ECONOMICS OF DAIRYING IN THRISSUR DISTRICT

By

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THESIS

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DECLARATION

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I, hereby declare that the thesis entitled "**Economics of dairying in Thrissur district**" is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree, diploma, fellowship or other similar title, of any other university or society.

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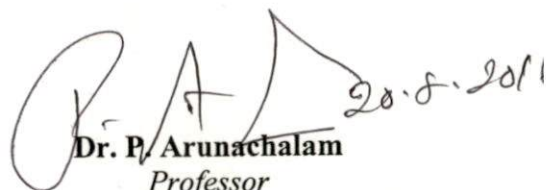*Vellanikkara, Thrissur*
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MILMA	:	Kerala Co-operative Milk Marketing Federation
DDD	:	Dairy Development Department
AHD	:	Animal Husbandry Department
NDDB	:	National Dairy Development Board
PED	:	Productivity Enhancement Department
ANOVA	:	One way Analysis of Variance
CAGR	:	Compound Annual Growth Rate
GOK	:	Government of Kerala
GOI	:	Government of India
FAO	:	Food and Agricultural Organisation
AI	:	Artificial Insemination
APCOS	:	Anand Pattern Co-operative Societies
CMPS	:	Clean Milk Production Scheme
P and I	:	Procurement and Inspection
FSP	:	Food Security Programme
ILDP	:	Integrated Livestock Development Project
MCP	:	Milch Cow Programme
MSDP	:	Milk Shed Development Programme
BCR	:	Benefit Cost Ratio
APL	:	Above Poverty Line
BPL	:	Below Poverty Line

INTRODUCTION

CHAPTER 1

INTRODUCTION

Dairy is a vital part of the global food system providing economic, nutritional and social benefits to a large proportion of the world's population and dairying has become an important secondary source of income for millions of rural families. Thus it has assumed the most important role in providing employment and income generating opportunities for rural population. The advent of dairying has been a boon for dairy farmers and of particular importance to those segments of the society that have been traditionally weak, the small landholders, landless labourers and women. The agriculture, being only seasonal, the dairy industry provides off-season work, steady income and keeps the rural population employed throughout the year. It provides a year-round source of income for people who previously could only depend on payments from small seasonal crops or from occasional labour. Dairying in rural areas surpassed crop production in terms of profit in marginal, small and medium-sized holdings. For small-scale farmers with irrigated land, dairying and crop production together, were more profitable than crop farming alone.

India has the credit of being the largest producer as well as the biggest consumer of milk in the world. It also has the world's largest dairy herd comprising of cows and buffalos. India ranks first in milk production, accounting for 18.5 per cent of world population, achieving an annual output of 146.3 million tonnes during 2014-2015 as compared to 137.69 million tonnes during 2013-2014 recording a growth of 6.26 per cent. The per capita availability of milk in India has increased from 176 grams per day in 1990-91 to 322 grams per day by 2014-2015. It is more than the world average of 294 grams per day during 2013. This represents a sustained growth in the availability of milk for the growing population. (Ministry of Finance, GOI, 2016) The importance of dairying in a country like India hardly needs emphasizing. Indian agriculture is an economic symbiosis of crop and cattle population. The population growth, urbanization, income growth, high income elasticity of demand, and changes in food habits have fuelled the increase in milk consumption. Over the period, dairying has also acquired the contours of a fully-fledged industry in the country and has positively improved the life of those engaged in this business, directly or indirectly, bringing significant socio-economic changes. Though the milk production is growing at 3.3 per cent, consumption is growing at 5 per cent leaving a gap between demand and supply. The current market size of the dairy industry is INR 2.6 trillion and is estimated to grow up to

INR 3.7 trillion by 2015. Among the major states in India, milk production is highest in Uttar Pradesh (225.56 lakh MT) followed by Rajasthan (135.12 lakh MT) and Andhra Pradesh (120.88 lakh MT). Kerala ranks 13th position with 27.16 lakh MT in 2011-12 (Economic Review 2013).

Cattle rearing had been a very popular household based economic activity in Kerala associated with agriculture where the cattle waste was the major input for all types of agriculture and thus even today dairying is mainly a subsidiary occupation to agriculture in Kerala. Kerala is identified as one of the big consumer states of India in the food sector. In the milk production front, Kerala has a prestigious position producing over 70 per cent of the requirement within the State. Emergence of the Operation Flood Programme in the State during the year 1980 and the formation of Kerala Co-operative Milk Marketing Federation (KCMMF) popularly known as MILMA became a turning point in the history of dairy development activities of the State. MILMA could replicate the successful Anand model in Kerala. Though Kerala was not covered under the first phase of operation flood, the growth rate in Kerala during the period had increased to 12.52 per cent from 2.52 per cent of the previous decade which was basically due to the impact of the various dairy development activities undertaken in Kerala such as Indo-Swiss Project and intensive cattle development project which were focused on breed improvement through cross breeding and other input services for increasing milk production in the state. The growth rate was 6.41 per cent in the operation flood phase in Kerala. The growth rate has declined in the last stage of operation flood (1990-96) to 4.24 per cent and it was further declined to 3.78 per cent in 9th plan period (1997-2002) and it becomes negative in 10th plan period. But Kerala could retain a positive growth rate of 6.18 per cent in the period 2006 – 2010 as a result of the organized efforts of the government to promote dairy development in the state. (Sample survey reports of Animal Husbandry Department, GOK, 2010)

1.1 Statement of the problem

The organised dairy sector of Kerala consists of nearly 3000 functioning primary dairy co-operatives, three regional unions and the state apex body KCMMF. Out of an estimated 11 lakh dairy farmers in the State, nearly three lakh farmers market their surplus through the co-operative system (Expert Committee Recommendations, GOK,2009) Dairying provides a unique daily income to these families who are engaged in this profession.

However, due to the steep hike in the production cost and other problems which they are facing in the field of production and marketing, they are forced to quit this sector. Recently the gap between demand and supply of milk is widening, which has led to a situation where Kerala has to depend on neighbouring states for meeting her needs. This implies that, though there is an assured guaranteed market, the farmer producers are reluctant to take up this occupation. Self sufficiency in milk production cannot be attained, unless and until the farmers are retained in the dairy sector. To ensure sustainability of dairy farmers, dairying should be sustainable. The farmers will be encouraged to take up this occupation only if they can depend on dairying as a subsidiary means of livelihood. Hence, economics of dairying in terms of production, productivity, income augmentation, employment generation, marketing, asset creation and improving standard of living of farmers holds great significance. In this context, economics of dairying with reference to Thrissur district is highly relevant.

1.2 Objectives

The specific objectives of the study are as the following

(i) To examine the pattern of dairying adopted by farmers

(ii) To identify the sources, types and extent of assistance and incentives provided to the dairy farmers

(iii) To study the impact of assistance and incentives on the sustainability of dairying.

1.3 Utility, Scope/ Limitations of the study

1.3.1 Utility

The study has enabled to understand the pattern of dairying adopted by the dairy farmers, the assistance and incentives received by them and also the impact of assistance and incentives for the sustainability of dairying. In this current scenario of rising input costs and other expenses, assistance and incentives have got a significant importance for ensuring better income and profitability to the dairy farmers. Kerala Co-operative Milk Marketing Federation namely MILMA, Animal Husbandry Department and Dairy Development Department which are the institutional setups that are actively engaged in promoting dairying in the state are providing various assistance and incentives. And it is pertinent to study

whether it is beneficial to the farmers or not. There are lot of problems confronting by the dairy farmers that makes them difficult to continue with this sector. The study also throws light to the constraints faced by the dairy farmers and how effectively the Government Agencies can interfere to make the farmers self sufficient in this sector.

1.3.2 Scope / limitations

The study covers the major assistance and incentives provided to the dairy farmers by the Government agencies. From the study it could be observed that majority of the dairy farmers are undertaking dairying as a subsidiary occupation and for meeting their own day to day expenses. Hence their dependence on Government agencies and their association with the societies to which they are associated is less. Although many of the assistance and incentives are for supporting the dairy farmers, their hesitant attitude towards the system makes them unaware. This has created difficulties in analysing the real impact of these benefits among the dairy farmers in the study area.

1.4 Organisation of the thesis

The report of the study has been presented in five chapters. The first chapter discusses the statement of the problem, objectives, utility and scope/ limitations of the study. The second chapter deals with the literature review of available studies with respect to economics of dairying, its profitability, viability and the impact of institutional set up for the promotion of dairying. The third chapter describes the methodology adopted in the process of investigation and analysis. The fourth chapter deals with results and discussion of the study. The last chapter highlights the summary of findings and conclusion followed by references, appendices, and abstract of the thesis.

REVIEW OF LITERATURE

CHAPTER 2

REVIEW OF LITERATURE

Dairy industry is one of the most rapidly developed industries in India. Today, India is the largest producer of milk in the world and it is an important economic activity of our country which contributes to the main source of income to the majority of rural population, particularly the weaker section. It provides subsidiary occupation in rural area and provides gainful employment to the under employed. A dairy holding enterprise is a profitable complementary enterprise in agriculture and also be compared with a manufacturing or production enterprise where the milch animal is the machine, the raw material is feeds and fodder, and the final product is milk. It is because of this profitable nature, most of the cultivating households irrespective of the size of their land holding continues to rear cattle and has become an integral part of Indian agriculture. However due to the recent hike in the production cost and other problems which they are facing ,the farmers are forced to quit this sector and there exist a demand supply gap in the milk production which may even force to depend on the neighbouring States for meeting the consumption needs. And this questions the viability of dairying. To ensure sustainability of dairy farmers, dairying should be sustainable and then only self sufficiency in milk production can be achieved. The dairy farmers should get the maximum assistance for exploring the profitable avenues in dairying profession and it is the need of the hour.

Review of literature is an integral part of all scientific investigations which would enable the researcher to understand the research gap and justify the study. Here the research begins with an enquiry into the studies already conducted in the field of dairying and it would throw light on the various aspects of dairying that has been studied from different angles by expert researchers and authors. The studies collected in this regard have been classified under four heads, viz.,

2.1 Dairying: An assessment through dairy co-operatives

2.2 Economics of dairying

2.3 Impact of dairying on the economic upliftment of dairy farmers

2.4 Constraints in dairying

2.1 Dairying: an assessment through dairy co-operatives

Dairying is a rural land based saving and gender neutral enterprise in contrast with crop production. It offers more favourable opportunity of employment and provides constant source of income for rural farm households. An institutional structure in this regard has contributed a lot for the dairy farmers and thus the dairy co-operatives play a pivotal role in ensuring dairying as a profitable avenue. Dairy Co-operatives have made a social impact in the country in the sense that they educate and train the rural masses to overcome the exploitation by means of the co-operative ideology. Hence an assessment of dairying from the point of view of an institutional support has of great relevance.

Francis and Sibanda (2001) conducted a study titled "Case study of the viability of small holder dairy farming in Nharira- Lancashire, Zimbabwe". The objective was to assess the viability (based on gross margin: GM analysis) of dairy farming in Nharira communal area and Lancashire small scale commercial area. This paper is based on data obtained through participatory monitoring of 13 small holder dairy farms. From the study, it could be noted that, though substantial inter-farm differences were observed, small holder dairy farming in Nharira- Lancashire was found to be viable. It was also observed that feed costs, number of cows and sizes of land holdings were the main factors determining viability of small holder dairy farming. And they pointed to the fact that the development of low cost feeding strategies based on farm produced feeds would improve the profitability of the small holder dairy farms.

