtra, Andhra Pradesh & Telangana on the east, Tamil Nadu on the southeast, and Kerala on the south west. The 350 km long coastline formed the western boundary of the state.



Source: Maps of India 2018

Source: Maps of India 2018

Figure 3.1: Study Area of Karnataka state

3.1.2 Selection of districts

Two major districts out of 30 districts in Karnataka namely, Mandya and Dharwad were selected purposively for the purposed study.

3.1.3 Selection of blocks

Hebballi block from Dharwad district and Krishnarajpete block from Mandya district were selected randomly.

3.1.4 Selection of villages

From each selected block, one village was selected in random fashion. The villages selected were ballikeri and kappanahalli from Krishnarajpete block and somapur and shivalli from Hebballi block.

3.1.5 Selection of the sample households

Twenty-five milk producer households were sampled in each of the selected villages to collect the desired information. Number of milch animals in each household was the selection criterion for farming households. After conducting personal interview, the data obtained from the milk producers were categorized in to small (2-11 milch animals), medium (12-15 milch animals) and large (16-24 milch animals) herd size categories using the cumulative square root frequency technique with milch animal as the basis of classification. Thus, total 100 producer households were distributed as 15 small, 24 medium and 61 large herd sized category households. Along with the farmer-producers, 50 numbers of milk and milk products consumers (exclusive consumers) were interviewed personally to study their utilization pattern of raw milk and several milk products as well as to analyze the expenditure made by the consumers on milk and milk products.

3.1.6 Selection of milk market intermediaries

Both the organized and unorganized milk marketing sectors were prevailing in both of the studied districts. Therefore, all the marketing agencies involved in milk collection (formal and informal) were selected for the present study. Thus, 10 creameries, 10 milk vendors, 10 *halwais*, 4 medium size dairy plants and 1 large commercial dairy plant were selected. The description of the milk marketing agencies is given below.

Creameries: Fresh milk was collected from the producers by creameries of areas and sell directly to consumers as raw milk or after processing it into milk products.

Milk vendors: The person who collects milk from milk producers and sell it to the consumer or to the other milk marketing functionaries.

Halwais: They are mostly engaged in sweet business. They collect milk either directly from the producer or from milk vendors, convert it to various kinds of sweets and then directly sell in market.

Table 3.1: Composition of study sample

Participants	No. of respondents	Method of data collection	Selection criteria
Dairy farmers	100	Personal Interview	Random selection
Creameries	10	Personal Interview	Random selection
Halwais	10	Personal Interview	Random selection
Milk vendors	10	Personal Interview	Random selection
Milk processing plant	5	Personal Interview	Purposive selection
Consumers	50	Personal Interview	Random selection

3.2 Data Collection

Both primary and secondary sources have been explored to collect data as per the requirements of the present study.

3.2.1 Primary Data

All the sample households were interviewed personally by using well structured and tested schedule to have primary data. Socio-economic and demographic particulars of households like age, education of household heads, family composition, occupation, operational land holding, type of livestock, investment on livestock, machinery and equipments, value of feed, fodder and other miscellaneous expenses, milk production level and prices *etc.* were collected from farmers. Along with it, data regarding quantity and cost of milk procurement, processing it into different milk products and marketing

was collected from different milk processing and marketing agents. Lastly, data on the basis of the quantity consumed and expenses made on milk and milk products were collected from the consumers through personal interview method.

3.2.2 Secondary Data

Secondary data regarding agro-climatic factors, cropping pattern, livestock population, infrastructural facilities of livestock and dairy development were collected from various authentic sources like Department of Animal Husbandry and Fisheries (DAH&F), Livestock census, National Dairy Development Board (NDDB), National Dairy Research Institute (NDRI) and other published sources.

3.3 Analytical Framework

In order to accomplish the objectives of the research, the data collected from the producers, consumers, creameries, vendors and commercial dairy plants were scrutinized, tabulated which are discussed in this section.

3.3.1 To estimate production levels of milk and milk products in the study area of Karnataka

Total milk production from all the milch animals in the household is recorded as the household total milk production. The per day milk consumption of household was calculated as total milk retained for home consumption or conversion into milk products.

Per capita per day milk availability =Total milk production of household / Family size

Per capita per day milk consumption = Quantity of milk retained at home / Family size

3.3.2 Estimation of cost and returns of milk production

Standard Animal Units (SAUs):

Among the various cost items discussed, the producer incurs certain expenses for the entire herd on the farm. Fixed assets like cattle shed, feed manger, chaff cutter, milk cans and buckets etc. are used collectively by the farmer for all the cattle irrespective of their age and sex. Therefore, for assigning the joint expenditures into per animal basis, the entire herds were converted into standard animal units (SAUs).

Keeping in view the differences in regional endowments of animal species and wealth, the dairy animals have been converted into SAUs using the factors reported by Sirohi *et al.* (2015) for the southern region. The body weight of the animal along with the labour utilization was taken into consideration for estimating the SAUs.

3.3.2.1 Estimation of cost

The total costs involved in milk production comprise of fixed costs and variable costs. For estimation of different costs and return, the following methodology was undertaken.

3.3.2.1.1 Fixed costs

Fixed costs (FC) are the expenditure incurred by the producer irrespective of the level of production. FC don't vary with the output and remain unchanged in the long run. Various components of fixed cost include depreciation and interest on fixed capital. Capital Recovery Cost (CRC) method was used for estimation of fixed cost. Another fixed cost item *i.e.* interest on fixed capital was not estimated separately as CRC approach was followed.

Depreciation cost: Depreciation is defined as decrease in the value of fixed assets due to wear and tear, over time, accidental damage and technological obsolescence. CRC method was used to calculate the annual cost of depreciation over the useful life of asset which in turn provides economic rate of return on investment. Annual depreciation on animals, buildings, machinery and equipments used in dairy farming practices was included for calculation using CRC method.

The formula for estimation of CRC is given by:

$$R = Z\left[\frac{(1+r)^n r}{(1+r)^n - 1}\right]$$

where R is the capital recovery cost; Z is the initial value of the capital asset, **r** is the interest rate; **n** is the useful life of the assets

When the assets were purchased from borrowed capital the actual interest rate charged by the bank was taken as 'r', while in case of owned funds, the rate of interest on term deposit of 1-5 years was taken.

3.3.2.1.2 Variable Costs: Variable costs are those costs which are incurred on the variable factors of production and can be altered in the short run. Variable cost items include feed and fodder cost, labour cost, veterinary and miscellaneous expenses. Data on the variable expenses were collected from the farmers for entire herd size. Annual expenditures were converted to daily expenses and then apportioned into standard animal units (SAUs).

i) **Feed and fodder cost:** It include costs of green fodder, dry fodder, concentrates and mineral mixture fed to animals. The cost was estimated as a product of quantity of certain feed/fodder fed to animals and the purchase price of respective feed. In case of home-grown feed/fodder, their farm harvest prices were considered. Where farm harvest prices were not available, imputed value of crop was taken into account as the prevailing price of standing crop in the locality. For calculating cost of the concentrated feed which was prepared at home, weighted prices of ingredients *i.e.* share of each component in the concentrate composition was taken into account. When animal feeds were grass and tea leaves collected from common property resources, its imputed value *i.e.* their expected sale price was accounted for estimation of the feed and fodder cost.

ii) **Labour Cost:** The information regarding labour requirements for various farm operations and labour cost were collected during the personal interview with the farmers. Labour cost comprises of both family labour and hired labour. The cost of hired labour was calculated considering type of work allotted and wages paid, whereas, family labour costs were determined on the basis of existing wage rate of permanent farm labour.

iii) **Veterinary and miscellaneous expenses:** Veterinary expenses included medicines, doctors' fees, vaccination charges as well as natural and artificial insemination charges. Miscellaneous expenditure included electricity, water charges, expenses on repairing fixed assets, insurance charges and other related expenses. As these expenses were joint costs, hence, apportioning was done based on SAUs.

3.3.2.1.3 Other Cost Concepts

Gross Cost: It is the total cost incurred by the producer which was estimated by adding all the cost components including fixed and variable costs.

Gross Cost = Total Fixed Cost + Total Variable Cost

Net Cost: The net cost was estimated by deducting the imputed income earned through dung, from the gross cost.

Net Cost = Gross Cost – Value of the Dung

Cost of milk production: In order to estimate the cost per liter of milk, the average net maintenance cost per animal per day was divided by average milk of animal per day.

$$\text{Cost per liter of milk (₹/lit)} = \frac{\text{Net cost per Animal}}{\text{Avg. milk yield of animal}}$$

Gross Returns: Milk yield of an animal x prevailing prices equals to gross returns.

Gross Returns = (Milk produced by household on daily basis) × Price of Milk

Net Returns: Difference of net cost from gross returns equated to Net return

Net Returns = Gross Returns -Net Cost

Price of Milk: Milk price differs for buffalo, crossbred cow and local cow.

3.3.3 Estimation of marketed surplus: Quantity of produce brought to the market for sale would be Marketed surplus. The quantity of milk sold by the producer after meeting family requirements, farm needs and other payments would be marketed surplus.

3.3.3.1 Marketed Surplus of Milk = Total Milk Production – Total Milk Consumption

Total milk production of the household is the total milk produced by all the milch animals per day. The quantity of milk retained at home for consumption or converting into other dairy products is the total milk consumption.

3.3.3.2 Factors affecting marketed surplus:

The marketed surplus of milk-producing household influenced by number of factors. The marketed surplus function was fitted to test the significance of the responsible factors. Marketed surplus of milk was considered as the dependent variable and factors like family size, price of milk, milch animal holding, operational land holding, experience of

household heads, and education level of household heads were considered as the explanatory variables in multiple regression analysis.

I. **Family size:** The family size and composition determine the consumption of milk. Larger family size consumption would be more, hence, lower will be the marketed surplus. Family size was considered as one of the independent variables in the marketed surplus function that would negatively affecting the marketed surplus.

II. **Education of the household heads:** Education of the household heads considered as an important factor influencing marketed surplus of milk in positive direction.

III. **Milch animal holding:** The total daily milk production from bovines in the milk producing household was considered as an explanatory variable.

IV. **Price of milk:** Weighted average of milk price was taken as an explanatory variable in the marketed surplus function and calculated for each household as follows:

$$\textbf{Weighted Average Price} = \sum P_i W_i / \sum W_i$$

Where,

Per liter price of the i^{th} type of milk: P_i

Total quantity of i^{th} type of milk sold by the household: W_i

V. **Land Holding:** Total operational land holding was considered as an explanatory variable positively influencing the marketed surplus of milk in the model.

VI. **Experience of household heads:** The farmer has more experience in dairying it will helpful to increase the milk production by adopting scientific dairy farming practices.

Specification of Marketed Surplus Function:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6)$$

X_1= Average milch animal holding (Number)

X_2= Family size (Number)

X_3= Price of milk (Rs/liter)

X_4= Operational Land holding (ha)

X_5=Experience of household heads(years)

X_6= Education level of household heads(ranks)

Type of model under regression analysis was based on economic criteria *i.e.* sign and value of the estimated parameters, statistical significance of estimated parameters and co-efficient of multiple determination (R^2). Multiple regression was performed to determine the degree and extent to which the factors were affecting marketed surplus of milk. The marketed surplus function was then specified:

1. Coefficient of multiple determination value (R^2).

2. Level of significance of regression coefficients.

3. Ability of the model to describe meaningful results.

3.3.4 Estimation of marketing efficiency of various milk marketing channels

3.3.4.1 Cost Components of Market Intermediaries:

In the present study, the cost incurred by various market intermediaries can be divided into fixed costs and variable costs. Depreciation on buildings and equipment's, interest on fixed capital, investment on transportation vehicles and other furniture included under Fixed cost. Likewise, variable cost includes expenditure on labour, milk procurement, fuel, electricity and other miscellaneous charges.

I. Fixed Costs

a) Interest on fixed capital

Interest on the amount of money spent on building, equipment, transportation vehicles which were worked out on prevailing rate of interest *i.e.* 8 per cent on fixed deposit.

b) Depreciation

It included annual depreciation on equipment's, buildings and transporting vehicles. The depreciation was worked out with the help of capital recovery cost (CRC) method.

II. Variable costs

a) Purchasing cost of milk

The cost of quantities of raw milk actually purchased per day was multiplied by their prices paid to estimate the purchasing cost of milk.

b) Fuel cost

Fuel cost included expenses on petrol for the vehicle, wood and matchbox.

c) Electricity cost

Electricity was used for running electric equipment's like fan, light, fridge, mixer grinder etc.

d) Labour cost

Wage prevailing in the area was taken as labour cost and total expenses on labour was estimated by multiplying the prevailing wage rate with total number of labours were engaged in the business.

e) Miscellaneous cost

Miscellaneous cost included the cost of repair of equipment's and vehicles, cost of gunny bags, cost of chemicals used for making milk products, cost of small glassware etc.

3.3.4.2 Estimation of Marketing Efficiency

Information on milk marketing channels, cost and returns of marketing agencies, producer's share in consumer's rupee and price spread was collected and analyzed to calculate marketing efficiency.

I. Price spread

The price spread of an agricultural commodity helped to calculate the economic efficiency of marketing system. Price spread maintained inverse relation with the efficiency therefore smaller price spread would be desirable for higher efficiency of marketing chain. The difference between the price paid by the consumer and price received by the milk producer defined the price spread (Acharya and Agarwal, 2009).

It was calculated as, $\mathbf{P_s = P_c - P_f}$

Where,

$P_{s\ is}$ the Price spread

P_c is the Consumer's price

P_f is Producer's price

II. Producer's share in consumer's rupee

It is the price received by the farmers and expressed as a percentage of the price paid by the consumer (Acharya and Agarwal, 2009). The producer's share was calculated with the following formula.

$$P_s = (P_f / P_{c)} * 100$$

Where,

P_s is the Producer's share in consumer's rupee

P_f is Producer's price

P_c is the Consumer's price

III. Marketing Efficiency for different marketing channels

Marketing Efficiency of different channels was calculated by using the following formula.

MME = FP / (MC + MM)

Where,

MME is the Modified Measure of Marketing Efficiency

FP is price received by producer

MC is marketing cost MM is marketing margin

3.3.5. Utilization pattern of milk and milk products

Utilization pattern of milk is defined as the process of consumption of raw milk or in the form of various milk products by different stakeholders. The producers retain some amount of milk for their family consumption, some portion of milk they consume as raw milk and remaining quantity of milk is converted to various milk products. The *halwais* procure raw milk either from the farmers or from vendors and utilize it to produce milk products. Likewise, both milk and milk products are also consumed by the non farmer-consumers to varying extent. Hence, primary data collection was done regarding the utilization of milk and consumption pattern of milk and products from 100 farmers and 50 consumers by personal interview method.