Subburaj et al. (2001) analyzed the member's perception on the social impact of dairy co-operative societies in Dindigul district. The specific objectives were to study the socio-economic conditions of members of dairy Co-operatives and to assess the perception of members on the social impact of dairy Co-operative societies. By adopting stratified random sampling procedure, 25 members and non member respondents were identified and selected. The result shows that there is significant difference in the perception level between member and non member respondents. It was found that the members of dairy co-operatives have greater perception on the democratic benefits of co-operation than non members.

Sulastri and Maharjan (2002) in their study titled "Role of dairy co-operative services in dairy development in Indonesia: a case study of Daerah/stimewa Yogyakarta province made specific objectives to grasp the situations of dairy farming and dairy co-operative in

Indonesia especially DIY province, to see the relationship of dairy co-operative and dairy farming and assess the role of dairy co-operative services on dairy development and its contribution on household income of farmers. Data were collected by interview with dairy co-operative officials and the farmers through a structured questionnaire, on site observation and participatory appraisal. From the study, it could be revealed that most of the farmers make best use of all services provided by the dairy co-operatives and improve their dairy farming. Dairy farmers are also well satisfied with the co-operative services and perceive that their dairy farming management has become better in almost all the aspects. Consequently, the income from dairy farming has a very high share, more than half in the household income of the co-operative members, significantly raising their total household income. The study suggested that government should also be actively involved in order to attain sustainable dairy development that will be used as an effective instrument for rural employment and rural development as a whole.

Vinod *et al.* (2004) conducted a study with reference to 120 respondents scattered in six villages of two blocks in Rewari district of Hariyana to analyze the nature of markets and role of cooperatives in marketing of milk. It was observed that on medium and large category of farms the milk sold through cooperative society was found to be higher than the disposal through milk vendors and directly to the consumers mainly due to more marketable surplus. While on small farms the disposal was found to be almost equal, i.e., 35 percent through milk vendors and directly to the consumers, and the disposal of milk through cooperative society was less due to lower marketable surplus owing to smaller heard size.

Lopoyetum and Selvamani (2006) studied whether dairy co-operative marketing business organizations are sustainable in the new economic environment and to evolve strategies for the same. They found out that sustainability of dairy co-operative marketing business organizations in the new economic environment demand a lot of marketing efforts and adoption of new strategies. The authors have provided strategies for ensuring sustainability of dairy co-operative business organizations, such as provision of adequate financial assistance and financial services for promotion of dairy sector, marketing and sales promotion for dairy co-operative products, and improving marketing efficiency and effectiveness of co-operative societies.

Sulaiman and Pillai (2006) conducted a study with the objectives of assessing the quality of services provided by the dairy co-operatives to its members, identifying the

problems if any, in the marketing of milk through the society by the dairy farmers and suggesting suitable measures for improving their income from dairying. A sample size consisting of 30 member farmers of dairy co-operatives from different parts of Thiruvananthapuram district were selected for the survey. Purposive sampling method was adopted for selection of sample farmers. From the study, it was found that even though dairy co-operatives are rendering services to member farmers, the working of the societies is not up to the expectation. Majority of the member farmers are not satisfied with the various efforts of the society in improving the efficiency in the marketing of milk produced by the farmers. The farmers are still facing problems like low procurement price of milk, partial collection of milk, indifferent attitude of the staff, lack of transparency in the quality of inspection and delay in getting sales proceeds.

Khan and Jagatap (2007) examined the working of dairy societies in Karnataka. It was observed that the schemes of the society have enabled the downtrodden and weaker sections of the society to meet their minimum and daily expenditures. He also observed that though they are leading a comfortable and respectful life, they are facing some inconveniences with respect to the price of milk supplied by them. The severe drought even causes exhaustion of animal stock due to the shortage of fodder in the village. He also opined that the state government should give much attention to this urgent and genuine matter.

Sharma *et al.* (2007) made a study on "Potential and prospects of dairy business in Uttarakhand: a case study of Uttaranchal cooperative dairy federation limited." This study has analyzed the inefficiencies existing in improving milk production, procurement pattern, marketing channels, and price spread of a dairy cooperative. Uttaranchal Cooperative Dairy Federation Ltd (UCDFL), also known as 'Anchal' in the Kumaun region of Uttarakhand . Nainital and Almora districts of Kumaon region have been selected for the study; these cover almost 40 per cent of cattle population in the division, except Udham Singh Nagar. It has been found that UCDFL is focused mainly on liquid milk marketing and has not adopted product diversification, which is the need of the day. It has also been found that due to insufficient margins, the number of agents working for other private dairies has increased. Different marketing channels for milk have been identified and price spread has been calculated for all the channels. Lack of business development services related to dairy industry has been found leading the farmers to disassociate from Anchal. The study has suggested that Anchal should evolve a definite policy with regard to procurement of milk in

both lean and regular periods and to sustain its members, incentive package should be provided. Anchal should find ways to establish fodder banks at strategic locations for providing fodder during emergencies and periods of fodder scarcity.

Gangasagare and Karanjkar (2009) in their study titled "Status of milk production and economic profile of dairy farmers in the Marathwada region of Maharashtra, an attempt was made to analyze the various trends of milk production and socio-economic status of the dairy farmers. The survey was carried out for the milk pocket areas of eight districts of Marathwada region. From these, 253 farmers were identified on the basis of their contribution in selling milk either to milk co-operative society or in the open market and preparing milk products at their homes. They were contacted individually and requested to react on the questionnaire as approved by the National Productivity Council, New Delhi. The results pointed out that there was an equal contribution for milk production from the landless dairy farmers with those having land of Marathwada. It could also be observed that, with the increase in herd size, the productivity has decreased. It could be seen that the members of single family maintained the dairy animals more carefully than those of joint family.

Mishra and Bardhan (2009) analyzed the patterns of adoption and disadoption of vaccination and deworming by dairy farmers in TARAI area of Uttarakhand and identified the factors influencing patterns of adoption. The study was carried out on 80 farmers in five randomly selected villages of Rudrapur block of US Nagar district of Uttarakhand. Primary data were collected by personally interviewing the head of the household with the help of a well- structured and pre- tested schedule on socio-economic, communication behaviour, Psychological and institutional attributes. In this study, two three- item scales were developed to measure farmer's risk attitude and risk perception as per the method used by Bard and Berry (2005). The findings pointed out that the adoption rates have been high for vaccination over the years when compared to deworming. It could also be observed that providing farmers easy access to market in terms of better infrastructure might work in favour of early adoption of technologies. The author also envisaged policy implications that to ensure farmer's adoption of technologies like vaccination and deworming, it is necessary to increase their awareness about the benefits of these technologies and making sure that these technologies are available frequently and timely.

Singh *et al.* (2010) assessed the level of adoption of dairy farmers in Haryana regarding scientific dairy farming practices. The study was conducted in Haryana on 200 dairy farmers who were regular members of Milk Producer's Co-operative Societies (MPCSs) for the last three years. A multistage stratified random sampling technique was employed to select ultimate units. i.e., chilling centres, milk collection routes, MPCSs and respondents. The respondents were personally interviewed to collect the relevant information. The study pointed out that the landless category of dairy farmers had lowest level of overall adaption of scientific dairy farming practices, whereas, all other categories viz., small, medium and large dairy farmers had fairly higher level of adoption. The maximum percent of adoption by the dairy farmers were found to be in case of the animal feeding practices followed by breeding practices, healthcare practices and management practices. However, the landless dairy farmers had lowest level of adoption in case of feeding practices. The main reason attributable for the low level of adoption of dairy feeding practices by the landless dairy farmers were the poor economic condition and mainly based on feeding of roadside grasses and leftover agricultural waste.

Nishi *et al.* (2011) in her study titled "Dairy farmer's satisfaction with dairy societies: a case study" assessed the level of Farmer's satisfaction with Dairy Co-operative Societies and influence of the characteristics of the farmers on their satisfaction with DCSs. The study was conducted in purposively selected organization i.e., PCDF, Uttarpradesh. Out of 31 milk unions under PCDF, 4 milk unions were selected under stratified proportionate random sampling procedure. The survey revealed that more the farmers are motivated towards economic accomplishment, they utilizes the services of the societies to a great extent for their economic benefit. It could also be found that about one –third of the respondents were happy with the functioning of the societies. Organization participation, market potential and economic motivation were found to have strong influence on the satisfaction level of farmers. However the prevailing constraints like impediments for member farmers in getting accrued benefits of several provisions within the co-operatives and the hostile or non co-operative attitude towards societies have negatively contributed towards farmer's satisfaction with the functioning of DCSs.

Shinde (2011) carried out a study titled "Socio - economic profile of dairy farmers in Solapur district of Maharashtra state". The objectives of the study were to provide a general review of dairy units in the Solapur district and to study the growth and performance of

selected dairy units in study area. The present study was taken up in a drought prone district leading in milk production namely Solapur district of Maharashtra State. The criterion for the selection of the District was its progress in dairy performance. The entire Taluks of the district has divided into two regions namely irrigated Taluks and non-irrigated Taluks. The primary data were collected through the structured questionnaire (Appendices I) which was developed and administered for this purpose. From each region 130 respondents were selected by using stratified random sampling, purposive random sampling method the total sample size was 260. It has been found that there is a striking difference in primary sources of occupation across the different categories. A large proportion of small farmers (42 per cent) in the irrigated Taluks were wage earners, while in the non-irrigated Taluks about 44 per cent of smallholders had dairying as their primary occupation. The constraints perceived by farmers were found to be technological, marketing, disease, feed and fodder and Environment etc.

Tewari and Gakkhar (2011) conducted a study titled "A study of opportunities extended to dairy women entrepreneurs under women's dairy development scheme." with the objective to know the facilities provided by the women's dairy development scheme to dairy women entrepreneurs so as to help them to make satisfactory progress. The study reveals that women's Dairy development scheme is yielding good results by supporting rural women who wants to start dairy enterprise by providing them knowledge, financial help and marketing facilities. Majority of the dairy entrepreneurs had availed training and found them helpful for managing the dairy enterprise in one or the other aspect. Regarding financial help, majority of them were not availing .It may be due to difficult and tedious process of availing loan or high interest rates. There is a need to have easy credit facilities with low interest rates to the small and marginal farmers and even landless dairy products. Dairy entrepreneurs were satisfied with the establishment of dairy at their doorstep .But there was little dissatisfaction regarding milk price. It can be fixed on the basis of milk production cost. Majority of the dairy entrepreneurs had received entrepreneurial training and they found it necessary for running the enterprise. A high percentage of dairy entrepreneurs were getting adequate support from the institution. Main marketing facilities as revealed by the dairy entrepreneurs were formation of milk co-operatives and removal of middleman, thereby enabling the dairy entrepreneurs to directly sell their produce to the co-operative.

Jaisridhar *et al.* (2013) explored the factors determining the adoption of scientific dairy farming with special reference to farmer's call centre of Tamilnadu". The study was taken to assess the socio-economic determinants of dairy farmers of Tamil Nadu who obtained information on scientific dairy farming practices from farmer's call centre (FCC). The research design formulated in this study consisted of 150 randomly selected respondents who were practicing dairy farming and who had consulted farmer's call centre (FCC) to seek information on scientific dairy farming. The data for the study was collected with a well-constructed interview schedule and the analysis was carried out using Statistical Package of Social Science (SPSS) software. From the results it was evident that, farmers who had contacted Farmer's Call Centre (FCC) and enquired about scientific dairy farming practices had utilized its recommendations greatly. The timely delivery of information and its trustworthiness among clients might have stimulated the information utilization pattern of the farmers and increased their extent of adoption on scientific dairy farming practices. On the other side, it is suggested that awareness should be stressed upon farmers to utilize video conferencing, voice mailing and SMS facilities that are available with FCC. Training programme can be organized for the farmers on how to operate such facilities.

Manimekalai and Barratry (2013) in their study titled "A study on satisfaction level of women entrepreneurs in dairy sector in Salem district of Tamilnadu" highlighted the fact that Women entrepreneurs are in vital role in India, particularly in Dairy industry. The objective of the study is to find out the satisfaction level of women in dairy industry. The survey research method was applied for the purpose of collecting primary data. The sample size was taken 200 convenience sampling procedure was adopted for the study. A structured questionnaire was used for the data collection. The collected data were tabulated for a clear understanding. The analysis was done using statistical tools like chi-square; weighted average and simple percentage were used. The study revealed that Livestock production is one of the promising sectors of entrepreneurship development in India. Development of entrepreneurship ensures optimal utilization of resources and facilities and value to product and services. The study also pointed out that women entrepreneurs were satisfied with Family support and business profit; family members were giving good guidance to the women entrepreneurs. So all type of family may support and encourage the women entrepreneurs, and then only they could reach their goal.

From the above studies, it could be revealed that a formal institutional framework can positively contribute a lot for the efficient functioning of dairying. Majority of the farmers are motivated towards economic accomplishment and they utilize the services of the societies to a great extent for their economic benefit. It was also observed that the schemes of the society have enabled the downtrodden and weaker sections of the society to meet their minimum and daily expenditures. The satisfaction level of women entrepreneurs in the dairy sector is also commendable.

2.2 Economics of dairying

To ensure the sustainability of dairying, dairy farmers should be sustainable. By analyzing the economics of dairying, it is possible to study the cost and return structure and thus the association of dairy farmers towards dairying can be studied. The dairy farmers exist in this sector only if they find it as viable for them. Thus the studies related to this aspect throw light on an important issue.

Parthasarathy (1975) studied the economics of milk production and trade covered on hundred dairy farmers supplying milk to the Integrated Milk Project (I.M.P), Vijayawada, Krishna district of Andhra Pradesh. The input output ratios, cost components were analyzed. They revealed that the average input output ratio was 1.31 per animal and the average yield was 2024 lts per lactation and the total cost of maintenance was Rs 3112 and 85 percent of it was on feeds. Most of the milk trade was with private agencies and only one fourth was with I.M.P.

Madhava Swamy (1982) dealt with the comparative economics of production of local and graded research buffaloes in Kurnool district of Andhra Pradesh. He estimated the relative share of crop and livestock production in total gross farm income of small and marginal farmers. Costs and returns of crops besides the cost of dairying, feed, concentrates, and milk yield pertaining to animal maintained were gathered. Tabular analysis was employed to draw results. He concluded that the graded murrah buffaloes yielded higher net returns by Rs 258 than local breed. The cost of production per liter of milk of local buffalo was Rs 1.50 as against Rs 1.3 in graded murrah buffalo. It was revealed that out of the total gross farms income, 48 percent of higher net returns were contributed due to live stock production compared to crop production.

Singh *et al.* (1983) compared and analyzed monthly fluctuations in the prices of cow and buffalo milk offered and quantity of milk procured by cooperatives, private and public sector organizations, operated in three villages. They observed that private milk plant paid the lowest price per liter of milk during July to March and the highest during April to May. Public sector paid higher price in July. Cooperatives price remained constant and higher than public sector and equal to private plants during July 1980- 1981. They concluded that public and private sector organization could attract only about 17 percent of the total milk sellers and cooperatives procured milk from about 45 percent and the remaining milk sellers sold to milk vendors, tea shops etc.

Sambasiva Rao (1985), studied the factors affecting milk production, marginal value productivity of different resources at their respective geometric mean levels in Nagarajuna sagar project command area of Andhra Pradesh. Cobb-douglas type of production function was used to express relationship between the average milk yield per day and value of dry fodder, green fodder, concentrates per animal per day, number of lactations completed, labour hours used per animal per day, value of animal (in rupees) and age of animal. He observed that the inputs like green fodder and concentrates were the principal factors affecting milk production in all the size groups of farmers and estimated marginal value products of green fodder and concentrates were greater than factor cost implying that all the farmers were under utilizing these two inputs. He concluded that the use of green fodder and concentrates increased the milk yield and regarding labour, only marginal farmers were utilizing in an efficient manner.

Alam *et al.* (1995) conducted a study titled "Economics of mini dairy farms in selected areas of Bangladesh". The objective of the study was to evaluate the Economics of Dairy Farms in selected areas of Bangladesh. Two thana (Thana is an administrative unit of local government consisting of several union councils), savar and Manikgonj of greater Dhaka district in Bangladesh were selected for this study. Twenty farms were selected randomly; ten from each thana and the selected farms were classified by herd size into three categories- small, medium and large. A survey schedule was prepared and pretested in the field before final collection of data. The collected data were analyzed using statistical techniques such as mean, percentages and ratio's for better precision of analysis. The study revealed that the mini Dairy farming is economically profitable. In addition, each farm created an annual employment opportunity of 649.70 man days which was met by both male

and female laborers. And the expansion of dairy farming with cross- bred cows is suggested for accelerating income and employment opportunities in rural Bangladesh.

Kabir and Talukder (1999) designed a study titled "Economics of small scale dairy farming in Bangladesh under the Government Support Programme" to assess the financial performance of newly established commercial dairy farmers for one complete year of operation. The data were collected by the researcher himself through personal interview with the individual dairy farmers. The study revealed that the Government intervention in the form of subsidy on dairy cows helped small scale dairy farmers to expand their size. The intervention resulted in significant increase in milk production and consumption by farm families. It also provided opportunities for increased employment of persons in dairy businesses. It could also be noted that profit was greater with cross-bred than with local-bred cows. The impression gained from the field visits suggests that financial support provided by the Government has given remarkable stimulus to the small private investors to undertake dairy farming particularly for those having capital constraints.

Rao et al. (2004) made an in-depth study on the economics of milk production in Kanpur (dehat) district of Uttar Pradesh. Two blocks from the selected district and five villages from each selected blocks were selected randomly. The study revealed that the total maintenance cost of a milch animal per lactation increased as farm size increased. Among all, labour charges accounted for the highest share followed by fodder and concentrates. The gross income from milk production was higher on large farmers because of excess utilization of concentrates by large farmers. Input output ratio was the highest on small farmers and it was 1:1.31.Elasticity of production for fodder was the highest followed by human labour and concentrates for all farms.

Singh and Dayal (2004) attempted to study the economics of production and marketing of milk in the state of Uttar Pradesh. Linear and log-linear functions were used to work out the estimates of factors affecting marketed surplus of milk both for the private and cooperative systems. The results of the study indicated that the feed and fodder cost was the most important item of the total maintenance cost accounting for 55 to 65 percent of the total cost in zone-I and 51 to 66 percent in zone-II. The net profit per day of a milch buffalo was very low due to the higher maintenance and low milk yield of milch buffalo on each herd size group in each zone of the state. The net profit of milk production per buffalo per day was

observed to be higher in the case of small size group due to higher milk yield of milch buffaloes in this size group as compared to medium and large herd size groups in both the zones. The establishment of milk cooperative societies in the rural areas had positive impact on the marketed surplus of milk. The study further showed that the milk vendor being an important intermediary in milk marketing made huge profits by adopting various types of malpractices. Lender utilization of plant capacity was the major factor for incurring losses by cooperative milk plant in fluid milk marketing.

Thakur and Singh (2004), conducted surveys in the year 2002-03 to assess the energy and cost requirement for milk production in different commercial dairy farms in four locations, viz., Maharajpur, Imaliya, Pariyat and Mohaniya, around the Panagar block of Jabalpur district, representing the Kymore plateau and Satpura hills zone of Madhya Pradesh. The locations for conducting the survey was selected at random without following any statistical method as there are enough number of commercial dairy farms to get a good comprehensive data on the different activities in milk production. It was inferred that cattle raising was not only an important occupation for supplying the nutritional diet to the people but also it has greater concern to uplift the socio-economic status of the people related to agricultural sector. Likewise raising goats, cows, buffaloes and birds as a supplementary occupation in the agricultural sector is apparently most economical for the development of socio economical status of rural people particularly in weaker sections, having small and, marginal holdings or low investment capacity and tribal communities.

Chauhan *et al.* (2006) in their research titled "A study on the economics of milk processing in a dairy plant in Haryana", the economics of manufacturing of different dairy products, viz. ghee, full-cream milk, standardized milk, toned milk, double-toned milk, skimmed milk and ice-cream (processing only) have been reported. An ISO-9002 dairy plant having installed capacity of 60,000 litres per day (LPD) situated in the north-eastern area of the Haryana state was selected for the study. The data for the period April 2000 to March 2001 on various aspects were collected from the records of the dairy plant, by interviewing the personnel working in the plant and by the observation method. It has been observed that all the products, except the double-toned milk are being produced above the recommended breakeven level. A comparison of unit manufacturing cost with unit price received by the plant for different products has revealed that ice-cream manufacturing has been the most profitable proposition among different dairy products, and standardized milk has provided the

maximum profit margin among the milk pouches manufactured during the study period, 2000-01. The double-toned milk has revealed a loss. Therefore, the study has suggested that the quantity of double-toned milk production should be raised at least equal to the recommended break-even level to avoid losses, if there is a market demand for this product or the resources of this product could be shifted to some other profitable products.

Bardhan and Sharma (2012) through their study on "Economics of milk production in Kumaon region of Uttarakhand", an attempt was made to compare the cost and returns from milk production at farm household level across member and non members of Milk Producers Co-operative Societies. The study was carried out on 150 milk producing households in Kumaon region of Uttarakhand. Two districts, viz. U.S. Nagar (located in the plains) and Almora (located in the hills) were chosen for the study so as to have a comparative picture of milk production scenario in the plains and hills. Based upon cumulative square root of the frequency method, all the milk producer's societies' were stratified into three strata, viz. low, medium and high procurement societies on the basis of milk procurement per day. The findings of the analysis revealed that in the plains, relatively higher net maintenance cost per standard animal unit (SAU) was incurred by member group as compared to the non member group. In contrast, in the hills, the average net maintenance cost per SAU was higher for non member group than that of member group. Average net maintenance cost tended to decline with increase in herd size across groups. The proportion of fixed cost in gross cost was comparatively lesser in hills than in plains, indicating towards relatively lower level of investment made by farmers in dairying in the hills than in plains. Computation of different income measures revealed that both in the plains and hills, dairying is more profitable for non member households as compared to their member counterparts. The income measures also indicated that dairying becomes more or less profitable only when family labor charges are ignored.