CHAPTER –4

Description of the Study Area

$$P_s = (P_f / P_c) * 100$$

Where,

P_s is the Producer's share in consumer's rupee

P_f is Producer's price

P_c is the Consumer's price

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CHAPTER-IV
DESCRIPTION OF THE STUDY AREA

The overall economic development of any region depends on its physical endowment, human resources and technological progress. Therefore, an objective description of the study area is useful to understand the scope and limitation for its economic development. Information regarding the geographical location, demographic features, literate rate, soil types, land use pattern, climates, rainfall distribution of Karnataka state has described.

4.1 Objective description

4.1.1 An overview

The state of Karnataka is endowed with rich geographical set up and natural resources. The state has rich fertile table land, rivers and their tributaries, tanks for irrigation facilities. The state's human resources with racial and religious sects and professional skills make it a hub of industries.

Karnataka was ruled by many emperors in ancient and medieval time, they all enriched the culture, religions, traditions, arts and science of the state. In the British rule and the state was distributed among as many as 20 different administrations, it became a single state called Mysore State in 1956 while it was renamed as Karnataka in 1973. Karnataka state was formed on November 1, 1956. Presently state has divided into 30 districts, comprising 176 taluks and 747 hoblis with 61.13 million people as per recent census with 31.06 million men and boys whereas 30.07 million were girls and women (Karnataka at a glance (2018-19).

4.1.2 Location

Karnataka is the eighth largest state in India with an area of 19.049 million ha. It is situated between 11.31 $^{\circ}$ and 18.45 $^{\circ}$N latitude and between 74.12 $^{\circ}$ and 78.78.40 $^{\circ}$ E longitude in the southern plateau. Karnataka is bordered on the west by the Arabian Sea, Goa on the northwest, Maharashtra on the north, Andhra Pradesh &Telangana on the east, Tamil Nadu on the southeast, and Kerala on the south west. It has a 350 km long coastline, which is the western boundary (Fig.4.1).

Figure 4.1: Karnataka Map

4.1.3 Demography

As per the 2011 census, the total population of the state stands at 61.13 million. Out of which, the males constitute to about 31.05 million and females to about 30.07 million. Population density is 319 persons per km square. while the sex ratio is 968 females to 1000 males.

4.1.4 Literacy rate

As per 2011 Census, the literacy rate of Karnataka state has increased from 66.64 per cent in 2001 to 75.36 per cent in 2011. While male literacy has increased to 82.85 per cent, while female literacy has also gone up to 68.03 per cent in 2011. This is due to the accord of high priority to expansion of female education and projects for improving the conditions the disadvantaged under women and child development programs of the government.

4.1.5 Climate and rainfall

The Karnataka has wide range of climate varying from arid to semi-arid in the plateau region, sub-humid to humid tropical in the western ghats region and humid tropical monsoon type in the western coastal plains. The state receives 80 per cent of the total annual rainfall in the southwest monsoon period, 12 per cent in the post-monsoon period, 7 per cent in the summer and only 1 per cent in the winter. The coastal region, on the windward side of the ghats, receives highest of rainfall (4,080 mm) during the southwest monsoon.

4.1.6 Soil types

In Karnataka, eleven groups of soil orders are recognized based on the differences in soil formation processes, as reflected in the nature and sequence of soil horizons. As per the taxonomic classification, the soils of Karnataka are grouped into7 orders, 12 sub-orders, 27 great groups, 47 subgroups and 96 soil families (Ministry of Agriculture, GoK, 2018-19). Of the total area of Karnataka, 37 per cent is covered with red soil, 28 per cent with block soil, 16 per cent with alluvial - colluvial soil, 7 per cent with lateritic, 5 per cent with forest soil, 4 per cent with coastal soil and 3 per cent with miscellaneous soils.

4.1.7 Land utilization pattern

The purpose of land utilization pattern is to understand the idea of extent to which the land has been put to different uses such as the forests, agriculture, horticulture, built up area, and open spaces. Of the total geographical area of state around 64 per cent of the

total area is under cultivation. Net sown area in the state is 99.23 lakh ha and area of 23.43 lakh ha is put to cultivation more than once in a year. Therefore, the gross cropped area is 122.66 lakh ha. The cropping intensity is 121.30 per cent. The state has an area of 30.73 lakh ha under forest cover, 7.86 lakh ha as barren and uncultivable land, 14.43 lakh ha land put to non-agriculture uses, 4.10 lakh ha as cultivable waste land, 9.06 lakh ha under permanent pasture and 2.81 lakh ha under miscellaneous tree crops, groves. (ASCR 2018-19, DES)

4.1.8 Agricultural profile and cropping pattern

About 64.00 per cent of total geographical area of the state is under cultivation. Agriculture is characterized by vast stretches of drought prone area and sporadic patches of irrigated area. It is mainly dependent on the southwest monsoon and only 27.60 per cent of the total cultivable area is under irrigation (Agricultural Profile of Karnataka 2019).

Karnataka is the largest producer of coffee, raw silk and sandalwood based products like perfumes and 75 per cent of Indian floriculture industry is located in Karnataka. The state accounts for 59 per cent of the country's coffee production and 47 percent of the country's ragi production. About 70 per cent of the people live in the villages and 71 per cent of the total work force is engaged in agriculture. Jowar, Bajra, and pulses (Tur and gram) and oil seeds are largely grown in the drier areas of northern dry zone and north-central zone of Karnataka. Cotton is grown in abundance in Gulbarga district and Davangere district is a center of cotton trade and industry.

Farmers in the state grow different field crops like cereals, pulses, oilseeds and annual crops to meet their food requirements and to raise the income levels from the land and also to maintain the fertility status of the soil. The state cropping pattern is mainly dominated by cereals. Area under food grains is 74.96 lakh ha, which comprises 50.02 lakh ha under cereals and 24.94 lakh ha area under pulses production. In cereals, area under rice is more followed by maize, jowar and other crops. Cultivation of oil seed is in14.14 lakh ha area in the state. In which Bengal gram, tur and green gram are major. About 14.40 lakh ha area under annual crop, in which area under cotton is more (ASCR 2018-19, DES).

4.1.9 Dairy farming

Karnataka is one of the progressive dairying states in the country and is eleventh largest milk producing state. The state has good network of dairy co-operatives fostering rural milk procurement and liquid milk sale. The Karnataka Cooperative Milk Producers' Federation Limited (KMF) is the apex body for the dairy co-operative movement in Karnataka. It is the second largest dairy cooperative amongst the dairy cooperatives in the country. In southern part of India, it stands first in terms of procurement as well as sales. One of the core functions of the KMF is marketing of milk and milk products. The brand "Nandini" is the household name for Pure and Fresh milk and milk products. KMF has 14 Milk Unions covering all the districts of the state which procure milk from primary dairy cooperative societies (DCS) and distribute milk to the consumers in various towns/cities/rural markets in Karnataka.

CHAPTER –5

Results and Discussion

CHAPTER-V
RESULTS AND DISCUSSION

The discussions the salient findings of study were presented under the following broad sections.

5.1 Socio-economic profile of sample dairy farmers

5.2 Production level of milk and milk products

5.3 Cost and returns of milk production

5.4 Marketed surplus and factors affecting it and marketing efficiency of milk

5.5 Utilization pattern of milk and milk products

5.1 Socio-economic profile of sample dairy farmers

Socio-economic profile of the sampled households for the study area is quite pertinent before the interpretation of the salient findings of the study. This has been shown as pre-requisite for decision making process that would affect the profitability of the dairy enterprise. Hence, this section throws light on some basic socio-economic profiles like family composition of sample households, educational status of household heads, herd sizes, main and subsidiary occupations, land holdings across different herd categories. Land, being the resource base for the production activities, it determines the level of production as well as income of the farmers. Educational status of the sample households' heads is a useful factor for determining the level of adoption of different scientific management practices. The important socio-economic characteristics of the sample households were discussed in the present section.

The primary data had been collected from the randomly selected 100 households from four villages selected from two districts of Karnataka. The households were stratified into three categories by using cumulative square root frequency method. The total 100 sample households had been distributed as 15 small herd size dairy farmers (2-11 milch animals), 24 medium herd size dairy farmers (11-15 milch animals) and 61 large herd size dairy farmers (16 and more milch animals) categories. The data collected had been analyzed and interpreted as per different herd size categories of dairy farmers as well as overall.

Table 5.1 provides an idea about the distribution of the dairy farmers across the herd size categories in terms of the Standard Animal Units (SAUs) as suggested by Sirohi *et al.* (2015) approach for the northern region of India.

Table 5.1: Distribution of sample households across herd size categories (N = 100)

Particular	Herd size (SAUs)		
	Small (2-11)	**Medium (11-15)**	**Large (16-24)**
Farms	15 (15)	24 (24)	61 (61)
SAU per farm	9.66	12.70	18.50
Milch SAU per farm	6.25	9.60	13.50

(Figures within parentheses indicate percentage to total 100 sample households)

Table 5.1 indicates that the number of small, medium and large herd size dairy farmers in the sample households were 15, 24 and 61, respectively. The large herd size farmers were found to constitute a major portion (61%) of sample size, followed by medium (24%) and small farmers (15%).

5.1.2 Family size of sample households

The family size of the farm household is useful to assess the contribution of family labour in dairy farming. Table 5.2 portrayed the information on family composition of the sample households across different herd size categories. The average family size was found to be highest in case of large farmers (5.27 members), followed by small (4.86 members) and then medium (4.70 members) farmers. Overall family size was estimated to be 4.88 members including 73.69 per cent of adult and 26.31 per cent of children. The highest adult male population was present in the small herd size category and highest female adult population was present in large herd size category. The highest male child population present in the small herd size category and highest female child population was observed in large herd size category.

The results obtained regarding the cost of production and net return per liter of milk was found to be similar with the studies conducted by Vanishree (2018) and Athare (2019).

Table 5.2: Family size composition across herd size (N = 100)

Category/items	Adult (>18 years)		Children (≤18 years)		Total
	Male	Female	Male	Female	
Small	1.83 (37.66)	1.66 (34.13)	0.98 (20.18)	0.39 (8.03)	4.86 (100)
Medium	1.75 (37.23)	1.69 (35.96)	0.86 (18.30)	0.40 (8.50)	4.70 (100)
Large	1.87 (35.44)	2.00 (37.97)	0.67 (12.66)	0.73 (13.92)	5.27 (100)
Overall	1.82 (37.18)	1.78 (36.51)	0.84 (17.12)	0.45 (9.19)	4.88 (100)

(Figure in parentheses indicate percentage)

5.1.3 Educational status of the head of the households

The educational status of the head of sample households determines the level of adoption of various scientific management practices and innovative technologies. Education level of a farmer is directly related with his motivation towards adoption of recent technologies. Various decision-making strategies viz. resource utilization, input management, production system as well as efficient marketing of the products are determined by the education of the farmers. The level of education of the sample households across different herd size categories were represented in Table 5.3. It was understood that 13.00per cent of the head of the sample households were found to be illiterate, 47.00 per cent had studied up to primary level, 22.00 per cent had completed secondary level, 11.00 per cent had studied up to higher secondary level and 7.00 per cent of head of the households were educated up to graduation level. Thus, it can be understood that the majority of the head of the sample households had completed their education up to secondary level.

Table 5.3: Education status of head of the sample households across herd size (Freq)

(N = 100)

Category	Small	Medium	Large	Overall
Illiterate	5 (33.33)	3 (12.50)	5 (8.20)	13 (13)
Primary	6 (40)	6 (40)	35 (57.38)	47 (47)
Secondary	1 (6.67)	6 (25)	15 (24.59)	22 (22)
Higher Secondary	2 (13.33)	6 (25)	3 (4.92)	11 (11)
Graduate & above	1 (6.67)	3 (12.50)	3 (4.92)	7 (7)
Total	15 (100)	24 (100)	61 (100)	100 (100)

(Figure in parentheses indicate percentage)

5.1.4 Occupation of the sample farmers

The occupation status of the sample households is considered as useful for analyzing the extent of adoption of dairy farming as a main or subsidiary occupation in the study area. Table 5.4 provided the information regarding the occupational status of the sample households. Dairy was found to be the major occupation of the sample households (47 farmers) and mostly the farmers had adopted farming as their subsidiary occupation (32 farmers). Some farmers had also adopted business (2 farmers) and services (1 farmer) as their major occupations.

It was observed from the category wise comparison that in case of all the three herd size categories, dairy was practiced as the major occupation. It was estimated to be 46.15 per cent, 33.33 per cent and 43.90 per cent in case of small, medium and large herd size categories, respectively.

Among the subsidiary occupations, overall, 41.25 per cent of the households adopted dairying followed by agriculture (31.25%), agriculture labour (10%), business

(7.50%) and services (5.00 %) The results obtained regarding the cost of production and net return per liter of milk was found to be similar with the studies conducted by Vanishree (2018) and Athare (2019).

Table 5.4: Occupation status of sample households **(N = 100)**

Main	Agriculture	5 (38.46)	7 (44.44)	20 (41.46)	32 (43.06)
	Dairy	5 (46.15)	6.00 (33.33)	35 (43.90)	46 (40.28)
	Agriculture labour	1 (0)	0 (5.56)	1 (0.00)	2 (1.39)
	Business	0 (7.69)	2 (11.11)	0 (9.76)	2 (9.72)
	Rural artisans	0 (7.69)	1 (0)	0 (2.44)	1 (2.78)
	Service	0 (0)	1 (0)	1 (2.44)	1 (1.39)
	Other	0 (0)	1 (5.56)	0 (0)	1 (1.39)
	Total	11 (100)	17 (100)	57 (100)	85 (100)
Subsidiary	Agriculture	3 (35)	4 (32)	2 (28.57)	9 (31.25)
	Dairy	1 (55)	0 (44)	0 (31.43)	1 (41.25)
	Agriculture labour	0 (10)	0 (8)	1 (11.43)	1 (10)
	Business	0 (0)	2 (8)	0 (11.43)	2 (7.50)
	Rural artisans	0 (0)	0 (0)	0 (8.57)	0 (3.75)
	Service	0 (0)	1 (8)	0 (5.71)	1 (5)
	Other	0 (0)	0 (0)	1 (2.86)	1 (1.25)
	Total	4 (100)	7 (100)	4 (100)	15 (100)

(Figure in parentheses indicate percentage to total)

5.1.5 Lactation length of the crossbred cow, buffalo and local cow.

In case of buffalo the calving interval should be about 12-13 months, with a lactation length of about 300 days, and 60 to 90-day dry period, and milk production 6000-7000 kg per lactation. In crossbred cow calving interval should be about 10-12 months, with a lactation length of about 240-280 days and 40 to 50 days dry period. And milk production is average 8000 kg per lactation. In case of local cow, the lactation length of about 300 days.