Velanganni (2013) dealt with a study titled "Income and expenditure pattern of Samichettipalayam milk producers co-operative society in Coimbatore district: A survey". The objectives of the study are to examine the Income and Expenditure pattern of Samichettipalayam Milk Producers Co-operative Society, to know whether there are differences among Milk Producers with respect to their Income and Expenditure, to know whether there are variations in the Income and Expenditure among Milk Producers, to know whether there exist a relationship between the socio-economic factors and the Income and

Expenditure pattern of Milk Producers and also to understand how the Milk Producers maintain their family during periods of less Income. Structured Interview Schedule was administered among 50 milk Producers selected on a simple random basis. Data gathered through the Structured Interview schedule was compiled and analyzed with the help of Statistical Package for Social Science (SPSS). Two way tables were prepared and the data were analyzed with the help of simple averages and Percentages. To disclose the relationship between and among variables, Chi- Square and Correlation Analysis are employed facilitating for testing of Hypothesis. The study finds no significant relationship between all the demographic, social and economic factors and Income level of the respondents. The study proves that expenditure pattern has close association with Income level and expenses increases when Income Increases. However the money spending on food expenses takes away larger portion of the Income particularly among Milk Producers earning less Income. Hence the study suggests that social security measures have to be implemented particularly for the benefit of less Income people. Further, during periods of less Income, majority of the milk producers maintain their family out of petty loans and advances, that too to meet out their food expenses. Therefore the study further suggests that employment opportunities have to be created suiting to the need, calibre, and skill and market environment of the less Income people dwelling in villages.

The above studies bear evidence to the fact that financial support from the part of Government has of great relevance to undertake dairy farming particularly for those having capital constraints and will enable dairying to be more economically profitable.

2.3 Impact of dairying on the economic upliftment of dairy farmers

Dairying can make significant impact on the income, employment, production, productivity and thus enables the farmers to be self sufficient. Hence it is pertinent to look into the impact studies of dairying on the livelihood of dairy farmers.

Thakur (1996) studied the impact of dairy development through milk cooperatives in Gujarat which covered four milk unions which were at the different stages of development. Twenty-four village milk producers' societies were selected randomly in four districts and 400 respondents, respectively. The primary data collected on survey method from respondents and secondary data from the sample milk unions and societies, progress was

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captured by tabular analysis. The farmers are categorized, as landless, small, medium, and large in order to examine the impact of milk cooperatives on economic conditions of the weaker sections. It was observed that the landless people earn as much as 65-70percent and small farmers earn more than 25-30 percent of the total income from dairying. The cash income obtained continuously from the sale of milk can be used for better management of milch animals and for the purchase of improved agricultural inputs to some extent which help the farmers in increasing their total income.

Reddy (2000) analyzed the employment opportunities and the standard of living among the rural folk and compared arable farming, mixed farming and dairy farming laborers in milk shed area of Vijayawada and the dry land area of Chitoor. The data were collected by survey method from selected respondents. The secondary data were collected and analyzed. They found that mixed farming created 32 percent of extra work as compared to arable farming. The dairy farming created 45 percent of extra work as against mixed farming and 92 percent of extra work as compared to arable farming. They also estimated that an additional employment for 129 days as compared to mixed farming and 225 days as compared to arable farming were found by maintaining dairy farm.

Ramachandran (2004), focused on the income and employment potential of dairy farming in different stages in Kanyakumari district of Tamil Nadu. The primary data collected from 100 farmers engaged in farming activities of five selected villages of Kanyakumari district. The study revealed that the dairy farming is an activity with great potential and has offered considerable scope for employment and income generation in Kanyakumari district, the dairy farming gives employment opportunities in the form of collecting dung, cleaning shed, watering and feeding animals, grazing and cutting grass, milking, sale of milk, processing of milk and milk products. It may be concluded that dairying constitutes the major proportion of the cattle population in the sample households. Cattle rearing occupy a pivotal place among women folk of the rural areas. Thus, dairy farming plays the main source of employment and income generation in the study area.

Sharma and sharma (2004) carried out a study to estimate the contribution of dairy and crop enterprises towards income and employment in relation to different size of holdings in the semi arid region of Rajasthan. For this study data were collected from 60 farmers in the four adopted villages of Sikar tehsil of Sikar district during the agricultural year 2003-2004.

The farmers were classified in to different size groups, namely, small (upto 2 ha), medium (2 to 4 ha) and large (4ha and above). From each village and each size group, 5 cultivators were randomly selected. Dairy enterprise provided maximum employment of 338 man-days and crop farming provided 219 man-days. Per worker employment from crop and dairy farming were 80 man-days and 123 man-days, respectively. Thus, dairy farming plays a key role in increasing employment and income in the semi arid tract of Rajasthan.

Jayachandra and Naidu (2006) studied the impact of Rangampet milk producers' co-operative society on the income, employment and creation of assets of marginal and small farmers. The study covered 60 families who were supplying milk to the milk producers' co-operative society situated at Rangampet. Data were collected through personal interviews and observations. The study observed that all farmers have significantly benefited by way of increased income through dairying after joining the society. The farmers have benefited through dairying as it generates additional employment opportunities. They opined that dairying offers a vast scope for increasing the income, employment and assets value of farmers whose marginal and average productivity is low.

Srikanth (2007) conducted a study titled "Performance of dairy co-operatives and their impact on milk production, income and employment in Kolar District- an economic analysis". The study was designed to examine the performance of Dairy Co-operatives and their impact on milk production, income and employment. The study was conducted in Kolar district of Karnataka state during 2006-07. For evaluating the objectives of the study, both primary and secondary data have utilized. The primary data have collected from the respondents through pretested questionnaire. The total sample comprised of 120 farmers out of which 30 dairy co-operative members and 30 non-dairy co-operative members were selected each from two areas. The study revealed that the members of co-operative societies have got high income as well as high employment than non members. The members who had business with the co-operative societies got better facilities, demand, easy marketing facilities, cattle feed supply, artificial insemination activities, technical assistance programmes, training and extention activities etc. when compared to the non members. The author has also recommended the policy implications and appropriate strategies for improving the performance of dairy co-operatives.

Cabrera *et al.* (2008) conducted a study titled "Economic impact of milk production in the state of New Mexico". The objective of this study was to quantify the economic role of dairy farming in New Mexico and to identify its linkages with allied industries in terms of income, value added, and employment impacts. An input- output model was used to estimate the direct, indirect and induced impacts of the dairy farm industry on the economy of New Mexico. The results showed that in 2005, New Mexico's dairy farm industry had a total economic impact of $1.98 billion and accounted for 14,313 jobs. Therefore, dairy farming in New Mexico had an output multiplier (income) of 1.92, a labor income multiplier of $248 thousand/ $ million of gross sales and an employment multiplier of 13.91 jobs/$ million of gross sales.

Kocturk (2009) made a study titled "A case study of increasing income of dairy cattle in rural area in western part of Turkey" with the objective to investigate the results of Government supported dairy cattle farming production in rural area. The research included dairy farms associated with yaglar Co-operative located in Kiraz-Lzmir (a province in western part of turkey). The number of dairy farms is 100at all are managed and owned by women. Out of these, 48 dairy farms were volunteered to participate to this study. The data belonged to 2008 production period and were obtained from the women farm operators face to face by means of questionnaires. The study revealed that dairy farming projects carried out by co-operatives have resulted positively in terms of income growth in areas where land allocation is not well balanced and not adequate. Co-operatives have played a large role in developing livestock. The major reasons for this are decrease in the cost of production particularly in feed cost and the fact that it demonstrates productive power in determining milk price by creating bargaining power.

Singh *et al.* (2011) in his study titled "Improved dairy production and processing through training programmes" an attempt was made to know the change in knowledge of trainees, to know change in dairy management practices and to know the economic benefits gained by trainees. Data were collected through interview from 614 farmers who participated in dairy farming trainings organized by Krishi Vigyan Kendra, Hanuman garh (Rajesthan from 2007 to 2010. It was found that after attending the 23 training programmes there was gain in knowledge level of the beneficiaries. After the adoption of the newer technologies learnt by the entrepreneurs, they got more income and employment. It is recommended that

various KVK should tailor and organize need based vocational training programmes for entrepreneurship development so that the rural people are benefited. It is also imperative that the dairying being component under the mixed farming system need to be strengthened in the shuttle cities of different states and in blocks around the major towns of India. This will help in achieving the substantial production and in turn will increase the income and employment in the rural areas. It is also recommended that through such training programmes organized by KVK's, socio-economic conditions of the rural farm families could further be improved through scientific dairy farming. It could observe that average adoption rate was 52.3 per cent and unemployed rural youths (55 per cent) showed keen interest in dairy farming. The knowledge level of the respondent before and after training for cattle breeding, feeding, health care and management was 29.31, 46.41, 30.61, 57.49 and 71.33, 86.32, 68.72, 89.9 respectively. Milk yield was increased with decrease in anoestrus cases and calf mortality which in turn fetched more profit to farmers.

The above studies reinstated the fact that dairying occupies a major position particularly among the rural masses in uplifting them by way of augmenting their income and creating more employment opportunities. It could also be noted that cash income obtained continuously from the sale of milk can be used for better management of milch animals and for the purchase of improved agricultural inputs to some extent which help the farmers in increasing their total income.

2.4 Constraints in Dairying

Dairying, though a remunerative activity, possesses a large number of constraints in profitably managing it. This may often prompt the dairy farmers to quit this sector and may adversely affect the self sufficiency in milk production and this has far reaching consequences in our economy. Hence it is relevant to get an idea about the constraints faced in this sector.

Suzuki *et al*. (2006) investigated the constraints to dairy cattle health and production in rural small holder communities in northern Vietnam, one of the targets of the Vietnam's government's dairy development programme. A total of 99 dairy farms were recruited from 9 of 32 communes in Ba Vi District using random two stage cluster sampling. After the initial questionnaire interviews were conducted, farms were visited at three monthly intervals over a period of one year. The study indicated that farmers who had been involved in dairying for

longer (not indicative of better management skills, larger herd size and cattle being kept in a shed were linked to reduced reproductive performances. The negative effect of an increased number of animals owned can be interpreted as resulting in less individual care for each animal, since the number of household members looking after these animals did not increase. As most of the sheds were fully walled, ventilation was inadequate to remove heat, moisture, micro organisms and pollutants. Therefore one practical improvement measure would be to let animals graze during the day. They suggested that good extension programs are necessary to inform farmers about appropriate dairy cattle shed designs.

Manhas and Sharma (2008) made an attempt to study the constraints faced by 200 dairy farmers in Jammu district of Jammu and Kashmir. The study revealed that half of the dairy farmers had faced medium level of constraints, while 32.5 and 17.5 per cent respondents had faced high and low level of constraints, respectively. The respondents had expressed infrastructural constraints as the most severe impediment, whereas technical constraints were hampering dairying, to the least extent. There was significant difference between different groups of respondents with respect to constraints encountered by them.

Patil *et al*. (2009) analyzed the constraints faced by dairy farmers in Nagpur district while adopting animal management practices. The study was conducted in 15 villages from 3 taluks of Nagpur district by personally interviewing 225 dairy farmers. From the study, it was revealed that majority of the respondents (72.44 per cent) faced the constraint of low milk production from local breeds. 45.33 per cent as shortage of green fodder and 41.33 per cent as lack of clean water while 25.33 per cent stated lack of preservation facility as their constraint. Referring to the financial constraints, 78.22 per cent of the respondents stated their constraint as delay in milk payment, 63.11 per cent as inadequate money and lack of loan facility whereas high cost of concentrates as constraints by 56.44 per cent of the respondents. As regards technical constraints, majority of the respondents(68. per cent) have stated their constraint as inadequate knowledge of diseases, their prevention control while 56.89 per cent have referred their constraint as non availability of veterinary services. The study suggested that there should be special provision to impart frequent training to dairy farmers in areas which they are concerned in their day to day life based upon judicious assessment and analysis of the training needs of dairy farmers in areas such as animal health

care and disease control, care and management of animal, breeding and management of animal, feeding and management of animal and clean milk production etc.