5.1.6 Land holding pattern of sample households

The average size of operational land holding in the study area was 3.73 ha with 3.15 ha being in case of small category of households and 4.70 ha in case of large category of households. In case of small farmers out of 3.15 ha they used 2.48 ha for crop production and 0.67 ha used for fodder production. Where as in case of medium category total operational land 3.34 ha from this land 2.72 ha was used for crop production and 0.62 ha was used for fodder production. In case of large category total operational land 4.70 ha from this land 3.62 ha was used for crop production further land was used for fodder production. The results obtained regarding the Land holding pattern of sample households was found to be similar with the studies conducted by Sharif (2014) and Priscilla (2017).

Table 5.5: Land holding pattern of sample households (Hectare)

Category	Areas under crop production	Area under fodder production	Total
Small	2.48	0.67	3.15
Medium	2.72	0.62	3.34
Large	3.62	1.08	4.70
Overall	2.94	0.80	3.73

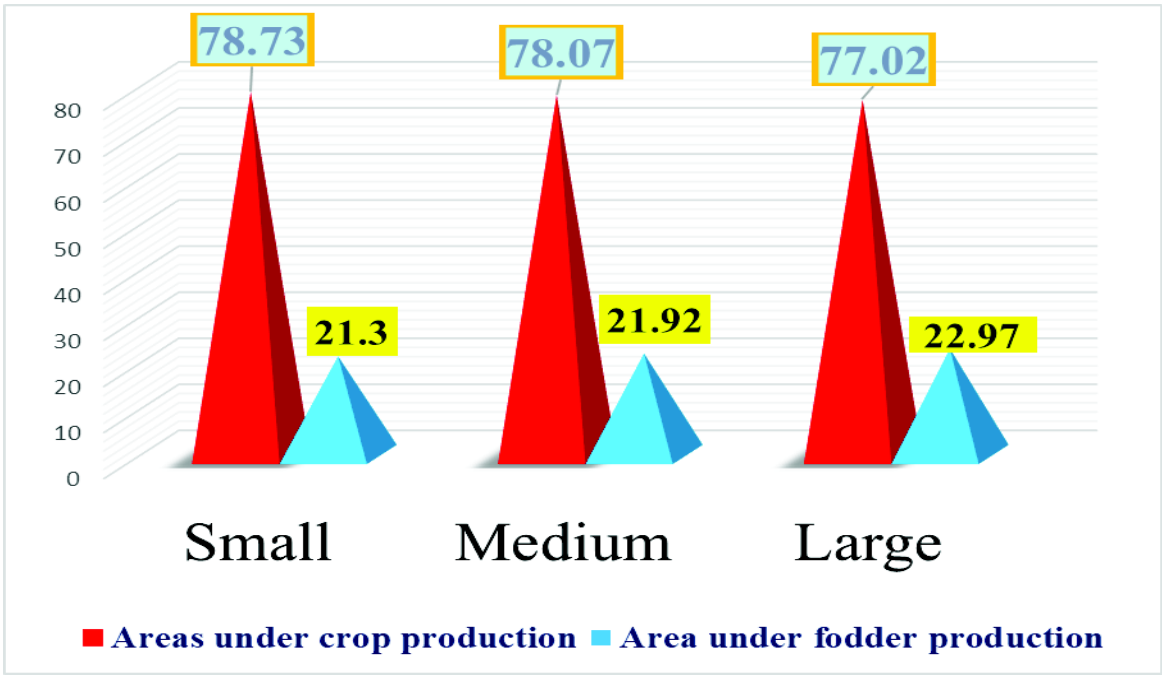

Figure 5.1: Land holding pattern of sample households (%)

5.2 Production level of milk and milk products

The number of in milk animals in the state had taken from recent livestock census. The yield of the animals was calculated by using weighted average method. Production level of the milk for the study area calculated by multiplying the number of in milk animals with the average yield of the animals. The total milk production in the study area was about 22.12 lakh liters per day (LLPD), the Mandya district was found to be the dominant producer which contributed about 80 percent of the total milk (17.52 LLPD), followed by Dharwad district (4.60 LLPD). Mandya district dairy farmers were rearing maximum number of crossbred animals. The average productivity of crossbred and buffalo for Mandya district was higher as compared to Dharwad district.

Table 5.6: Level of milk production (Liter/day)

Animal type	Dharwad			Mandya			Overall		
	No of in milk animals	Yield (Ltr/animal /day)	Prod. (LLPD)	No of in milk animals	Yield (Ltr/animal /day)	Prod. (LLPD)	No of in milk animals	Yield (Ltr/animal /day)	Prod. (LLPD)
Crossbred	33158	8.31	2.76	156053	9.24	14.42	189211	8.77	17.18
Buffalo	24691	5.114	1.26	49880	5.82	2.90	74571	5.46	4.16
Local cow	14682	3.96	0.58	5492	3.60	0.20	20174	3.78	0.78
Total	72531		4.60	205933		17.52	283956		22.12

From the table 5.6 it was obtained that yield obtained from crossbred cow was found to be highest, followed by buffalo and local cows. Overall average yield from crossbred was 8.77 liter/day *i.e.* 8.31 liter/day in Dharwad and 9.24 liter/day in Mandya district. Overall milk yield obtained from buffalo and local cows was found to be 5.46 liter and 3.78 liter per day. The results obtained regarding the Level of milk production was found to be similar with the studies conducted Ghule (2010), Khoveio (2011) and Athare (2019).

Table 5.7: Level of milk production in Karnataka (Liters/day)

Animal type	Karnataka		
	No of milking animals	Yield (Ltr/animal /day)	Production (LLPD)
Crossbred	1240415	8.77	108.8
Buffalo	67137	5.46	3.66
Local cow	1248440	3.78	47.20
Total	2555992		158.86

Total level of milk production in Karnataka was found to be 158.86 LLPD, more than half of the milk production solely comes from crossbred animal which produced 108.8 LLPD. Total milk produced by buffalo and local cow was found to be 3.66 and 47.20 LLPD, respectively.

Daily production level of milk and milk products in five dairy processing plants of the study area was presented in the above table. From the above table, it was observed that Dharwad milk union was the highest milk procuring plant with a milk procurement level of 2,71,146 liter on daily basis, followed by Ram Rahim dairy (43,600 liter/day) and Aditya dairy (20,970 liter/day). Highest quantity of milk was observed to be marketed in the form of liquid milk by the five processing plants. The processing plants located in Dharwad region *i.e.* Ram Rahim dairy, Aditya dairy and Dharwad milk union processed more milk for the preparation of Peda due to higher demand of this sweets Peda in the Northern region of Karnataka. Higher quantity of milk was used for preparation of Mysore Pak particularly by Dayananda dairy and Nandhishwar dairy *i.e.* the dairy plants located in Southern Karnataka region.

Table 5.8: Production level of milk products (Liter/day)

Processing plants	Total milk collection (ltr)	Liquid milk	Butter	Ghee	Peda	Mysore Pak	Curd	Paneer	Kunda
Ram Rahim Dairy	43600	16200 (37.16)	1400 (3.21)	7500 (17.20)	9000 (20.64)	2500 (5.73)	6500 (14.91)	-	500 (1.15)
Aditya Dairy	20970	13070 (62.33)	2250 (10.73)	625 (2.98)	2500 (11.92)	375 (1.79)	950 (4.53)	-	1200 (5.72)
Nandishwara Dairy	15500	8700 (56.13)	1500 (9.68)	1250 (8.06)	750 (4.84)	1500 (9.68)	1050 (6.77)	-	750 (4.84)
Dayananda Dairy	18820	11750 (62.43	1250 (6.64)	820 (4.36)	550 (2.92)	3500 (18.60)	400 (2.13)	-	550 (2.92
Dharwad milk union	271146	185146 (68.28)	32500 (11.99)	7500 (2.77)	35000 (12.91)	2500 (0.92)	6500 (2.40)	1500 (0.55)	500 (0.18)

Table 5.9: Per capita availability (Liter/day)

Category/items	Small	Medium	Large
Average milk production of household	33.80	45.18	66.26
Average number of people in households	4.86	4.70	5.27
Per capita production of milk	6.95	9.61	12.57

The per capita per day milk production for small, medium and large farmers were found to be 6.95-liter, 9.61 liter and 12.57 liter, respectively. Per capita milk production for large was higher than medium and small herd size categories. Since large farmers had greater number of milch animals as per their good experience of rearing the animals and modern dairy farming practices.

5.3 Cost and returns of milk production

Analysis of costs and returns of milk production of different categories of herd had been observed as an important aspect of dairy enterprise because it determined the productivity and profitability of the enterprise. It also helps in decision making process and policy formulations to maximize the profit with proper utilization of the available resources. Estimation of the cost component indicates whether or not the farmers are being able to earn remunerative prices from the dairy business. There is a lot of scope for undertaking dairy business as a sole or subsidiary enterprise as it provides a continuous source of income to the farmer throughout the year. Therefore, taking these things into consideration, appropriate methodology was used for the estimation of costs and returns from local cow, crossbred and buffaloes. Several climatic and biological components such as temperature, rainfall and genetic potential of animal's act as limiting factors for enhancing the productivity of the dairy animals. Hence, the only scope to increase the income of the dairy farmers is to reduce the cost of milk production in order to maximize the profit. Profit maximization *via* cost minimization can be achieved by efficient utilization of available resources. Cost and returns of milk production were estimated on the daily basis.

5.3.1 Costs and returns of milk production for crossbred cow

Table 5.10 indicated that the overall gross maintenance cost of crossbred cows varied from ₹183.97 per day for small herd size category to ₹189.77 per day for large herd size category farmers and the overall gross maintenance cost was found to be ₹187.43 per day.

The overall total fixed cost was estimated to be ₹22.86per day which contributed about 12.19 per cent of overall gross cost. The total fixed cost was found to be ₹23.08, ₹22.35 and ₹23.18 for small, medium and large herd size categories, respectively. The percentage contribution of total fixed cost to the gross cost was found to be 12.55 per cent, 11.77 per cent and 12.21 per cent to their individual herd size categories, respectively. The total variable cost was worked out to be ₹160.89, ₹167.51 and ₹166.59 per day with a percentage contribution of 87.45 per cent, 88.23 per cent and 87.79 per cent to the gross cost for small, medium and large herd size categories, respectively. The overall total variable cost was estimated to be ₹164.57 and contribution of total variable cost to the gross cost was found to be 87.81 per cent. The share of total variable cost to the gross maintenance cost (87.81 %) was found to be higher than that of the total fixed cost (13.94 %). The results obtained regarding the per cent share of total fixed cost and total variable cost to the gross maintenance cost was found to be in conformity with earlier research conducted by Vanishree (2018), Vishnoi *et al*. (2014), Nagrale (2011) and Athare (2019).

From the table 5.10, it was seen that the overall feed and fodder cost constituted a major portion of about 71.23 per cent of the gross cost. Total feed and fodder cost varied from ₹125.80 (75.52 %) per day in case of large herd size category to ₹111.53 (69.32%) per day for small herd size category. Apart from the feed and fodder, the concentrates occupied a major share of 39.41 per cent in the gross cost, followed by dry fodder (32.78%) and green fodder (27.82%). The overall labour cost was estimated to be ₹36.63 per day with a share of 22.26 per cent to the variable cost and it was found to be highest for large herd size category (18.91%) and lowest in case of small herd size category (24.24%).

The cost of milk production was worked out to be ₹27.73, ₹27 and ₹27.98 per liter of milk in case of small, medium and large herd size category, respectively. The overall cost of production was estimated to be ₹27.56 per liter of milk. Net return was found to be positive for all the categories of households.

Table 5.10: Costs and returns of milk production for crossbred cow (₹/animal/day)

Particulars	Small	Medium	Large	Overall
Green fodder (F1)	29.20 (26.18)	33.20 (28.20)	37.37 (29.70)	32.61 (27.82)
Dry fodder (F2)	38.69 (34.69)	37.66 (31.98)	39.02 (31.02)	38.42 (32.78)
Concentrate (F3)	43.64 (39.13)	46.89 (39.82)	49.41 (39.28)	46.19 (39.41)
Feed and fodder cost (V1=F1+F2+F3)	111.53 (69.32)	117.76 (70.30)	125.80 (75.52)	117.252 (71.23)
Labour cost (V2)	39 (24.24)	37.56 (22.42)	31.50 (18.91)	36.63 (22.26)
Veterinary & Miscellaneous cost (V3)	10.36 (6.44)	12.19 (7.28)	9.29 (5.58)	10.72 (6.51)
Total Variable Cost (TVC=V1+V2+V3)	160.89 (87.45)	167.51 (88.23)	166.59 (87.79)	164.57 (87.81)
Total Fixed Cost (TFC)	23.08 (12.55)	22.35 (11.77)	23.18 (12.21)	22.86 (12.19)
Gross Cost (A=TFC+TVC)	183.97	189.86	189.77	187.43
Value of Dung (B)	23.74	23.34	24.76	23.86
Net Cost (C=A-B)	160.23	166.5	165.00	163.57
Average milk production (liter/animal/day) (E)	8.42	8.56	8.45	8.47
Price of milk (₹/liter)	27.73	27	27.98	27.56
Gross Return (D)	233.51	231.34	236.60	233.54
Net Returns (D-C)	73.28	64.83	71.61	69.98
Cost of milk production (₹/liter) (C/E)	19.03	19.46	19.51	19.30
Net Returns (₹/liter) (D/E)	8.70	7.58	8.47	8.26

The net return per liter of milk was worked out to be ₹8.70, ₹7.58 and ₹8.47 in case of small, medium and large herd size categories, respectively and overall net return was estimated to be ₹8.26 per liter of milk. The net returns from all the three categories of households were found to be varying with the herd size. Highest net return obtained in case of small herd size followed by medium and large herd size categories. The results obtained regarding the cost of production and net return per liter of milk was found to be similar with the studies conducted by Vanishree (2018), Nagrale (2011) and Athare (2019).

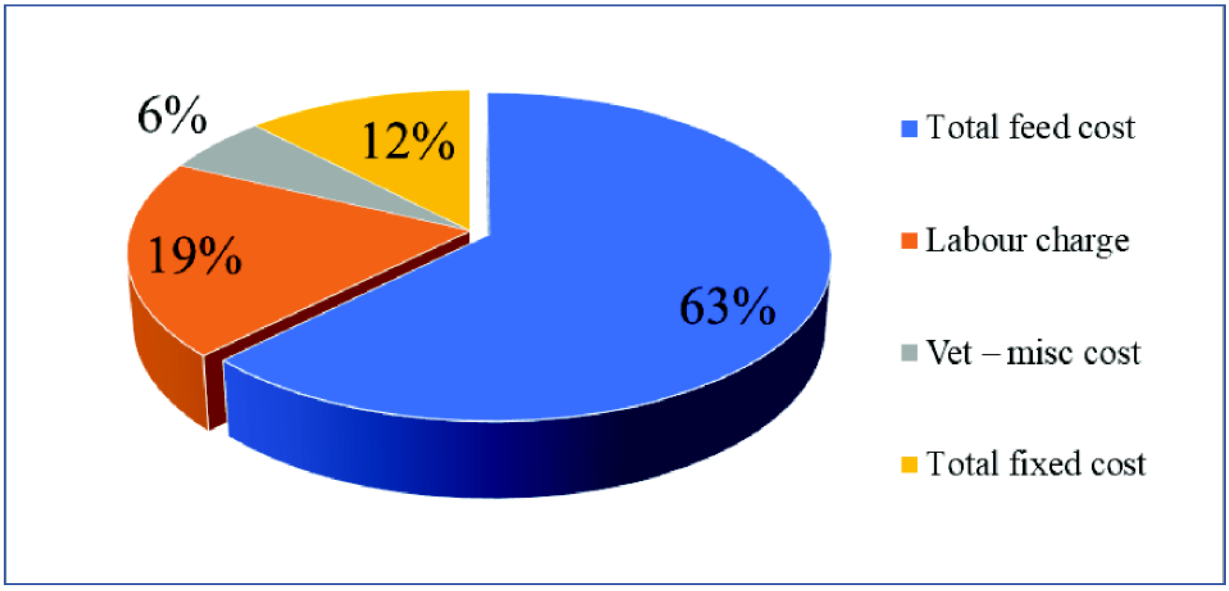

Figure 5.2: Total maintenance cost of crossbred cow

Glimpse of data collection

Glimpse of data collection

5.3.2Costs and returns of milk production for buffalo

Table 5.11showed that the overall total fixed cost for milch buffalo was estimated to be ₹22.86 per day which varied from ₹ 23.08 per day for small herd size category to ₹23.18 per day for large herd size category. The share of overall total fixed cost to the overall gross maintenance cost was found to be 15.22 per cent. The contribution of individual total fixed costs to their respective gross maintenance costs was worked out to be 15.80 per cent, 15.12 per cent and 14.47 per cent for small, medium and large herd size categories, respectively. The total variable cost was estimated to be ₹122.98 per day, ₹125.43 per day and ₹136.95 per day for small, medium and large herd size categories, respectively. The overall total variable cost was ₹127.31 per day which contributed about 84.78 per cent to the gross maintenance cost.

Table 5.11: Costs and returns of milk production for buffalo (₹/animal/day)

Particulars	Small	Medium	Large	Overall
Green fodder (F1)	22.30 (24.82)	24.09 (25.81)	25.33 (24.55)	23.67 (25.08)
Dry Fodder (F2)	24.80 (27.59)	25.62 (27.45)	29.44 (28.53)	29.44 (31.19)
Concentrate (F3)	42.78 (47.60)	43.63 (46.74)	48.41 (46.91)	44.47 (47.12)

Feed and Fodder cost (V1=F1+F2+F3)	89.88 (73.08)	93.33 (74.41)	103.18 (75.34)	94.38 (74.14)
Labour cost (V2)	31.16 (25.34)	30.23 (24.10)	32.00 (23.37)	31.05 (24.39)
Veterinary & Miscellaneous cost (V3)	1.95 (1.58)	1.86 (1.49)	1.77 (1.29)	1.87 (1.47)
Total Variable Cost (TVC=V1+V2+V3)	122.98 (84.20)	125.43 (84.88)	136.95 (85.53)	127.31 (84.78)
Total Fixed Cost (TFC)	23.08 (15.80)	22.35 (15.12)	23.18 (14.47)	22.86 (15.22)
Gross Cost (A=TFC+TVC)	146.07	147.78	160.12	150.17
Value of Dung (B)	18.36	18.26	18.41	18.34
Net Cost (C=A-B)	127.71	129.51	141.71	131.83
Average milk production (liter/animal/day) (E)	4.87	4.85	5.18	4.94
Price of milk (₹/liter)	38.20	37.96	37.96	38.00
Gross Return (D)	186.10	184.20	196.80	189.13
Net Returns (D-C)	58.39	54.69	55.09	56.30
Cost of milk production (₹/liter) (C/E)	26.21	26.69	27.36	26.66
Net Returns (₹/liter) (D/E)	11.99	11.27	11.27	10.64

The overall gross cost for buffalo was estimated to be ₹150.17 per day which varied from ₹146.07 in case of small herd size to ₹160.12 for large herd size category. Results obtained with respect to the contribution of total fixed cost and total variable cost to the gross cost was found to be on conformity with earlier studies conducted by Singh (2013), Makarabbi (2016), Lal (2016), Patibandla L. (2018) and Athare (2019).

It is found from the above table that the overall feed and fodder cost was estimated to be ₹94.38 per day and the contribution of overall feed and fodder cost to the variable cost was found to be 74.14 per cent which varied from 73.08 per cent in small herd size to 75.34 per cent in case of large herd size category. Among the feed and fodder, the contribution of overall green fodder, dry fodder and concentrates to the gross cost was worked out to be 5.07 per cent, 31.19 per cent and 47.71 per cent, respectively. Highest cost share of concentrates was attributed to their high cost and lowest share of green fodders was due to heir high productivity in the study area. The overall labour cost was estimated to be ₹31.05 per day with a contribution of 20.68 per cent to the gross maintenance cost.

The overall cost of production per liter of milk was estimated to be ₹26.66; ₹26.21, ₹26.69 and ₹27.36 per liter in case of small, medium and large herd size categories, respectively. The per liter cost of milk production was found to be negatively related with the herd size due to the economics of scale. The net return per liter of milk production was positive for all the herd size categories. The net return was found to be ₹11.99, ₹11.27 and 11.27 per liter of milk for small, medium and large herd size categories, respectively.

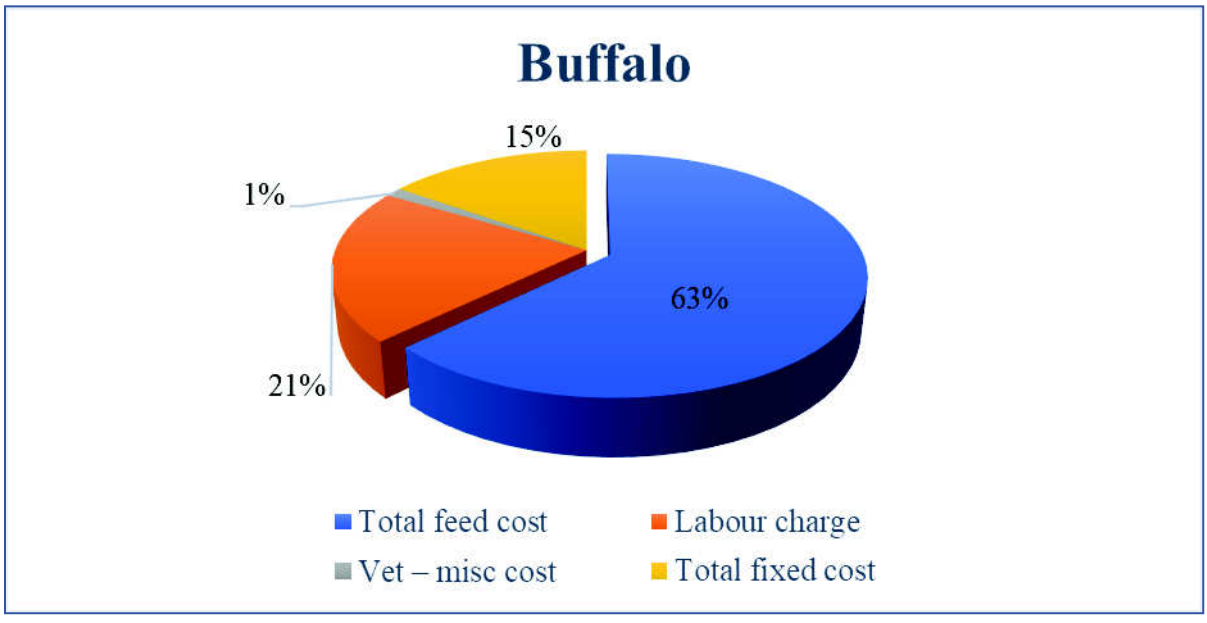

Figure 5.3: Total maintenance cost of buffalo

Glimpse of data collection

5.3.3. Costs and returns of milk production for local cow

Table 5.12 indicates the total costs and returns of milk production obtained from local cow in the study area. Total cost of production comprises of total fixed cost and total variable cost. The overall total fixed cost was estimated to be ₹22.85 per animal per day which accounted for ₹23.08, ₹22.34 and ₹23.17 for small, medium and large herd size category, respectively and it contributed for about 17.66 per cent of overall gross cost. The percentage contribution of fixed cost to the gross cost was found to be for small herd size category (18.27%) and for large herd size category (17.39%). The overall total variable cost was found to be ₹106.54per animal per day which estimated to be ₹103.21, ₹107.95 and ₹110.08 for small, medium and large herd size category, respectively and it accounted for about 82.33 per cent of overall gross cost. The percentage contribution of variable costs to gross cost for individual herd size category *i.e.* small, medium and large were estimated to be 81.72 per cent, 82.84 per cent and 82.60 per cent, respectively. The overall gross maintenance cost was estimated to be ₹129.40 per day which varied from ₹130.29 per day for small herd size category to ₹ 133.26 per day for medium size category and ₹133.26 per day for large size category.

From the table 5.12, it is understood that the overall feed and fodder cost constituted a major share for about 72.60 per cent of variable cost which varied from ₹75.23 per day (72.89%) in small herd size category to ₹80.62 per day (73.23%) in case of large herd size category. In feed and fodder, overall share of green fodder, dry fodder and concentrate was found to be 29.68 per cent, 35.75 per cent and 34.60 per cent, respectively. Overall share of labour cost to the gross cost was found to be varied from 20.09 per cent in small herd size category to 20.90 per cent in case of large herd size category. The contribution of both fixed and variable costs to the gross cost are found to be in conformity with the earlier studies conducted by Singh (2015).

In case of cost of milk production, per liter cost of milk production was estimated to be ₹31.26, ₹32.29 and ₹30.98 for small, medium and large herd size categories, respectively. Overall cost of milk production per liter was found to be ₹31.54 per day. Per liter cost of milk production was worked out to be highest in case of medium herd size category followed by small and large size category. The result of cost of production of per liter milk is found to be similar with earlier studies (Bhawar 2019, Makarabbi 2016, Sharif and Dixit 2015).

Table 5.12: Costs and returns of milk production for local cow (₹/animal/day)

Particulars	Small	Medium	Large	Overall
Green Fodder (F1)	22.61 (30.05)	22.77 (29.39)	23.59 (29.26)	22.91 (29.62)
Dry Fodder (F2)	27.76 (36.89)	27.39 (35.35)	27.87 (34.56)	27.66 (35.76)
Concentrate (F3)	24.85 (33.04)	27.32 (35.25)	29.51 (36.16)	26.77 (34.61)
Feed and Fodder cost (V1=F1+F2+F3)	75.23 (72.89)	77.50 (71.79)	80.62 (73.23)	77.35 (72.60)
Labour cost (V2)	26.00 (25.19)	28.05 (26.40)	27.5 (24.98)	27.22 (25.55)
Veterinary & Miscellaneous cost (V3)	1.97 (1.91)	1.94 (1.80)	1.95 (1.78)	1.96 (1.83)
Total Variable Cost (TVC=V1+V2+V3)	103.21 (81.72)	107.95 (82.84)	110.08 (82.60)	106.54 (82.33)
Total Fixed Cost (TFC)	23.08 (18.27)	22.34 (17.15)	23.17 17.39	22.85 17.66
Gross Cost (A=TFC+TVC)	126.29	130.29	133.26	129.40
Value of Dung (B)	17.80	17.29	18.36	17.77
Net Cost (C=A-B)	108.48	113.00	114.89	111.63
Average milk production (liter/animal/day) (E)	3.911	3.75	4.12	3.91
Price of milk (₹/liter)	31.266	32.29	30.98	31.54
Gross Return (D)	122.29	121.38	127.80	123.36
Net Returns (D-C)	13.80	8.38	12.91	11.73
Cost of milk production (₹/liter) (C/E)	27.73	30.06	27.85	28.56
Net Returns (₹/liter) (D/E)	3.53	2.23	3.13	2.98

- As a result of the economics of scale in case of large herd size category, the per liter cost of milk production was found to be lowest in spite of the highest gross cost. The net return obtained from per liter milk in case of all the herd size categories was found to be positive. The overall net return per liter of milk was worked out to be ₹2.98 and it varied from ₹2.23 for medium herd size category to ₹3.53 for small and ₹3.13 for large size category. Hence, the net return from milk production was found to vary with the herd size of the households. Though the net return obtained in case of indigenous cow was less as compared to crossbred and buffalo in the study area, but the farmers preferred to rear indigenous breed viz *khilari, hallikar,* and *amruthmahal* due to broad adaptability to climate vagaries, low maintenance cost. Gross return to cost ratio in case of local cows is less than one (0.95) so there is need to increase the productivity of local cows by adopting proper feeding and management practices in these areas

  The results obtained regarding the cost and returns of milk production in case of indigenous cows was found to be in conformity with the earlier studies conducted by Lal (2016) and Athare (2019), Bhawar (2018) and Makarabbi(2016).