Dennis (2010) conducted a study titled "Evaluation of the constraints to profitable small holder dairying: A case of Nakuru Country, Kenya. A sample of 129 small holder dairy farmers was selected from Rangai, Baruti, Ngata and Mbogoini provisions of the country. Multi stage sampling procedure was used to select respondents and the data were collected by the use of structured interview schedules administered by enumerators. The study revealed a number of factors such as type of breeds, feeding system etc that influence the profitability efficiency. Marketing of milk is paramount in determining profitability of dairy business. The study found that trust within the milk value chain is crucial in influencing profitability. The debt asset ratio is also an important factor which should be considered by the farmers. The higher the ratio indicates that the farm business is insolvent and also hinders attracting more credit. The study suggested that the farmers should be advised by experts to go for the breeds that balance between cost of production and yield and also should adopt best feeding system that fits the type of breed and available resources at their disposal.

Duguma et al. (2011) focused on the constraints faced by the urban dairy farmers and gender responsibility in animal management in Jimma town. A single- visit- multi- subject formal survey was adopted to sample and administer questionnaires to 54 respondents in the study area. Data were analysed using descriptive statistics. Lack of land, shortage of feed, lack of improved animals and lack of less access to artificial insemination were constraints limiting dairy production in the study area. Other constraints included lack of extension services, diseases, lack of credit service and marketing problem. The study also found that dairying generated a full time employment to 103 male and 13 female laborers. Majority of the farms (82.5 per cent) hired male labourers, while 22.2 per cent hired female farm workers. Veterinary health care (67 per cent) was the responsibility male household head. Milking (13 per cent) and milk processing (27.8 per cent) was done by female household members. Men decide selling of animals and milk. While women decide how much of the milk will be kept for household consumption. The study suggested that in order to improve dairy production in the study area, there is a need for technical and institutional intervention to alleviate the identified constraints.

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Khan *et al.* (2013) in their study titled "Current issues and future prospects of dairy sector in Pakistan found that dairy sector has vivid importance and role in national economy. But it has failed to attract the attention of policy makers. They pointed out a number of technical, traditional, marketing and financial constraints to animal production. They are poor availability of nutrients, deterioration of range of lands, animal health issues, issues related to marketing, lack of value addition facilities, institutional constraints, potential threats to livestock breeds, insufficient extension services, low productivity of Dairy animals, poor performance of livestock services, environmental issues due to increasing animal population etc. They suggested that trainings and skill development programmes for small holders especially for women should be carried out regularly to improve livestock production. Technology should effectively deliver benefit to small farmers at farm level and for such purpose extension services should be improved and strengthened.

Rani *et al.* (2013) studied the constraints perceived by dairy farmers in adoption and repayment of dairy loans. The study was conducted in Amritsar District of Mejha region of Punjab. The sampling procedure employed to select ultimate unit of sample was multi stage sampling technique. They found that the attitude of loan officer, too many intermediaries, lengthy complicated loan procedure, inadequate loan amount and illiteracy of borrowers as major problems. Most of the dairy farmers are illiterate and they cannot understand loan procedure of banks easily. They consider problem of financial guarantor, role of other department, policy of banks and mode of payment as negligible problems. For large dairy farmers having more than 20 dairy animals, inadequate loan amount stands as a major constraint. Shortage of quality breed animals, high cost of feed and fodder, high expensive animals were also being pointed out as constraints. The study suggests that there is a need of good quality animals and to reduce the cost of feed and fodder. Bank's should come forward and play positive role to provide loan and repayment of loan for a future growth of dairy sector in Punjab.

From the studies reviewed, it could be observed that there are technical, traditional, marketing and financial constraints to profitable Dairying. These studies suggest that in order to improve dairy production, there is a need for technical and institutional intervention to alleviate the identified constraints. The dairy farmers should get all sorts of assistance and support in order to retain them in this sector.

MATERIALS AND METHODS

CHAPTER 3

MATERIALS AND METHODS

The study titled 'Economics of dairying in Thrissur District' has been conducted with the objectives of examining the pattern of dairying adopted by farmers; identifying the sources, types and extent of assistance and incentives provided to the dairy farmers; and studying the impact of assistance and incentives on the sustainability of dairying. This chapter elucidates the methodology and data sources adopted in the study which is presented as follows.

3.1 Concepts used in the study

3.2 Locale of the study

3.3 Sources of data

3.4 Selection of the sample

3.5 Critical variables for the study

3.6 Statistical tools used for the study

3.1 Concepts used in the study

3.1.1 Dairy farmer

A person who owns one or two cows for his own consumption together with the purpose of selling.

3.1.2 Dairy Co-operative Society

A dairy co-operative society is an association of a group of dairy farmers who have membership and procures milk from both its members and also non members.

3.1.3 Member

A member of a Dairy Co-operative Society is a dairy farmer who pours not less than 500 litres of milk in a year and can enjoy certain privileges from the society.

3.1.4 Non Member

A non member is a dairy farmer who may or may not pour milk to the society, but not eligible for any of the rights and powers as for a member.

3.1.5 Assistance and Incentives

Assistance and incentives received by the dairy farmers from various institutional set up for the promotion of dairying.

3.1.6 Sustainability

As far as a dairy farmer is concerned, sustainability is defined by his ability to reduce the expenses incurred under dairying and thereby increasing the net income which prompts the dairy farmer to continue and exist in this sector.

3.2 Locale of the study

The pattern of dairying, assistance and incentives provided to the dairy farmers and the impact of assistance and incentives on the sustainability of dairying have been studied at the district level of Thrissur using both secondary and primary data. For examining the objectives of studying the pattern of dairying adopted by the farmers and to study the impact of assistance and incentives provided to the dairy farmers, the entire five Taluks of Thrissur district have been selected. From each Taluk, two Anand Pattern Co-operative Societies (APCOS) have been selected for which the societies in the Taluks have ranked based on the quantity of milk supplied to MILMA during the last three years. The selected societies are Pannenchery Dairy Co-operative Society and Pattikadu Dairy Co-operative Society from Thrissur Taluk,Padiyoor Dairy Co-operative Society and Eddakulam Dairy Co-operative Society from Mukundapuram Taluk,Pattiparambu Dairy Co-operative Society and Punnamparambu Dairy Co-operative Society from Thalappily Taluk, Punnayurkulam Dairy Co-operative Society and Eddasseri Dairy Co-operative Society from Chavakkadu Taluk, Pathineteralayam Dairy Co-operative Society and Anjappalam Dairy Co-operative Society from Kodungallur Taluk.

3.3 Sources of data

Secondary data regarding the various assistance and incentives received by the farmers have been collected from Dairy Development Department, Animal Husbandry Department and Kerala Co-operative Milk Marketing Federation (Thrissur Dairy). Data regarding the societies have been collected from the procurement and inspection (P&I) wing of Thrissur dairy.

3.4 Selection of the sample

Multi-stage random sampling was used to select 133 respondents from Thrissur district. Multi-stage sampling refers to sampling plans where the sampling is carried out in stages using smaller and smaller sampling units at each stage. In the first stage, from each Taluk, two Anand Pattern Co-operative Societies (APCOS) have been selected for which the societies in the Taluks have been ranked based on the quantity of milk supplied to MILMA during the last three years. From the rank list prepared, societies which ranked first and last have been selected. Thus the sample size of APCOS is ten, i.e., two societies each from five Taluks. In the second stage, from each of the societies, 10 farmers who are pouring members for the last three years have been selected randomly. As a control group for comparison, three farmers who are not the members of the society, but residing within the area of operation of the society have been selected. Thus the sample size is 130 dairy farmers, consisting of 100 member farmers of APCOS and 30 non member farmers. In addition to this, three commercial dairy units from the study area having a minimum cattle holding of 20, have also been included for the study. Pre-tested structured interview schedule have been used for collecting data from the respondents.

3.5 Critical variables for the study

Critical variables for the study are socio economic profile of the respondents, cattle holding of respondent farmers, breed of cattle, breeding practices, feeding practices, sources of assistance and incentives, types of assistance and incentives, awareness on assistance and incentives, attitude of farmers towards assistance and incentives, milk production, cost of inputs for cattle rearing like feed, fodder, medicines, insurance and transportation, income from cattle rearing, contribution of income from dairying to total income, marketing avenues other than society including value addition, constraints in dairying etc.

All these variables have been included in the interview schedule to collect data from the respondent farmers. Schedule was pre tested among the dairy farmers before actual data collection.

3.6 Statistical tools used for the study

The objectives were analysed with the help of one sample t-test, Independent samples t-test, One-way analysis of variance (ANOVA), Post-hoc test for multiple comparisons, Cobb- Douglas production model, Kruskal Wallis H test and Mann Whitney U test.

3.6.1 One Sample t-test

One sample t-test is used to compare the mean of a single sample with the population mean, to know whether the sample comes from a particular population. The statistical hypothesis for one sample t test takes one of the following forms, depending on whether the research hypothesis is directional or non directional. All parametric statistics have a set of assumptions that must be met inorder to properly use the statistics to test the hypothesis. The assumptions are random sampling from a defined population, interval or ratio scale of measurement and normal distribution of the population. In the equations below, μ_1 refers to the population from which the study sample was drawn. μ is replaced by the actual value of the population mean.

$H_0 : \mu_1 = \mu$

$H_A : \mu_1 \neq \mu$

$H_0 : \mu_1 \leq \mu$

$H_A : \mu_1 > \mu$

$H_0 : \mu_1 \geq \mu$

$H_A : \mu_1 < \mu$

In this study, one sample t test has been used to find out whether there is significant difference between the actual feeding practices and the recommended feeding schedule. The feed items include concentrates, paddy straw and green grass and each feed item is analysed separately during milching and dry period by taking into account the actual feeding practices which is followed by the respondent farmers and the recommended feeding schedule prescribed by the Productivity Enhancement Department of National Dairy Development Board, Anand. The actual feeding practices have been compiled from the primary data which has obtained from the respondent farmers and the recommended feeding schedule has been obtained from the secondary data.

3.6.2 Independent samples t-test

The Independent samples t- test compares the means of two independent groups in order to determine whether there is statistical evidence that the associated population means are significantly different. The independent t test is a parametric test. This test is also known as Independent t test, Independent measures t test, Independent two samples t test, Student t test, Two samples t test, Uncorrelated scores t test, Unpaired t test and Unrelated t test. The variables used in this test are known as dependent variable or test variable, independent variable or grouping variable. The data must meet the following requirements.Dependent variable should be continuous, (Interval or ratio level) independent variable should be categorical,(two or more groups) Cases that have values on both the dependent and independent variables and independent samples or groups. (independence of observations) In this study, the independent samples t-test is used for studying whether there is any significant difference between the members and non- members on the identified critical variables.

3.6.3 One-way analysis of variance (ANOVA)

ANOVA test has been done for comparing the production, gross income, cost and net income among the four categories of respondents. ANOVA is used to compare the means of more than two populations. It uses F-statistic, which tests whether the means of groups, formed by one independent variable or a combination of independent variables are significantly different. It is based on the comparison of two estimates of variances - one representing the variance of within groups, often referred to as error variance and other representing the variance due to differences in group means. If the two variances do not differ significantly, one can believe that all the group means come from the same sampling distribution of means and there is no reason to claim that the group means differ. The F-statistic calculates the ratio between the variance due to difference between groups and error variance.

$$F = \frac{\text{Variance due to difference between groups}}{\text{Error variance}}$$

The larger the F- ratio, the greater is the difference between groups as compared to within group difference. An F ratio equal to or less than one indicates that there is no significant difference between groups and the null hypothesis is correct. If the F- test proves the null hypothesis to be wrong, multiple comparison tests are used to further explore the specific relationship among different groups.