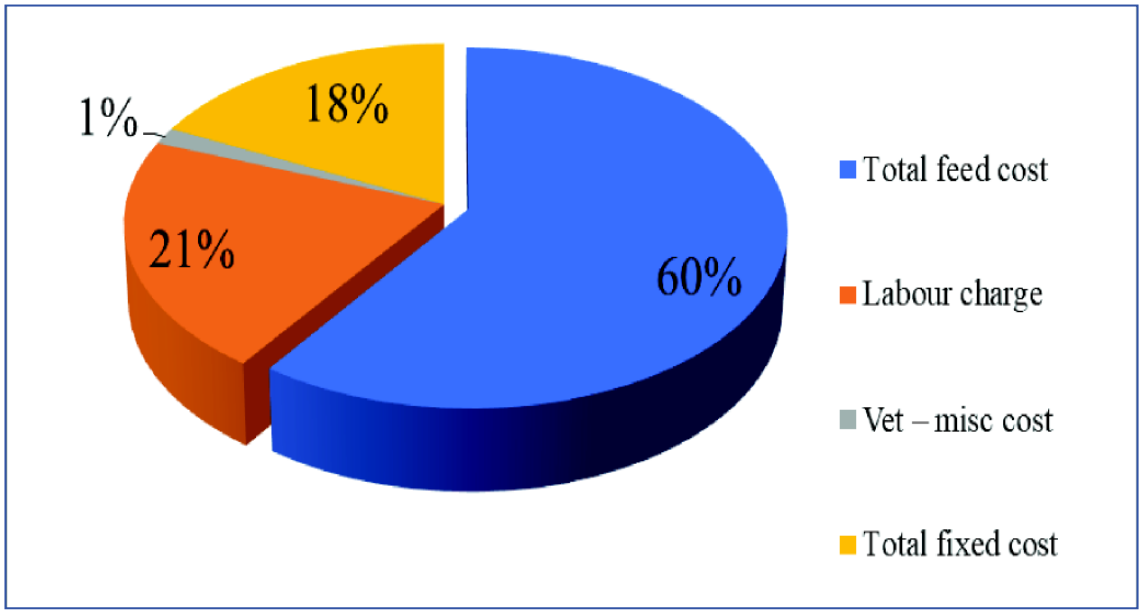

Figure 5.4: Total maintenance cost of local cow

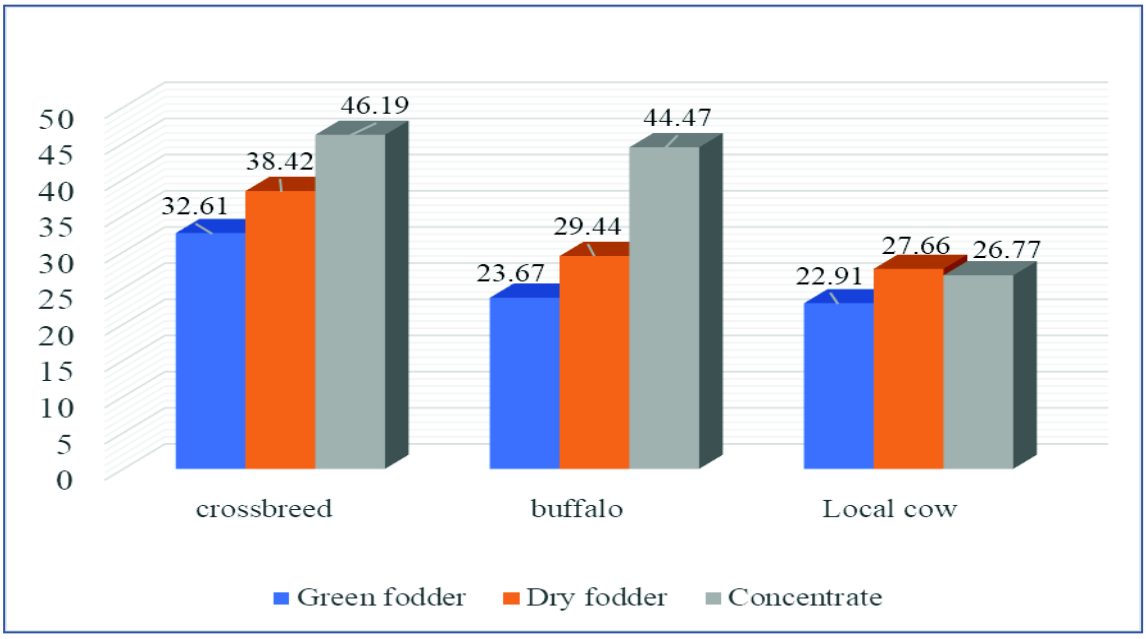

Figure 5.5: Total fodder cost per animal (₹)

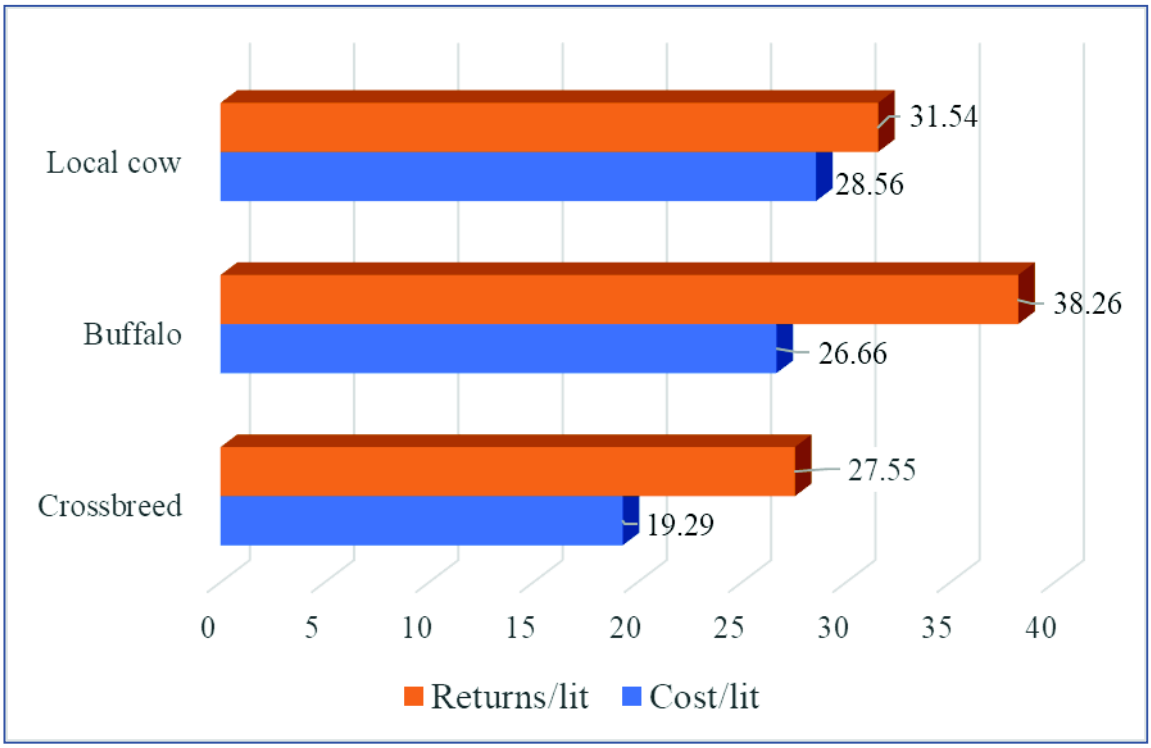

Figure 5.6: Cost and returns per liter of milk (₹)

Glimpse of data collection

5.4 To analyze the marketed surplus, and factors affecting it and marketing efficiency of milk and milk products

Milk is perishable in nature and its shelf-life is very short in unprocessed form. This must therefore be disposed of or converted as soon as possible into different milk products. Marketed surplus is the total quantity of milk delivered for sale into the market. Therefore, farmers of various herd size categories need to identify the contribution and the maximum share in the marketed surplus of milk. For the present study, consideration was given to the number of milk animal assets, family size, land holding, milk production per day, milk price and net return obtained from milk production among various factors influencing the marketed milk surplus. Milk disposal method is the selling of liquid milk through various organized and unorganized sectors after meeting the requirements of household consumption. Successful milk disposal depends on the efficiency of various marketing networks that are involved in the milk marketing network.

This section provides information on household consumption and the marketing surplus of milk, various factors affecting the marketing surplus, the disposal pattern of milk through

various marketing channels, as well as the marketing efficiency of traditional channels involved in the disposal of milk to end users.

Table 5.13: Average daily milk production, consumption and marketed surplus

(Liter/household/day)

Particulars	Average milk production (liter)	Consumption/ Retained (liter)	Marketed surplus (liter)	Proportion of marketed surplus in per household's milk production (%)
Small (2-11)	33.8	6.5	27.3	80.76
Medium (12-15)	45.18	7.85	37.33	82.63
Large (16-27)	66.26	10.5	55.76	84.15
Overall	48.41	8.28	40.13	82.89

Table 5.13 represented the average daily milk production, family consumption and marketed surplus of milk of across different categories of the farmer households. It was evident from the table that the average milk production was estimated to be 33.8, 45.18 and 66.26 liter/household/day for small, medium and large herd size categories and overall average milk production was 48.41 liter. Overall family consumption of milk was worked out to be 8.28 liter per day which varied from 6.5 liter/day in case of small farmers up to 10.5 liter/day for large farmers. As shown in the table, family size had a positive relationship with the average family consumption. The overall average marketed surplus was estimated to be 40.13 liter which varied from 27.3 liter in case of small farmers up to 55.76 in case of large farmers. The overall share of marketed surplus of milk was found to be 82.89 per cent of the total milk production. The share of marketed surplus in total milk production showed an increasing trend with the herd size which was lowest for small herd size category (80.76 per cent) and highest in case of large herd size category (84.15 per cent). Therefore, it is quite evident that the farmers of all the categories consume a little quantity of milk and they dispose of most part of the milk produced.

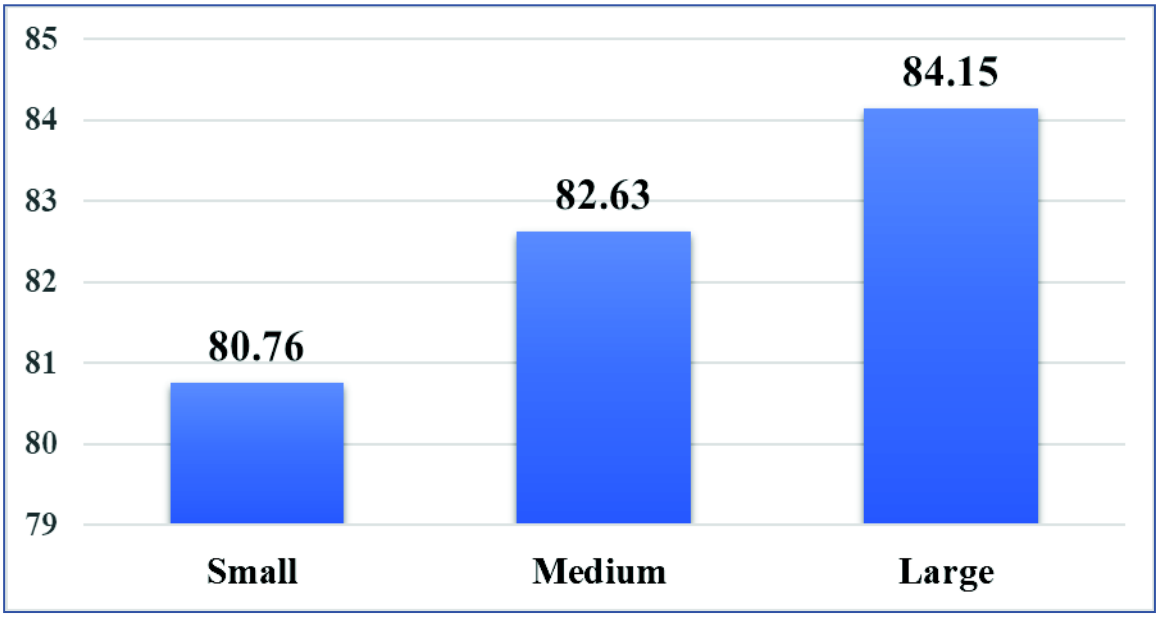

Figure 5.7: Proportion of marketed surplus in per households' milk production (%)

Glimpse of data collection

5.4.2. Factors affecting marketed surplus of milk at farmers' level

A number of factors influencing the marketed surplus of milk across different herd size categories of farmers were identified and fitted into different regression models like linear, log linear and Cobb-Douglas. Linear regression model was found to be the best fit considering the value of coefficient of determination (R^2).

Table 5.14: Regression analysis of marketed surplus.

Variables	Regression coefficient
Constant	-41.56 (70.58)
Family size (numbers)	-0.103* (0.323)
Operational land holding (hectare)	1.273* (0.906)
Herd size (numbers)	1.64* (0.511)
Price of milk received by farmer (₹/lit)	0.98 (2.15)
Education level of household heads (scores)	0.06 (1.41)
Experience of the farmer in dairying (years)	0.22 (0.44)
Milk production per day (liter)	2.30 (1.23)
Income of the farmer (thousands)	-0.04 (0.03)
R^2	0.722

(Figure in parenthesis indicate the standard error of regression coefficient)

* Significant ($p<0.05$); ** Significant ($p<0.01$).

From the Table 5.14, it understood that value of the coefficient of multiple determination (R^2) was 0.722 which means only 72.20 per cent of the total variation in marketed surplus of milk was explained by the variables included in the regression model.

The herd size was found to be statistically most significant factor ($p<0.05$) influencing the marketed surplus of milk. One number of animal increase in the herd size resulted in an increase in marketed surplus of milk by 1.64 liter. This is due to the fact that farmers of all the categories mainly concerned to sale a major portion of the total milk produced.

It was also found that the regression coefficient of price per liter of milk was found to be significant ($p<0.05$). One per cent changes in the price of milk resulted in a change in the marketed surplus by 0.98 per cent, for which farmers tend to spare more milk for sale in order to obtain higher income from the dairy enterprise.

In the study area, it was observed that the large farmers were having highest share of marketed surplus of milk in total quantity of milk production (84.15%) as they were gaining highest net return per liter of milk marketed.

The size of operational land holding was reported to show a positive and significant influence ($p<0.05$) on the marketed surplus of milk. One hectare increases in the area of land holding increased the marketed surplus of milk by 1.273 liter. It is due to the fact that if more area will put under fodder cultivation, then the marketed surplus will be enhanced through improvement in milk production.

Family size of the farmer was found to be a significant determinant ($p<0.05$), negatively influencing the marketed surplus. The regression coefficient was found to be -0.103 which means the marketed surplus declined by -0.103 liter upon addition of one member to the family. Due to increase in family size, the family consumption requirement of milk increases which negatively affects the marketed surplus of milk. However, four other determinants *i.e.* education, milk production per day, income of the farmer and experience of the farmer were found to non-significant influence on marketed surplus of milk.