3.6.4 Post-hoc test for multiple comparisons

Rejection of null hypothesis in ANOVA only indicates that all population means are not equal. Multiple comparisons are used to assess which group means differ from which others, once the overall F-test shows that at least one difference exists. Turkey HSD (honestly significant difference) was used in the present study, which is one of the most conservative and commonly used test.

3.6.5 Cobb- Douglas production model

To examine the impact of various costs such as feed cost, labour cost, veterinary cost, transportation cost and insurance cost on the production of dairy farmers, Cobb- Douglas production model has been used. Cobb- Douglas production model was fitted using production as dependent variable and feed cost, labour cost, veterinary cost, transportation cost and insurance cost as independent variables.

The general form of Cob-Douglas production function is as follows:

$$Y = AX_1^{b1} + X_2^{b2} + X_3^{b3} + X_4^{b4} + X_5^{b5} \ldots\ldots\ldots(1)$$

Where A = constant, X_1 = feed cost (in rupees), X_2 = labor cost (in rupees), X_3 = veterinary cost (in rupees), X_4 = transportation cost (in rupees), X_5 = insurance cost (in rupees)

The function can be estimated in logarithmic form as follows:

$$\log Y = \log A + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 \ldots\ldots\ldots(2)$$

3.6.6 Kruskal Wallis H test

The Kruskal Wallis H test was developed by Kruskal and Wallis (1952) jointly and is named after them. The Kruskal Wallis test by ranks, Kruskal Wallis H test or One way Anova on ranks is a non parametric method for testing whether samples originate from the same distribution. It is used for comparing two or more independent samples of equal or different sample sizes. The parametric equivalent of the Kruskal Wallis H test is the One way Analysis of Variance (ANOVA). A significant Kruskal Wallis H test indicates that atleast one sample stochastically dominates one other sample. The test does not identify where this stochastic dominance occurs or for how many pairs of groups stochastic dominance obtains. Since it is a non-parametric method, the Kruskal Wallis H test does not assume a normal distribution of

the residuals unlike the analogous One way Analysis of Variance. If the researcher can make the less stringent assumptions of an identically shaped and scaled distribution for all groups, except for any difference in medians,then the null hypothesis is that medians of all groups are equal and the alternative hypothesis is that at least one population median of one group is different from the population median of at least one other group. In the study, the Kruskal Wallis H test has been employed in order to examine whether the asset created by the dairy farmers is from the net profit obtained from undertaking dairying activity. For this, the average facilities of the families have been compared among various net income class.

3.6.7 Mann Whitney U test

Mann Whitney U test is the alternative test to the independent samples t- test. It is a powerful non parametric test that is used to compare two population means that come from the same population. It is also used to test whether two population means are equal or not. It is used for equal sample sizes, and is used to test the median of two populations. Wilcoxon rank sum, Kendall's and Mann Whitney U test are similar tests and in the case of ties, it is equivalent to the chi-square test.If the ordinal measurement is satisfied, Mann-Whitney U test can be used to test whether there is any significant difference between two independent groups. Mann Whitney U test has been employed under the study in order to examine whether there is significant difference in the number of persons employed under dairying among the respondents who have availed and not availed the assistance and incentives.

Let $H_0 : M_x = M_y$

And, n_1, and n_2 be the sample sizes where $n_1 < n_2$. To apply this test, first combine the observations of both samples and rank them in the order of increasing size. Let R_1 be the sum of the ranks obtained by the sample having n_1 observations, R_2 be the sum of ranks obtained by sample having n_2 observations. The test statistic U is calculated as

$$U_1 = n_1 \, n_2 + \frac{n_1 (n_1+1)}{2} - R_1 \; \ldots (1)$$

Or equivalently,

$$U_2 = n_1 \, n_2 + \frac{n_1(n_1+1)}{2} - R_2 \; \ldots (2)$$

Equations (1) and (2) give different values of U. the smaller value is taken as the best criterion.

Case I

When $n_1 < n_2 < 9$

$P_r(U \leq U')$ where 'U' is the observed value of U and are tabulated for various values of n_1 and n_2. If this observed probability is less than or equal to the value given in the statistical tables we reject the hypothesis.

Case 2

When $9 \leq n_2 \leq 20$

The critical values of U are tabulated for various values of n_1 and n_2 and at different levels of significance. If the observed value is less than or equal to the value given in the statistical table we reject the hypothesis.

Case 3

$N_2 > 20$

As n_1 and n_2 increase in size, the sampling distribution of 'U' approaches to normal distribution with

$$Mean = \frac{n_1 n_2}{2}$$

$$Variance = \frac{n_1 n_2 (n_1 + n_2 + 1)}{12}$$

$$Z = \frac{U - \frac{(n_1 n_2)}{2}}{\sqrt{[n_1 n_2 (n_1 + n_2 + 1)]}} \sim N(0,1)$$

In addition to the above tools, simple percentages have also been computed to find the share of each variable to the total of its head.

3.7 Conclusion

With the sample size of 133 dairy farmer respondents consisting of 100 member farmers, 30 non member farmers and three farms selected through multi-stage random sampling from five Taluks of Thrissur district, the impact of assistance and incentives have been investigated. Study region, sources of data, sample selection and critical variables were determined according to the requirements of the study objectives. Statistical tools were used in accordance with the availability and reliability of data to analyse the problem under study.

RESULTS AND DISCUSSION

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CHAPTER 4

RESULTS AND DISCUSSION

Dairying has been considered as an important source of income for small and marginal farmers in India since a certain per cent of the income of the rural households is contributed by milk. It helps to improve the status of rural masses especially weaker sections, consisting of small and marginal farmers and landless laborers and women of low income families. In India, a large majority of milk producers have one or two milch animals and account for about 70 per cent of milk production. Small and marginal farmers prefer this sector because of its short operating cycle, steady returns and a job that can be done manually with less dependency on others by making an initial investment. Dairying seems to be a viable option for villagers who don't otherwise have access to other lucrative and alternative employment opportunities. The villagers who are less educated and those who cannot aspire for a regular income white collar job can depend upon these cattle for meeting their day to day expenses and also a meagre share for saving.

The study titled "Economics of Dairying" has been undertaken with the following objectives.

(i) To examine the pattern of dairying adopted by farmers

(ii) To identify the sources, types and extent of assistance and incentives provided to the dairy farmers

(iii) To study the impact of assistance and incentives on the sustainability of dairying.

Based on the objectives of the study and the results of data analysis, the discussions are presented in five parts in the present chapter. A brief outline of the global scenario in dairying has been discussed in the first part of the chapter followed by the history of dairying in India and Kerala. The second part of the chapter consists of the sources, types and extent of assistance and incentives provided to the dairy farmers. As primary data analysis comes under the first objective, for meaningful analysis, the pattern of dairying adopted by the farmers has been analysed in the third part of the chapter followed by the economics of dairying. The impact of assistance and incentives on the sustainability of dairying forms the last part of this chapter. Hence the chapter is arranged under the following subheads.

4.1 Dairying: a prelude

4.2 Sources, types and extent of assistance and incentives provided to the dairy farmers

4.3 Pattern of dairying adopted by the farmers

4.4 Economics of dairying

4.5 Impact of assistance and incentives on the sustainability of dairying

4.1 Dairying: A prelude

Dairying holds great significance globally, nationally and also state level. Here a brief description has been done about the world's milk production, history of dairying in India and Kerala and also their performance in the field of milk production.

4.1.1 Dairying: Global scenario

In the year, 2013, the world cow's milk production stood at 636 million tonnes with the top ten producing countries accounting for 56.1 per cent of production. The largest milk producer in the world is USA producing 91 million tonnes in 2013, accounting for 14.4 per cent of world production, an increase of 0.4 per cent when compared to the year 2012. The second largest milk producer in the world is India producing nearly 61 million tonnes in 2013, accounting for 9.5 per cent of world production. The 10th largest producer of milk is United Kingdom producing nearly 14 million tonnes in 2013 and accounting for 2.2 per cent of world cow's milk production. Among the top ten largest milk producing countries, Turkey and Brazil have shown the largest percentage growth from 2012 to 2013 at 4.2 per cent and six per cent respectively. During the same period, the milk production in China has fallen by 5.6 per cent. (FAO, 2015)

Table 4.1 Milk production in the world, 1970 - 2010

Sl. No.	Year	World Milk Production(in million tonnes)
1	1970	391.82
2	1980	465.66
3	1990	542.47
4	1996	547.02
5	1997	550.77
6	2000	578.88
7	2005	648.00
8	2010	720.98
Growth rate (in %)		84.00

Source: FAOSTAT, 1970 – 2010

Table 4.1 shows the world milk production from the year 1970 to 2010. The figures clearly spell that over the years, there has been a consistent increase in the production of milk. In the year 1970, the world milk production stood at 391.82 million tonnes and has increased to 720.98 million tonnes, thus recording an increase of 84 per cent in the world milk production over the years.

4.1.2 History of Dairying in India

In India, dairying is recognized as an instrument for social and economic development. The nation's milk supply comes from millions of small producers, dispersed throughout the rural areas. These farmers maintain an average herd of one or two milch animals, comprising cows and/or buffaloes. The animals' nutritional requirements are largely met by agricultural waste and byproducts. Ample labor and a small land base encourage farmers to practice dairying as an occupation subsidiary to agriculture. While income from crop production is seasonal, dairying provides a stable, year-round income, which is an important economic incentive for the small farmer to take to dairying.

Milk production in India is dominated by small and marginal landholding farmers and by landless laborers who, in aggregate, own about 70 percent of the national milch animal herd. Dairying, as a subsidiary source of income, is a real relief to most of weaker groups in society.

Often one or two milch animals enable farmers to generate sufficient additional income to break the vicious subsistence agricultural-debt situation.

The World Bank Funded Operation Flood (OF) Programme covering all its three Phases (1970- 1996) commonly known as 'White Revolution' was instrumental for enhancing the milk production in the country. The operation flood programme was initiated with its novel objective of uplifting and empowering the small rural producers to become self-sufficient.

4.1.2.1 Dairy Co-operative Movement in India

The co-operatives have marked tremendous achievements in many segments of national economy. The co-operative efforts of small and marginal farmers in India got worth through the formation of dairy co-operatives. As on March 2010 the dairy co-operative network in India includes 177 milk unions, operating in over 346 districts, covering 1, 40,227 village level societies, owned by 14 million member farmers of which 4 million were women (NDDB, 2010).

The marginal milk producers in a small town named Anand (in Kaira District of Gujarat) had to travel long distance to deliver milk to the only dairy, the polson dairy in Anand. Many a times, the milk went sour as producers had to physically carry the milk in individual containers, especially in summer season and farmers had incurred huge loss. The agents of polson dairy arbitrarily decided the prices depending on the production and the season. Milk is a commodity that has to be collected twice a day from each cow/buffalo. In winter the producer was either left with surplus/unsold milk or had to sell it at very low prices. The polson dairy had been given monopoly rights by the government to collect milk form Anand and supply it to Bombay city in turn. The farmers were heavily exploited by the polson dairy. Angered by the unfair and manipulative trade practice, the farmers of Kaira district approached SardarVallbhbhai Patel (who later becomes the Deputy Prime minister of India) under the leadership of the local farmer leader Tribhuvandas Patel. SardarVallbhbhai Patel advised the farmers to form co-operative society and supply milk directly to the Bombay milk scheme instead of selling it to polson. He sent Morarji Desai (who later became Prime Minister of India in 1977) to organize the farmers. In 1946 the farmers of the area went on a milk strike refusing to be further oppressed. Thus the Kaira District Co-operative was established in 1946 and milk collection was also decentralized as most producers were marginal farmers who were in a position to supply only 1-2 liters of milk per day. Village level co-operatives were established to organize the marginal milk producers in

each of those villages. The co-operative was further developed and managed by Dr.V.Kurien along with Shri.H.M Dalaya. The first modern dairy of the Kaira union was established at Anand (which came to be known as AMUL dairy as its brand name). Indigenous R&D and technology development at the co-operative had led to the successful production of skimmed milk powder from buffalo milk- the first time on a commercial scale anywhere in the world. The foundation of a modem dairy industry in India was laid since India had one of the largest buffalo population in the world. Impressed with the development of dairy co-operatives in Kaira district and its success, Sri.Lal Bahadur Shastri, the then prime minister of India during his visit in Anand asked Dr.Kurien to replicate the Anand Model dairy co-operative all over India. Thus the National Dairy Development Board (NDDB) was formed and Operation Flood Programme was launched for replication of the Amul Model all over India.