An effective marketing system is crucial for proper milk channeling across different marketing channels, which eventually acts as a means to increase dairy farmers' income levels. Two sectors, i.e. formal or organized, and informal or unorganized marketing sectors, were observed in the study area. The formal sectors composed of dairy cooperative societies (DCS) and private collection centers for milk (PMCC) concerned with the supply of milk

from the producers, transportation to the dairy processing plants and finally marketing of loose milk and packet milk.

The formal sector dealt with a total marketed surplus of about 70.58 per cent of milk. This section deals with the analysis of the informal marketing channels involved in the marketing of milk starting in the study area from the producers to the consumers. The unorganized / informal sector comprised of various market intermediaries, such as creameries, milk vendors, halwaii, etc. The informal sector was found to be concerned about the marketing of around 29.42 per cent of the producers' total marketing surplus milk.

5.4.3 Milk marketing channels

Marketing channel consists of a number of intermediaries through which various commodities are transferred from producer to consumer. Milk marketing channels were categorized into organized or formal and unorganized or informal channels depending upon the intermediaries involved, mode of milk procurement, provision of various assistances to producers as well as the net return obtained by the producers and market intermediaries. The analysis informal marketing sector of milk involving various intermediaries like creameries, and milk vendors has been conducted in this section.

The informal milk marketing channels which were found to be active in the study area are:

1. Producer- Consumer
2. Producer - Creameries - Consumer
3. Producer - Milk Vendor- Consumer
4. Producer- Milk Vendor- Creameries- Consumer
5. Producer- co-operatives- Consumer

The investment pattern of intermediaries, cost incurred and returns obtained by the market intermediaries and marketing efficiency of the marketing channels involved in the study area were also worked out and reported in this section.

5.4.3. Average quantity of raw milk handled in the study area

Data was collected from the market intermediaries by personal interview. They were found to collect milk from other dairy farmers besides the 100 sample milk producers. The average quantity of raw milk handled per day was found to be highest in case of creamery A (208 liters/day) as they were procuring milk directly from the farmers for comparatively less procurement price. On an average, creamery B, vendor A and vendor B were handling 204 liters, 162 liters and 156 liters of milk per day (Table 5.15).

Table 5.15: Quantity of milk handled by different market intermediaries(lit/day)

Market intermediaries	Average quantity of milk (lit/day)
Creamery A	208
Creamery B	204
Vendor A	162
Vendor B	156

5.4.4. Investment pattern of various market intermediaries

Investment on a dairy enterprise depends upon the initial and working capital, scale of business, type of business according to various market intermediaries and different types of equipment's used etc. Average initial investments by different market intermediaries are represented in the Table 5.16.

Table 5.16: Average initial investment by market intermediaries (₹)

Particulars	Investment on		Total
	Vehicles	Equipment's	
Creamery A	37000 (56.92)	28000 (43.07)	65000 (100.00)
Creamery B	37000 (57.82)	27000 (42.18)	64000 (100.00)
Vendor A	46000 (96.47)	1680 (3.53)	47680 (100.00)
Vendor B	50000 (96.75)	1680 (3.25)	51680 (100.00)

(Figures in parentheses indicate percentage of total investment)

5.4.4.1. Investment by creameries

Creameries in the study area were found to collect milk directly from the producers or from the private milk vendors and then further supplied milk to the consumers. They also converted the milk into different products in a small scale and then sold to the local

consumers. The creameries were classified as creamery A and creamery B as per the process of procurement of milk. Creamery A collected milk directly from the farmers, whereas creamery B was found to procure from private milk vendors as per their demand. Total average initial investment of creamery A was worked out to be ₹65000/- which comprised of vehicles (₹37000/-) and equipment's (₹28000/-). The proportion of the average investment on vehicles was found to be higher (56.92%) in comparison to the equipment's (43.07 %). Total average initial investment made by creamery B was estimated to be ₹64000/- out of which ₹37000/- had been invested upon vehicles, whereas ₹27000/- (42.18%) had been invested on equipment's. In case of creameries, the initial investment on equipment's was found to be higher as compared to other intermediaries since they require a large set of equipment's (refrigerator, cheese production lines, blenders, weighing balance, furniture, etc.) for setting up of a creamery unit.

5.4.4.2 Investment by vendors

Private milk vendors are usually engaged in procurement of milk from the producers and supplying the milk directly at the consumers' doorstep or to other market intermediaries involved in the milk marketing chain. In the present study, vendors are classified as vendor A and vendor B. Vendor A was involved in directly supplying the milk to the consumers, whereas vendor B was supplying milk to the creamery units as per their demand. They made various initial investments on vehicles (motorcycles) and equipment's (aluminum or plastic milk cans, weighing balances *etc.*). The average initial investment was found to be higher for vehicles in comparison to equipment's in case of both vendor A and B. Total initial investment in case of vendor A was worked out to be ₹47680/- which comprised of vehicles (₹46000/-) and equipment's (1680/-). The proportion of average investment in case of vendor A on vehicles was estimated to be 96.47 per cent, followed by equipment's (3.53 per cent). Total average initial investment of vendor B was found to be 51680/-, out of which 50000/- and 1680/- were invested on vehicles and equipment's, respectively. The share of vehicles in average initial investment was found to be higher (96.75%) in comparison to equipment's (3.25%).

5.4.5. Costs and returns of milk market intermediaries

Costs and returns obtained by different market intermediaries depend upon their investment, operational expenses as well as scale of marketing of milk. The costs and returns incurred by the market intermediaries involved in informal sector of milk marketing are represented in the Table 5.17.

Table 5.17: Costs and returns incurred by different market intermediaries (₹/liter)

Particulars		Creamery-A	Creamery-B	Vendor-A	Vendor-B
Depreciation	a) Vehicle	0.10	0.10	0.13	0.10
	b) Equipment	0.07	0.09	0	0
Total fixed cost (TFC=A)		0.17	0.19	0.13	0.11
Milk cost (B)		37	37	36.60	35.80
Fuel		0.42	041	1.23	1.04
Electricity		0.23	0.21	0	0
Labour		0.6	0.50	0	0
Miscellaneous		0.24	0.24	0.26	0.30
Total variable cost (TVC=C)		1.49	1.36	1.49	1.34
Milk marketing cost excluding milk cost (D=A+C)		1.66	1.55	1.62	1.15
Total milk marketing cost (B+D)		38.66	38.55	38.22	36.95
Consumer's price		46.80	47	47.80	46.20
Returns		9.80	10	11.20	10.40

5.4.5.1. Costs and returns incurred by the creameries

Creameries involved in milk marketing channels in the study area were classified as creamery A and B depending upon their mode of procurement of milk from farmers and milk vendors, respectively. Creamery A, on an average handled 208 liters of milk per day. The average procurement price of milk for creamery A from the milk producers was ₹37. Fixed cost incurred by creamery A comprised of depreciation values on vehicles and equipment's which were found to be ₹0.17 and ₹0.19 per liter of milk. Total marketing cost was estimated to be ₹1.66 per liter out of which fixed cost was ₹ 0.17 and variable cost was found to be ₹1.49. The total milk marketing cost was worked out to be ₹38.66 and average selling price of milk of creamery A to the consumer was ₹46.80 by which the net return obtained by creamery A was estimated to be ₹9.80 per liter of milk. On an average, creamery B was handling 204liters of milk per day which was procured from the private milk vendors at an average cost of ₹37 per liter of milk. Total marketing cost was estimated to be ₹1.55 per liter of milk which comprised of both fixed costs (₹0.19) and variable costs (₹1.36). The total milk

marketing cost was worked out to be ₹38.55. Average selling price of milk was found to be ₹47 per liter of milk which helped the creamery B to obtain a return of ₹10 per liter of milk.

5.4.5.2. Costs and returns incurred by the milk vendors

Vendors were classified as vendor A and B as per their disposal of milk directly to the consumers or to the creameries in the study area. The average procurement price of vendor A from the farmers was ₹36.60 per liter of milk. Fixed costs and variable costs were estimated to be ₹0.13 and ₹1.49 per liter of milk, respectively. Therefore, the total milk marketing cost per liter was estimated to be ₹1.62 and average selling price of milk was found to be ₹47.80 by which vendor A earned a return of ₹11.20 per liter of milk. Similarly, vendor B was involved in disposal of the milk to some creamery units. The average purchase price of milk by vendor B from the farmers was ₹35.80 and the total marketing cost was estimated to be ₹36.95 per liter of milk. They sold milk to the creameries at a rate of ₹46.20 per liter of milk; hence, earned a return of ₹10.40 per liter of milk marketed.

5.4.6 Producers' share in consumers' rupee

Producers' share in consumers' rupee is defined as the price received by the farmers in terms of the percentage of the price paid by the consumers. The share of producers and other intermediaries in the consumers' price in case of all the four channels involved in milk marketing in the study area is presented in Table 5.18.

Table 5.18: Producers' share in consumers' price in different marketing channels

Intermediaries	Marketing channels				
	Channel-I	Channel-II	Channel-III	Channel-IV	Channel-V
Producer	37 (100.00)	37 (79.05)	36.60 (76.56)	36.20 (73.87)	33.50 (79.76)
Creamery	0	9.8 (20.94)	0	4.80 (9.70)	0
Vendor	0	0	11.20 (23.43)	8 (16.32)	0
Co operative	0	0	0	0	8.50 (20.24)
Consumers' Price	37	46.80	47.80	49.00	42

(Figures in parentheses indicate percentage of consumers' price)

In channel-I, since the milk was directly sold to consumers by the farmers, complete amount of the consumers' price received by the producers *i.e.* ₹37. Therefore, producers' share in consumers' rupee was found to be 100 per cent. In case of channel-II, the average price received by the producer from creamery A was ₹37 and price paid by consumer was ₹46.80. Therefore, producers' share in consumers' rupee was worked out to be 79.05 per cent and the share of creamery A was found to be 20.94 per cent. In channel-III, average price received by the producer from vendor A was ₹36.60 and average price paid by consumers was found to be ₹47.80. In this channel, the producers' share was estimated to be 76.56 per cent and vendor A accounted for a share of 23.43 per cent in consumers' rupee. In case of channel-IV; involving both the creamery B and the vendor B, average price received by the producer was worked out to be ₹36.20 and price paid by the consumer was ₹49.00. Here, the producers' share was worked out to be 73.87 per cent and share of creamery B and vendor B was estimated to be 9.60 per cent and 16.32 per cent of the consumers' rupee, respectively. In case of channel V producers share in consumers rupee was found to be second highest. the average price received by producer from cooperatives was 33.50 and price paid by the consumer was 42. Therefore, producers share in consumers rupee was worked out to be 79.76 per cent and the share of cooperatives was found to be 20.24 per cent.

The producers' share in consumers' rupee was observed to be highest in case of channel-1 (100%) due to absence of any intermediaries and it was least in case of channel-IV (73.87%) due to interference of two intermediaries *i.e.* creamery B and vendor B in the marketing channel. Hence, producers' share in consumers' rupee was found to be varied indirectly with the presence of a number of intermediaries which means that higher is the number of intermediaries throughout the marketing chain, lower will be the producers' share in consumers' rupee.

5.4.7 Price Spread

Price spread is defined as the difference between price paid by the consumer and price received by the producer for an equivalent quantity of a product. It is an effective tool to measure the economic efficiency of marketing system of a commodity. Table 5.19 represents the marketing cost, marketing margin and price spread involved in corresponding milk marketing channels.

In case of channel-I, the price spread was zero due to absence of any intermediaries and direct disposal of milk from producer to consumer (Table 5.19). Price spread was estimated to be ₹14.40, ₹16.20 and ₹17.80 in case of channel-II, channel-III and channel-IV,

channel V respectively. In case of channel-II, creamery A was involved and price spread was found to be (₹14.40).

Table 5.19: Marketing cost, marketing margin & price spread in channels (₹/liter)

Particulars	Marketing channels				
	Channel-I	Channel-II	Channel-III	Channel-IV	Channel-V
Net receipt to producer	37	37	36.60	36.20	33.50
Marketing cost	0	2.60	3.98	5.18	2.70
Marketing margin	0	7.20	12.22	12.62	5.80
Consumers' price	37	46.88	47.80	49.00	42
Price spread	0	8.68	16.20	17.80	8.50

In channel-III, price spread was worked out to be ₹16.20 involving vendor B. It was found to be highest in case of channel-IV due to involvement of both creamery B and vendor B in the marketing process. Therefore, more is the number of intermediaries involved in the marketing channel, higher will be the price spread and lower will be the efficiency of the marketing channel. In case of channel V due to involvement of a smaller number of intermediaries involved, lower will be the price spread and higher will be efficiency compared to the other marketing channels. The marketing cost was found to be highest in case of channel-IV involving creamery B and vendor B (₹5.18), followed by channel-III (₹3.98) and channel–II (₹2.86). Marketing margin was observed highest in case of channel-IV (₹12.62) as compared to channel-III (₹12.22), channel-II (₹11.54) and channel V (₹5.80).

5.4.8 Marketing efficiency of the marketing channels involved in milk marketing

Marketing efficiency is important to analyze the degree of market performance of a commodity. Assessment of marketing efficiency of the marketing channels involved in disposal of milk is essential to improve the performance of the market intermediaries for raising the income level of the farmers and intermediaries as well as consumer satisfaction. Table 5.20 represents the marketing efficiency of different channels involved in informal marketing sector of milk.

Table 5.20: Marketing efficiency for different milk marketing channels

Channels	Marketing cost + Marketing margin	Price received by farmer	Marketing Efficiency
Channel-I	0	37	-
Channel-II	9.80	37	3.77
Channel-III	16.20	36.60	2.25
Channel-IV	17.80	36.20	2.03
Channel-V	8.50	33.50	3.94

The marketing efficiency was estimated to be 3.77, 2.25, 2.03and 3.94 in case of channel-II, channel-III, channel-IV and channel V, respectively. The results indicated that channel-V was most efficient (3.94) and channel-IV was least efficient (2.03) due to involvement of highest number of market intermediaries (creamery B and vendor B). This is due to the fact that efficiency of the marketing channel is indirectly related with the number of market intermediaries involved in the channel. The minimum price received by the farmers (₹33.50/liter) and maximum price paid by the consumers (₹37/liter) in case of channel-IV makes the channel least efficient. The result obtained in case of marketing efficiency of the channels was found to be in accordance with the research conducted by Singh (2015).

5.5 Utilization Pattern of Milk and Milk Products

Milk produced in the farm has multiple uses; either it is consumed as liquid milk or it can be utilized in different ways. In the study area, dairy farmers were found to consume the liquid milk or prepare different types of milk products for their household consumption. Similarly, *halwais* were also observed to procure raw milk directly from the producers or from other market intermediaries and convert the milk into different types of milk products. Finally, the consumers were found to be the end users of the milk products. Therefore, it is imperative to analyze the utilization pattern of milk at milk producers and *halwai* level and milk products at the consumer level.