4.1.2.2 The Three -tier "Amul Model"

The Amul model is a three —tier co-operative structure consists of dairy co-operative society at village level affiliated to a milk union at the district level which in turn is federated into milk federation at state level. The three-tier structure was setup in order to delegate the various functions. Milk collection is done at village level dairy society, milk procurement & processing at the district milk union and milk & milk products marketing at the state milk federation. This helps in eliminating internal competition and ensures that each tier has got clearly defined role in the business operation. This structure was first evolved at Amul in Gujarat and replicated all over the county under the Operation Flood and came to be known as the "Amul model" or Anand pattern of dairy co-operatives.

Fig.4.1 Organizational Structure of Anand Pattern Dairy Co-operatives

```
        ┌─────────────────────────────────────┐
        │   State Level Dairy Co-operative     │
        │            Federation                │
        └─────────────────────────────────────┘
                       ⬆
        ┌─────────────────────────────────────┐
        │ District Milk Producers Co-oprative Union │
        └─────────────────────────────────────┘
                       ⬆
        ┌─────────────────────────────────────┐
        │  Village Level Producers Co-operative │
        │               Society                │
        └─────────────────────────────────────┘
                       ⬆
        ┌─────────────────────────────────────┐
        │      Dairy Farmers at the Village    │
        └─────────────────────────────────────┘
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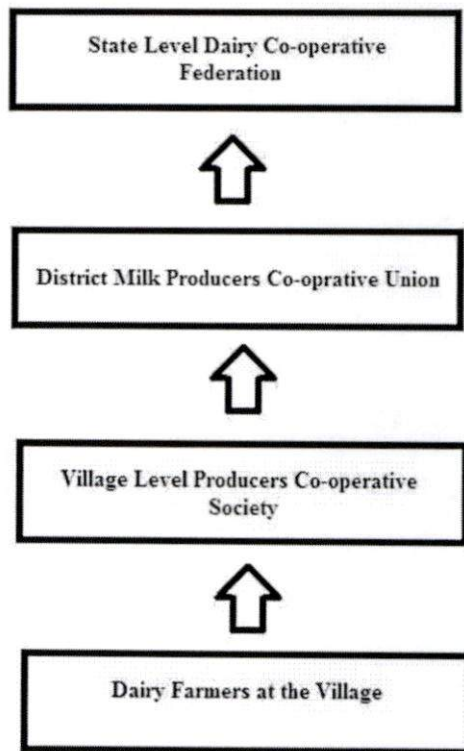
The primary milk producers democratically govern this entire federal co-operative structure to ensure that the higher tier organizations are geared to serve the purpose of the lower levels and the gains at all levels flow ultimately back to the milk producers in a significant measure. The core feature of Anand model is the farmer control on all the three stages that is procurement, processing and marketing of milk and milk products. The value addition at procurement and processing stages can be realized by the cooperatives only through control over marketing thus making control over marketing essential and critical features for success. In contrast, many dairy co-operatives worldwide end up as suppliers of raw materials to private companies as the private companies own the brands and marketing.

(i)   Village Dairy Co-operative Society

The milk producers of a village, having surplus of milk after own consumption, come together and form a village dairy co-operative society which is the primary society under the three tier structure. It has membership of milk producers of the village and is governed by elected management committee consists of 9 to 12 elected members, based on principle of one

member, one vote. The village society appoints a paid secretary and a few staff for the management of the day to day functions. The major functions of the village dairy co-operative society are mainly the following

- the collection of surplus milk from the milk producers of the village, payment based on quality and quantity (price bases on FAT& SNF) of milk supplied providing support services to the members like veterinary first aid, artificial insemination services, cattle-feed sales, mineral mixture sales, fodder and fodder seed sales, conducting training on animal husbandry and dairying.
- selling liquid milk for local consumers of the village
- supplying milk to the district milk union

The village milk co-operative is an independent entity managed locally by the milk producers and assisted by the district milk union.

(ii)   District Co-operative Milk Producers Union (Milk Union)

The village dairy societies of a district having surplus milk after local sales come together and form a milk union. The milk union is the second tier under the three -tier structure. It has got membership of village dairy societies of the district and governed by the board of directors elected from affiliated village dairy co-operatives. The milk union is managed by the appointed professional management team consisting of a managing director and competent staff. The main functions of milk union are as follows:

- Procurement of milk from village dairy societies coming under its preview
- Arranging transportation of raw milk from village societies to the union
- Providing input services to the producers like veterinary care, artificial insemination services, cattle-feed sales, etc.
- Conducting training on co-operative development, animal husbandry & dairying for milk producers and conducting specialized skill development and leadership development training for village dairy society members and staff.

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(iii)   State Co-operative Milk Federation (Federation)

The milk unions of the state are federated into a state co-operative milk federation. The federation is the apex tier under the three tier structure. It has membership of all the co-operative milk unions of the state and is governed by board of directors consisting of elected representative of each milk union. The state federation appoints a managing director and competent staff for the professional management of the federation. The main functions of the federation are as follows:

- Marketing of milk and milk products processed/manufactured by milk union
- Establishing distribution network for marketing of milk and milk products
- Arranging transportation of milk and milk products from the milk union to the market
- Creating and maintaining a brand for marketing of milk and milk products
- Providing support services to the milk unions and members like technical inputs, management and advisory services
- Pooling surplus milk from the milk unions and supplying it the deficit unions
- Establish feed balancing dairy plants for processing the surplus milk of the unions
- Arranging for common purchase of raw material used in manufacture /packing of milk products
- Deciding the prices of milk and milk products to be paid to milk unions
- Deciding on the products to be manufactured at various milk unions
- Planning long-term milk production and procurement & processing as well as marketing.
- Arranging finance for the milk unions and providing them technical knowhow
- Designing and providing training on co-operative development, technical & marketing functions.
- Conflict resolution and keeping the entire structure intact.

4.1.2.3 The Operation Flood Programme in India

Operation Flood, the world's largest dairy development programme, was based on the rich experience gained from the "Amul Model" dairy co-operatives. This innovative three tier organization structure has combined the productive capacity of dairy farmers with professional management and modern dairy technology. Major objectives of Operation flood projects were increase in milk production, augment rural income and fair prices for consumers. Operation flood programme was implemented in three phases.

Table 4.2 Operation Flood Programme in India, 1970 - 1987

Key parameters	Operation Flood Phases		
	Phase 1	Phase 2	Phase 3
Date of start	July 1, 1970	April 1, 1981	April 1, 1987
Date of ending	March 31, 1981	March 31,1985	April 30, 1996
Investment(Rs. Crore)	116.50	277.20	137.95
No of Milk sheds	39	136	170
No of DCSs set up	13270	34523	72744
No of members (Lakh)	17.5	36.3	93.0
Average milk procurement (million kg/day)	2.56	5.78	11.0
Liquid milk marketing (million liters/day)	2.78	5.01	10.02
Processing capacity Rural Dairies(million liters per day)	4.54	8.80	19.20
Metro Dairies (million liters per day)	2.90	3.50	7.28
Milk Drying Capacity (mt/day)	340.0	507.0	990.0
Technical Inputs No of Artificial Insemination Centres	4868	7802	10915
No. of Artificial Insemination done/year	820782	1329455	3943890
Cattle feed capacity(thousand mt/day)	1.7	3.3	4.9

States Covered	Andhra Pradesh, Bihar, Delhi, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Uttar Pradesh, West Bengal	Assam, Goa, Himachel Pradesh, Jammu Kashmir, Kerala, Orissa, Sikkim, Tamilnadu, Tripura, Andaman and Nicobar, Pondicherry in addition to the states covered under phase 1.	States covered under phase 1 and phase 2

Source: A note on the achievements of the dairy cooperatives (www.amul.com)

Table 4.2 indicates three phases of operation flood. Phase I lasted from 1970-1980. It was financed by the sale of skimmed milk powder and buffer oil gifted by European Economic Community (EEC) through the World Food Programme. NDDB planned the programme and negotiated the details of EEC assistance. During this phase, Operation Flood linked 18 of India's premier milk sheds with consumers in India's four major metropolitan cities viz, Delhi, Mumbai, Kolkata and Chennai.

Phase II commenced in 1981 and lasted till 1985. It increased the milk shed from 18 to 136 and 290 urban markets expanded the outlets for milk. By the end of 1985, a self- sustaining system of 43000 village dairy co-operatives covering 4.25 million milk producers had come into the network. Domestic milk powder production had increased from 22,000 tons in the project year to 140,000 tons by 1989; all this came from dairies set up under Operation Flood. The EEC grant and World Bank Loan helped to promote self-reliance. Direct marketing of milk by producers' co-operatives have increased by several million litres a day.

Phase III started in 1985 and lasted till 1996. It enabled dairy co-operatives to expand and strengthen the infrastructure required to procure and market increasing volumes of milk. Veterinary first aid services, feed and artificial insemination services for co-operative members were extended, along with intensified member education. This phase consolidated India's dairy co-operative movement adding 30,000 new dairy co-operatives to the 42,000 existing village milk co-operatives organized during Phase II. This Phase gave increased emphasis to research and development in animal health and animal nutrition. Innovations like vaccine for Theileriosis,

bypass protein feed and urea-molasses mineral blocks, all contributed to the enhanced productivity of animals.

4.1.2.4 Impact of Operation flood

The Amul model (Anand pattern) co-operatives seem to be the most appropriate organizational force for promoting agricultural development, using modern technologies and professional management. And thereby generating employment for the rural masses and eradicating poverty in undeveloped areas. India has demonstrated the superiority of this approach. The assets and facilities at all levels are owned by farmers and the co-operatives were able to build markets, supply inputs and create value added processing. Prompt and remunerative payment for produce of good quality has ensured the best incentive for the farmers to increase production and quality. The effect of Operation Flood programme was appraised by World Bank and commended that an investment of Rs.2000 crores over 20 years under Operation Flood has contributed to increase of India's milk production by 40 Million Metric Tonne (MMT) i.e. from about 20 MMT in Pre - Operation flood to more than 60 MMT at the end of Operation Flood Programme. An incremental return of Rs.40, 000 crores annually has been generated by an investment of Rs.2000 crores over a period of 20 years. This has been the most beneficial project funded by the World Bank anywhere in the world. The movement has helped India to attain the status of the largest milk producing country in the world and per capita milk consumption has increased from 107 grams per day in 1970 to over 226 grams per day in 2002. The substantial increase in milk production and milk availability has resulted in the stabilization of milk prices in the country. As per the report of World Bank on the impact of dairy development in India, the three - tier 'Amul model' has been instrumental in bringing about the white Revolution in the country. The 'Anand pattern' has demonstrated the following benefits:

- The role of dairying in poverty reduction
- The fact the rural development involves more than agricultural production
- The value of national 'ownership' in development
- The beneficial effects of higher incomes in relieving the worst aspects of poverty
- The capacity of dairying benefiting the poor at low cost and create jobs for the poor
- The importance of commercial approach to development
- The capacity of single commodity projects to have multi-dimensional impacts

- The importance of getting government out of commercial enterprises
- The power and problems of participatory organizations
- The importance of policy

4.1.2.5 The present status of dairying in the country

Dairy farming has been recognized as a major livestock enterprise in India where small and marginal farmers are engaged to earn their livelihood. In the year 2001, India has emerged as the largest producer of milk in the world with an annual production of 84 million tones. India recorded peak production of milk at 132.43 million tonnes (MT) in 2012-13, becoming the top milk producer globally, milk production in the year 2011-12 was 127.9 MT. Milk production in India, the world's largest producer and consumer, stood at 132.4 million tonnes 2012-'13, as per National Dairy Development Board (NDDB) data. Milk production is estimated to have increased by 6 per cent to about 140 million tonnes in 2013-14 fiscal helped by normal monsoon and increase in demand for dairy products. The per capita availability of milk has also increased from 225 grams per day in 2001-02 to 290 grams per day in 2011-12. Per capita availability of milk in India, world's largest milk producer, is slightly more than the world average.

Table 4.3 Production and per capita availability of milk in India, 2003-04 to 2013-14

Year	Milk Production (Million Tonnes)	Per capita availability (grams/day)
2003-04	88.082	231
2004-05	92.484	233
2005-06	97.066	241
2006-07	102.580	251
2007-08	107.934	260
2008-09	112.183	266
2009-10	116.425	273
2010-11	121.848	281
2011-12	127.904	290
2012-13	132.431	299
2013-14	137.70	307
CAGR	0.042	0.026

Source: Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, GOI, 2015

Table 4.3 reflects the production and per capita availability of milk in India. Both the production and per capita availability of milk show a positive compound annual growth rate of 0.042 and 0.026 respectively. Over the years, there has been an increasing trend in the production and per capita availability of milk and it is graphically represented by means of line diagrams in figure 4.2 and figure 4.3.

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Fig 4.2 Milk production in India
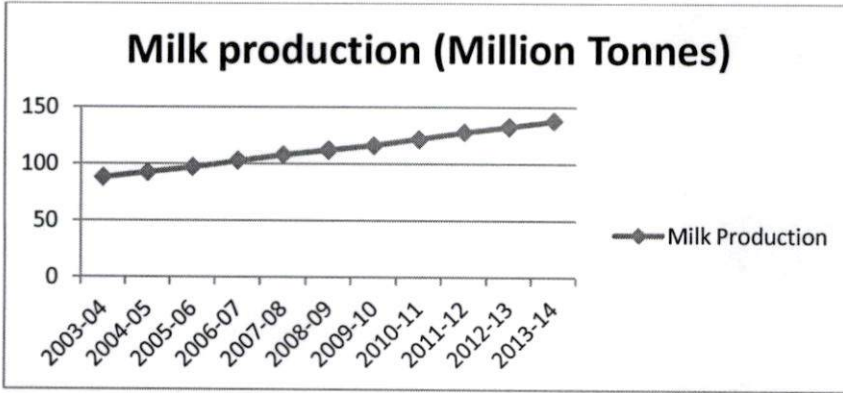
Source: Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, GOI, 2015

Figure 4.2 shows a rising trend in the production of milk in India from the year 2003-04 to 2012-2013. The milk production has increased from 88.082 million tonnes in the year 2003-04 to 137.70 million tonnes in the year 2013-14.

Fig 4.3 Per capita availability of milk in India
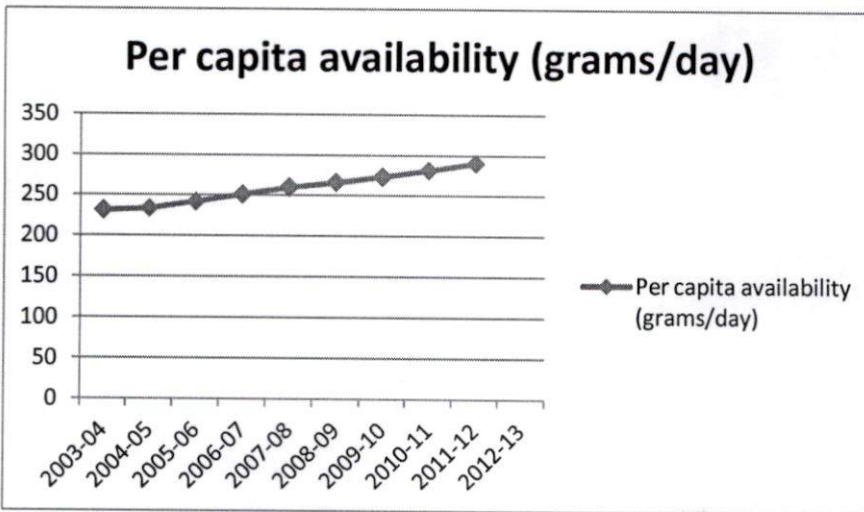
Source: Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, GOI, 2015

Figure 4.3 indicates an increasing trend in the per capita availability of milk in India. The per capita availability of milk has increased from 231 grams per day in the year 2003-04 to 132.431 grams per day in the year 2011-2012.

Fig. 4.4 Contribution of milk production from various sectors

Contribution of milk production from various sectors

■ private sector　■ co-operatives sector　■ unorganized sector

16%

17%

67%
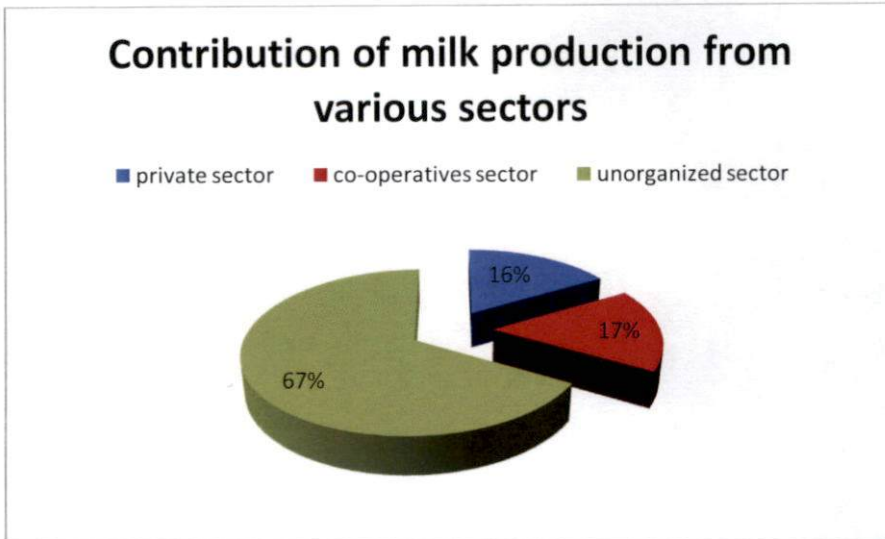
Source: Department of Animal Husbandry and Dairying cited in GoI, 2010

About 80 per cent of milk produced in the country is handled in the unorganized sector and the remaining 20 per cent is equally shared by co-operatives and private dairies. Over 1.33 lakhs village level dairy co-operatives spread over 265 districts in the county collect about 25.1 million litres of milk per day and market about 20 million liters of milk per day in the country. The efforts of the government in the dairy sector are concentrated in promotion of dairy activities in non-Operation Flood areas with emphasis on building infrastructure and, revitalization of sick dairy co-operatives and federations and creation of infrastructure in the states. (Source: GoI, 2010)

4.1.3 Dairying in Kerala

In Kerala, dairying continues to occupy a prominent position as a subsidiary occupation to agriculture. Co-operative sector has made remarkable progress in Kerala. Different types of co-operative societies are organized and they are now operating in all areas of human activity. Banking, agriculture, industry, dairying etc. are some of the fields where co-operatives are operating successfully in Kerala. Even in the fields of education, public health and transport, co-operatives play a significant role in Kerala. In the field of dairy, co-operatives have made remarkable progress in Kerala during the last decade. The first dairy co-operative in Kerala was the Palakkad Co-operative Milk Supply Union Ltd, which was registered in 1949. After the

formation of this society, a number of dairy co-operatives were formed in different parts of Kerala. By 1962 there were 50 dairy co-operatives in Kerala.

In the state majority of the dairy farmers are organized under village level dairy co-operatives .The Anand Model was implemented in Kerala under the second and third phases of Operation Flood Project (1980-96) with formation of Kerala Co-operative Milk Marketing Federation (KCMMF) popularly known as MILMA and the regional unions and village level Anand pattern co-operative Societies (APCOS). The Period 1980-1997 was considered as a golden era in the history of dairy development in Kerala with MILMA taking leadership in all aspects of dairy development in the state viz., formation of village level dairy co-operatives, programmes for enhancement of milk production, diary extension and veterinary services and training of dairy farmers, procurement, processing and marketing of milk and milk products including the price control of milk in the market. MILMA could replicate the successful Anand model in Kerala. The milk production in the state has reached a situation of plenty where MILMA was even struggling to manage the excess milk through production of value added products and by applying various marketing strategies to increase the sale of milk in the State. Once the contract of the Government of Kerala with National Dairy Development Board (NDDB) regarding the implementation of Operation Flood Project was over in 1996, policy of the government has changed in such a way that the MILMA became only a milk procurement and marketing agency. The foundational aspects of local level milk production namely, the administrative control of dairy co-operative societies, formation of new dairy co-operatives, dairy development initiatives, extension services and animal health care services were entrusted back to the government departments of Dairy Development, Animal Husbandry and Kerala Live Stock Development Board with MILMA having no significant roles in the key aspects of dairy development and consequently the business model of Anand Pattern got weakened in the State. Excessive control of government in the dairy sector has resulted in weakening of the federal co-operative organization of the people. The leadership which was with farmers in all stages of milk production and marketing has changed in favour of officials of the departments under the government policy decision to control the administration of APCOS through Dairy Development Department. The APCOS had become units fully controlled by government department and co-operative system has weakened with the weakening of people's organizations in the villages. The farmers had become just producers and suppliers of milk and milk price too is determined by the

Government. The peculiarity of dairy sector in Kerala is that different agencies are working for dairy development and for the welfare of dairy farmers with more or less similar programmes and services along with MILMA formed under the operation Flood Project.

4.1.3.1 Kerala Co-operative Milk Marketing Federation (KCMMF)

Kerala Co-operative Milk Marketing Federation (KCMMF), popularly known as MILMA was established in April, 1980 with its Head Office at Thiruvananthapuram for the successful implementation of the Operation Flood Project in Kerala. At present the MILMA Federation consists of 8.31 lakhs dairy farmers of 2678 village level primary milk co-operative societies organized under three regional milk producers unions namely TRCMPU (Trivandrum Regional Co-operative Milk Producers Union (JRCMPU), Ernakulum Regional Co-operative Milk Producers Union (ERCMPU), and Malabar Regional Co-operative Milk Producers Union (MRCMPU).

The three tier system of Anand pattern is followed in Kerala with slight modification. Instead of the district level milk producers union of the Anand Model, MILMA had developed three