Table 5.21: Average milk production and family consumption across different herd categories

(liter/household/day)

Herd size category	Average milk production	Average family consumption	Percentage of consumption to production
Small	33.80	6.5	19.23
Medium	45.18	7.85	17.37
Large	66.26	10.5	15.84
Overall	48.41	8.28	17.48

Table 5.21 illustrates the average milk production and family consumption requirement of milk across different herd size categories. Overall milk production was estimated to be 48.41 liter which varied from 33.80 liter in case of small farmers up to 66.26 liter in case of large farmers. Overall family consumption requirement was found to be 8.28liter which comprised of 17.48 per cent of the overall milk production. Family consumption requirement was found to be highest in case of large farmers (10.5 liter), followed by 7.85liter in case of medium farmers and it was least for small farmers (6.5 liter). The share of family consumption to average milk production was reported to be highest in case of small farmers (19.23%) as the small farmers were found to be basically concerned for meeting their daily requirement of milk. The share of family consumption to average milk production was found to be 17.37 per cent and 15.84 per cent in case of medium and large farmers, respectively. This is due to the fact that as the herd size increases, milk yield also increases which supports the farmers to sell more quantity of milk after meeting their family consumption requirements.

The amount of milk retained at home calculated as the difference between milk production and sale. Table 5.21 indicates the total milk retained at home, the manner in which milk is consumed between specific classes. The overall daily average can be calculated from the table 5.21. The quantity of milk retained was 8.26 liters for family consumption on daily basis. Household-wise study showed the average volume of consumed milk increased with the growth in family size.

Table 5.22 Utilization pattern of milk producers (liter/household/day)

Particulars	Quantity of milk retained in (liter)	Milk consumed as liquid milk	Milk converted into	
			Curd	Ghee
Small	6.5	2.14 (32.94)	4.36 (64.23)	0.29 (4.00)
Medium	7.85	2.62 (33.39)	5.23 (62.47)	0.35 (4.40)
Large	10.5	4.6 (43.80)	5.9 (53.12)	0.39 (3.00)
Overall	8.28	3.11 (37.55)	5.16 (58.47)	0.34 (4.15)

(Figures in parenthesis indicate per cent of horizontal total)

Out of the family's total milk retained, 37.55 per cent consumed in liquid form and transformed to curd and ghee by 62.45 per cent. The total volume of milk retained for family use was the highest in the case large herd size (10.5 liters) and lowest for small herd size (6.5 liters). Small size households consume 32.94 per cent as liquid milk along with curd (64.23%) and ghee (4.00%). Large households used 43.80per cent as a liquid milk and converted to curd (56.12%) and ghee (3.00 %).

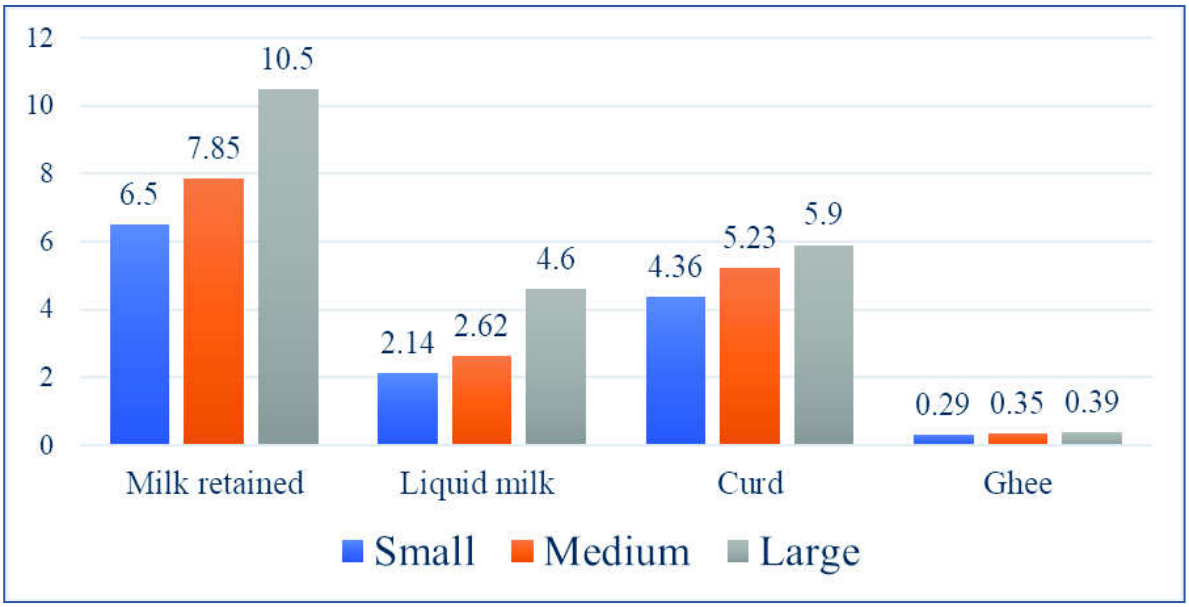

Figure 5.8: Utilization pattern of milk by milk producers (liter/household/day)

5.5.1 Utilization pattern of milk products by the consumers

Consumers were found to be the end users of the milk and milk products marketed by different stakeholders in the study area. Fifty consumers were selected, 25 each from both rural and urban communities to analyze their utilization pattern of milk and milk products (MMPs). The expenses incurred by the consumers for purchasing the MMPs were analyzed and represented in Table 5.23.

Table 5.23: Utilization pattern of milk, milk products and consumers expenses

Milk products	Categories of consumers			
	Rural		Urban	
	Average quantity (liter or kg)	Average expenses (₹)	Average quantity (liter or kg)	Average expenses (₹)
Liquid milk	1.55 (64.31)	65.55 (46.43)	1.30 (57.77)	55.66 (39.17)
Ghee	0.30 (12.44)	33.57 (23.77)	0.17 (7.55)	41.00 (28.85)
Butter	0.05 (2.1)	5.22 (3.69)	0.09 (4)	9.78 (6.88)
Curd	0.42 (17.43)	24.21 (17.14)	0.46 (20.44)	21.01 (14.78)
Lassi	0.027 (1.12)	0.87 (0.61)	0.08 (3.5)	0.76 (0.53)
Sweets	0.06 (2.48)	11.76 (8.32)	0.15 (6.66)	13.89 (9.77)
Total	2.41 (100.00)	141.18 (100.00)	2.25 (100.00)	142.1 (100.00)

(Figures in parenthesis indicate per cent of column total)

From Table 5.23, it concluded that total average consumption of MMPs was estimated to be 2.41 and 2.25 kg per day in case of rural and urban consumers, respectively. Total daily

expenses were estimated to be higher (₹141.18) in case of urban people in comparison to the rural people (₹142.1) due to higher market price of liquid milk and other milk products in urban area as compared to rural area. Liquid milk consumption was found to be higher in urban area (1.30) than the rural area (1.55 liters). Milk utilization in form of liquid milk was observed to constitute highest proportion (65.55%) in case of rural consumers, followed by curd (17.43%), ghee (12.44%), sweets (2.48%), lassi (1.12%) and butter (2.10 %), respectively. Therefore, the average expenses incurred by the rural consumers was found to be highest in case of liquid milk (46.43%), followed by ghee (23.77%), curd (17.14%), sweets (8.32%), butter (3.69%) and lassi (0.61%), respectively.

The urban consumers were utilized highest proportion of milk as liquid milk (57.77%) which comprises of average expenses of 39.17 per cent of total expenses on MMPs, followed by curd (20.44%), ghee (7.55%), sweets (6.66%), butter (4.00 %) and lassi (3.50%), respectively.

CHAPTER –6

Summary and Conclusions

CHAPTER- VI

SUMMARY AND CONCLUSIONS

Keeping in consideration the above points, the research entitled "**PRODUCTION, MARKETING AND UTILIZATION OF MILK AND MILK PRODUCTS IN KARNATAKA - AN ECONOMIC ANALYSIS"** was undertaken with the following specific objectives:

The specific objectives of the study were:

6.1 To estimate production levels of milk and milk products in the study area of Karnataka.

6.2 To calculate the cost and returns of milk production.

6.3 To analyze the marketed surplus and factors affecting it and the marketing efficiency of milk in the study area.

6.4 To determine the utilization pattern of milk and milk products by different end-users.

Karnataka has 10 Agro-Climatic Zones, two zones, namely, Dharwad (Northern dry zone) and Mandya (Southern dry zone) were purposively selected for the present study. One district from each zone i.e., Dharwad district from Northern dry zone and Mandya district from Southern dry zone was selected. From Dharwad district, one block namely Hebballi and another block namely Krishnarajpete from Mandya district was randomly selected. From each block, two villages were randomly selected i.e., Somapur and shivalli from hebballi while Kappanahalli and Ballikeri from Krishnarajpete. A random sample of 100 milk producers cum consumers, 10 milk vendors, 10 creameries, 10halwais,4medium size milk processing plants and 1 large commercial milk processing plant was selected along with50 consumers from nearby urban area. Milk producing sample households were further post- stratified into three herd size categories by using cumulative square root frequency method as:

- Small (2-11milch animals),
- Medium (12-15milch animals) and
- Large (16-24 milch animals)

Primary data collected during 2019-20 was scrutinized and analyzed systematically by adopting a standard analytical framework to meet the different objectives of the present study. The findings emerged from the analysis of the study were presented below.

Salient Findings of the Study:

The empirical findings from the analysis of socio-economic parameters of the milk producing sample households were as follows.

- The average family size across small, medium and large category herd size producer households was found to be 4.86, 4.70 and 5.27, respectively, with an overall average family size of 4.88.
- On an average, about 87.00 per cent of the head of households in the study area were found literate. The proportion of literate head of households showed positive correlation with the herd size i.e., increases with the increase in herd size.
- Overall average size of operational land holding of the sample households was observed to be 3.76 ha, varying from 3.05 ha in case of small herd size category to 4.70 ha in case of large herd size category. The size of land holding had increased with the increase in herd size categories of the milk producers.
- Overall average area under fodder crops (used for growing various fodder crops like berseem, jowar, fodder maize etc.) was 0.82 ha, which was21.81 per cent of the overall operational holding in the study area. Highest percentage of operational area under fodder crops was observed in case of large herd size category households i.e., 22.97 per cent followed by the medium (21.92%) and the large category households (21.30 %).
- The overall average herd size of sample households was 13.62 in the study area. Among various categories of household, large category households had largest average herd size (18.50) followed by medium category (12.70) and small category household (9.66).
- Average milk yield per animal per day of crossbreds was higher among all the three species across all the categories of households. Overall average productivity of indigenous cattle, buffalo and crossbred cows was 3.91, 4.94 and 8.47, respectively.

6.1 To estimate production levels of milk and milk products in the study area of Karnataka

- The total milk production in the study area was found to be 22.12 lakh liters per day (LLPD), the Mandya district was found to be the dominant producer which contributed about 80 percent of the total milk of studied districts (17.52 LLPD), followed by Dharwad district (4.60 LLPD).
- Overall yield from crossbred was found to be 8.77 liter/day *i.e.* 8.31 liter/day in Dharwad and 9.24 liter/day in Mandya district. Overall yield obtained from buffalo and local cows was found to be 5.46 liter and 3.78 liter per day.
- Total level of milk production in Karnataka was found to be 158.86 LLPD, more than half of the milk production contributed by crossbred which produced 108.8 LLPD. Total milk produced by buffalo and local cow was found to be 3.66 and 47.20 LLPD, respectively.

6.2 To calculate Cost and returns of milk production

- Overall total maintenance cost was highest for crossbred cow (₹187.43) followed by buffalo (₹150.17) and indigenous cattle (₹129.40).
- Variable cost accounts for the highest share in total cost of milk production. Overall, it constituted around 87.81 per cent, 84.78 per cent and 82.33 per cent in case of indigenous cattle, buffalo and crossbreds, respectively.
- Among the various cost items, feed and fodder cost accounted for the major share followed by labour cost for all the species of animals across various categories of households.
- Overall cost of milk production per liter was highest for indigenous cattle (₹28.56) followed by buffalo (₹26.66) and crossbreds (₹19.30), respectively.
- On an average, returns from milk production per liter accrued to producer households was highest in case of buffalo (₹11.51) followed by crossbred (₹8.26) and indigenous cow (₹2.98).
- Net returns were found to be positive for all the species of animals across all the category of households.

6.3 To analyze the marketed surplus, and factors affecting it and marketing efficiency of milk and milk products

- Overall marketed surplus of milk was found to be 82.89 per cent and was highest for large category households (84.15 %) followed by medium (82.63 %) and small category households (80.76 %).
- The milk production per animal of sample households was observed to be very responsive, most important, statistically significant ($p<0.01$) and stimulating factor affecting the marketed surplus of milk followed by family size.
- Among the prevailing milk marketing channels in the study area, the following marketing channels were studied.
    - Channel- Ⅰ: Producer – Consumer
    - Channel- Ⅱ: Producer - Creameries- Consumer
    - Channel- Ⅲ: Producer - Milk Vendor - Consumer
    - Channel- Ⅳ: Producer - Milk Vendor - Creameries - Consumer
    - Channel- Ⅴ: Producer – Co-operatives– Consumer
- The average initial investment made by different milk marketing agencies was observed to be highest in case of creameries. Creameries incurred higher proportion of their total investment on vehicle.
- Producer's share in consumer's rupee was observed 100 per cent in case of Channel- Ⅰ because no milk marketing agency was present in this channel.
- Marketing channels where at least one agency was involved in milk marketing was taken into consideration and thus producer's share in consumer's rupee was highest and the price spread was observed to be lowest in case of Channel- Ⅴ, hence, Channel- Ⅴ was considered the most efficient marketing channel of milk and products than Channel- Ⅱ, Channel- Ⅳ and Channel- Ⅲ.

6.4 To determine utilization pattern of milk and milk products

- Overall milk production was estimated to be 48.41 liter which varied from 33.80 liter in case of small farmers up to 66.26 liter in case of large farmers.

- Overall family consumption requirement was found to be 8.28 liter which comprised of 17.48 per cent of the overall milk production.
- The share of family consumption to average milk production was reported to be highest in case of small farmers (19.23%) as the small farmers were found to be basically concerned for meeting their daily requirement of milk.
- Out of the family's daily total milk, total 37.55 per cent Consumed in liquid form and transformed to curd and ghee by 62.45 per cent.
- Total average consumption of MMPs was estimated to be 2.41 and 2.25 kg per day in case of rural and urban consumers, respectively.
- Milk utilization in form of liquid milk was observed to constitute highest proportion (65.55%) in case of rural consumers, followed by curd (17.43%), ghee (12.44%), sweets (2.48%), lassi (1.12%) and butter (2.10%), respectively.

Conclusions:

From the above findings, following conclusions can be drawn as follows:

- In spite of indigenous cattle dominated the bovine stock of Karnataka, crossbred were contributed the maximum quantity of milk among all the species (108.8LLPD), caused may be the lower productivity of indigenous cattle.
- On an average, per liter returns from milk production was highest in case of buffalo (₹11.51) followed by crossbred (₹8.25) and indigenous cow (₹2.98). Net returns were positive for all the species of animals across all the category of households in the study area which indicated the possibility of further increasing the milk production by enhancing the productivity of animals along with remunerative price to farmers.
- Marketed surplus of milk was found to be 82.89 per cent and was highest for large category households (84.15 %) followed by medium (82.63 %) and small category households (80.76 %).
- Marketing efficiency was observed to be highest in case of channel-Ⅴ i.e., Producer–Co-operatives–Consumer while least in case of Channel-IV (Producer - Milk Vendor - Creameries - Consumer). This suggested that the producers should dispose of their milk through those channels in which minimum marketing agencies were involved, i.e., Channel–Ⅴ as it is the best channel which gave higher returns to the producer farmer in comparison to other channels in the study area.

Policy implications:

- Indigenous cattle were found to be dominating the bovine composition of farmers but their productivity was very low so there is need to increase the productivity of indigenous cattle by adopting proper feeding and management practices in these areas.
- Due to seasonal variation in milk production, more milk produced in flush season (June – August) could not be marketed as there was mismatch between demand and supply, but by augmenting the processing facility in the rural areas, milk could be processed to increase shelf life and in turn would provide better price to dairy farmer.
- Inadequate availability of fodder was the major constraint identified in study area. Hence, farmers should be educated about silage practices.
- More than 25 percent of the respondents were selling the milk through various marketing channels other than co-operative structure. Major reason was the distant locations of primary milk producer's co-operative societies in rural areas. Need to establish a greater number of primary milk producer's co-operative societies in nearby producing areas.

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Appendices

APPENDIX

DIVISION OF DAIRY ECONOMICS, STATISTICS & MANAGEMENT
ICAR-NATIONAL DAIRY RESEARCH INSTITUTE
KARNAL-132001 (HARYANA)

PRODUCTION, MARKETING AND UTILIZATION OF MILK AND MILK PRODUCTS IN KARNATAKA - AN ECONOMIC ANALYSIS

M.Sc. Scholar: ***Revappa M Rebasiddanavar***

INTERVIEW SCHEDULE-1 (FOR FARMING HOUSEHOLDS)

S.N…… **Date …….**

Socio Economic Profile of Producer Househol

1.1. Name of the household……

1.2. Address:

Village …….. Block …… Taluk ……. District……

Pin code…… Phone No…… Email……..

1.3. Category- Gen/OBC/SC/ST/Others

1.4. Particulars of family members & their source of income

Name	Relation with head	Age	Education	Occupation (Main)	Experience (years)	Monthly Income (₹)

1.5. Land Holding (Acres)

Particulars	Irrigated	Un Irrigated	Rental Value (₹/year)	Land revenue (₹/year)
Owned				
Leased In				
Leased Out				
Total				

1.6. Cropping Pattern

Name of the Crop	Area	Kharif	Rabi	Zaid (summer)
1.				
2.				
3.				
4.				
5.				
Fodder crop				
6.				
7.				
8.				
9.				
10.				

1.7. Livestock Inventory

Classification of animals		Indigenous Cow			Buffalo			Crossbred		
		No	Value(₹) per animal	Total value	No.	Value(₹) per animal	Total value	No.	Value(₹) per animal	Total value
Adult	In milk									
	Dry									
Heifers	Pregnant									
	Non-pregnant									
Young Stock	Male < 1 yr									
	Male 1-2 yr									
	Female < 1 yr									
	Female 1-2 yr									
Draught animal										
Others										

8. Livestock farm inventory

Sl. no	Particulars of items	No.	Present Worth (₹)	Year of Construction	Cost of Construction /Purchase	Expected useful life (Yrs.)	Expenditure on annual repairs (₹)	Remark (Junk value)
A	Buildings							
	Cattle shed							
	Store for fodder							
	Chaff cutter shed							
	Office							
	Fencing							
	Others							
B	Machinery							
	Cart/trolley							
	Tractor							
	Others							
C	Equipments							
	Feed manger (kachha/ pakka)							
	Water hand pump							
	Buckets							
	Water tubs							
	Milk cans							
	Weight balance							
	Iron chain							
	Milking machine							
	Brickading							
	Electric fixture							
	Milk cooler							
	Tube well							
	Air condition							
	Computer							
	Equipment for milk processing							
	Equipment for semen preparation							
D	Manure							
E	Concentrate							
F	Others							

1.9. Recurring Expenditure (for dairy enterprises)

S.I no.	Item of expenditure	Expenditure (₹)				
	Rent of the stall (mention the period if not owned)					
	Minor repair of the stall and equipments					
	Roof					
	Floor					
	Shed/store					
	Feeding troughs					
	White washing					
	Repair of chaff cutter					
	Repair of cans/utensils					
	Other(specify)					
	Service charges	Animal-1	Animal-2	Animal-3	Animal-4	Animal-5
	Natural					
	Artificial insemination					
	Veterinary charges	Animal-1	Animal-2	Animal-3	Animal-4	Animal-5
	Vaccination					
	Medicine cost					
	Veterinary doctor fees					
	Miscellaneous charges					
	Water					
	Identification tags					
	Electricity					
	Ropes, gunny bags, brooms					
	Basket, stationary charges					
	Fuel					
	Other					
	Municipal / other taxes if any					
	Stall					
	Animals					
	Insurance charges	Animal-1	Animal-2	Animal-3	Aanimal-4	Animal-5
	Animal insurance					
	Fire and hazard insurance					
	Farm vehicle insurance					
	Miscellaneous					
	Total					

1.10. Expenses of feed and fodder

KHARIF

Particulars	Green fodder			Dry Fodder			Concentrate			Mineral mixture		
	Name	Qty. (kg)	Rate (₹)	Name	Qty. (kg)	Rate (₹)	Name	Qty. (kg)	Rate (₹)	Name	Qty	Rate (₹)
Animal-1												
Animal-2												
Animal-3												
Animal-4												
Animal-5												
Home grown feed and fodder												

RABI

	Green fodder			Dry Fodder			Concentrate			Mineral mixture		
	Name	Qty. (kg)	Rate (₹)	Name	Qty (kg)	Rate (₹)	Name	Qty. (kg)	Rate (₹)	Name	Qty	Rate (₹)
Animal-1												
Animal-2												
Animal-3												
Animal-4												
Animal-5												
Home grown feed and fodder												

1.11. Labour utilization (Hours/day)

Operations	Family		Hired		Wages(₹/month)
	Male	Female	Male	Female	
Labour for milking					
Labour for fodder					
Feeding of animals					
Taking animals for grazing					
Giving water					
Handling the animals					
Cleaning animals and shed					
Labour for dung disposal					
Health care					
Selling milk					
Management					
Others					
Permanent labour	Male		Female		

1.12. Production of Milk (lit/day)

Particulars	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Animal-1												
Animal-2												
Animal-3												
Animal-4												
Animal-5												

1.13. Production and marketing of milk and milk products

(A) Milk

Months	**Qty. (In Lit.)**		**Price (₹)**		**Agency**	
	Cow	Buffalo	Cow	buffalo	Cow	buffalo
Jan						
Feb						
Mar						
Apr						
May						
Jun						
Jul						
Aug						
Sept						
Oct						
Nov						
Dec						

(B) Milk products

Products		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Qty.(lit)												
	Price(₹)												
	Agency												
	Qty.(lit)												
	Price(₹)												
	Agency												
	Qty.(lit)												

	Price(₹)												
	Agency												
	Qty.(lit)												
	Price(₹)												
	Agency												
	Qty.(lit)												
	Price(₹)												
	Agency												

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INTERVIEW SCHEDULE- (FOR CREAMERIES)

S.N…… **Date …….**

Socio Economic Profile

5.1. Name……

5.2. Address:
Village …….. Block …… Taluk …….
District……
Pin code…… Phone No…… Email……..

5.3. Category-Gen/OBC/SC/ST/Others

5.4. Particulars of family members & their source of income

Name	Relation with head	Age	Education	Occupation (Main)	Experience (years)	Monthly Income (₹)

5.5.1. Area dimension……

5.5.2. Fixed expenditure

Equipment	Number	Month /year of purchased	Value (₹)	Expected life (yrs)	Junk value (₹)	Annual repairs (₹)	Major repairs (₹)	Change in exp. life

5.7. Variable expenditure

Particulars	Value (₹)
Milk cost	
Electricity cost	
Labour cost	
Fuel cost	
Miscellaneous	

5.8. Collection of milk

Agency		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Qty.(lit)												
	Price(₹)												
	Qty.(lit)												
	Price(₹)												
	Qty.(lit)												
	Price(₹)												
	Qty.(lit)												
	Price(₹)												

5.9. Processing and marketing of milk

Products		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Qty.(lit)												
	Price(₹)												
	Agency												
	Qty.(lit)												
	Price(₹)												
	Agency												
	Qty.(lit)												
	Price(₹)												
	Agency												
	Qty.(lit)												
	Price(₹)												
	Agency												
	Qty.(lit)												
	Price(₹)												
	Agency												

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PRODUCTION, MARKETING AND UTILIZATION OF MILK AND MILK PRODUCTS IN KARNATAKA - AN ECONOMIC ANALYSIS

INTERVIEW SCHEDULE- (FOR MILK COLLECTION CENTRES)

1. Name of the collection centre : ……..
   a) Name of village : ……..
2. Year of establishment : ……..
3. Area of operation : ……..
4. Total members : ……..
5. Quantity of milk procured per day (liters) : ……..
6. Pricing of milk/lit
7. Fat content: ……., SNF content: ……....

6.1. Composition of the membership

S. No	Types	Number
1.	Marginal farmers	
2.	Small farmers	
3.	Big farmers	
5.	Others	
6.	**Total**	

6.2. Inputs and services provided

S. No	Particular	Response	price/unit
1.	Veterinary services		
2.	Cattle feed		
3.	Green fodder seeds		
4.	Consultancy		

6.3. Cost of collection of milk per year

Fixed cost

Fixed assets supplied by plant	Total number of items	Cost per item (₹)
Milk cans		
Furniture		
Machinery and equipment's		
Land and buildings		
Any others		
Total		

Variable cost

Items	Expenditure (₹)
Consumable articles	
Stationary used	
Rent paid	
Wages and salaries paid for labour	
Repairs and maintaince	
Electricity charges	
Any other	
Total	

Total quantity of milk collected per annum (liters) : .....
Cost of collection of per liter of milk (₹ per liter) : .....

Month	Jan	Feb	March	April	May	Jun
Rate (₹ /lit)						
Month	July	August	Sep	Oct	Nov	Dec
Rate (₹ /lit)						

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INTERVIEW SCHEDULE- (FOR COMMERCIAL PLANT)

S.N…… **Date …….**

Profile of the plant:

7.1. Name ……

7.2. Address:

Village …….. Block …… Taluk …….
District……

Pin code…… Phone No…… Email……..

7.3. Capacity of plant (lit/day):

7.4. Man power ……..(a) skilled……(b) Non skilled……..

7.5. Turnover …….

7.6. Utilization percentage of plant:

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilization perc. (%)												

7.7. Collection of milk

Agency		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Qty.(lit)												
	Price(₹)												
	Qty.(lit)												
	Price(₹)												
	Qty.(lit)												
	Price(₹)												
	Qty.(lit)												
	Price(₹)												
	Qty.(lit)												
	Price(₹)												
	Price(₹)												

7.8. Processing and marketing of milk and milk products

Products		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Qty.(lit)												
	Price(₹)												
	Agency												
	Qty.(lit)												
	Price(₹)												
	Agency												
	Qty.(lit)												
	Price(₹)												
	Agency												
	Qty.(lit)												
	Price(₹)												
	Agency												
	Qty.(lit)												
	Price(₹)												
	Agency												
	Qty.(lit)												
	Price(₹)												
	Agency												
	Qty.(lit)												
	Price(₹)												
	Agency												

7.9. Cost of transportation

S. No	Particulars	Salaries/wage of each	Total
1.	No of person employed		
2.	Procurement staff		
3.	Transporters		

S. No	Routes	Distance covered (km/route)	Total quantity of milk transported (liters)	Liters of milk wasted in each route	Penalty levied per liter	Total transportation cost	Transportation cost per liter
1.							
2.							
3.							

7.10. Cost of reception of milk

Total quantity of milk received per day: ……..

1) Fixed cost

S. No	Fixed assets	Units	Cost (₹)
1.			
2.			
3.			
4.			
5.			
No of staff		Salaries (Rs./month)	
No. of labour		Wages	

2) Variable cost

Items	Expenditure (₹)
Electricity bill	
Repair and maintaince	
Lubricant cost	
Cost of spare parts	
Consumable goods	

7.11. Cost of chilling of milk

1) Fixed cost

S. No	Fixed assets	No of item	Cost per item (₹)
1.			
2.			
3.			
4.			
5.			

Rent paid (₹ /year) : …….. Total milk chilled per day (lit) : ……..

2) Variable cost

Items	Expenditure (₹)
Electricity charges	
Water charges	
Fuel charges	
Stationary	
Telephone charges	
Cost of testing material, compressor oil	
Repairs and maintenance	
Labour	
Total	

Transportation cost from chilling center to plant

Payment to each hired insulated tankers: …….No of tankers per day: ……

7.12. Cost of milk processing

1) Variable cost

Items	Expenditure (₹)
Raw material	
Labour charges	
Electricity charge	
Water	
Refrigeration charges	
Items	**Expenditure (₹)**
Repair and maintenance	
Packaging material	
Quality control	
Storage and stationery	
Milk loss	
Sundries expenses	
Supervision and administration	
Others	
Machinery and equipment's	
Buildings	
Any others	

2) Fixed cost

S. No	Fixed assets	No of items	Cost per item (₹)

Total electricity consumption for processing of milk/year (`): ……..

Steam requirement for liquid milk /year: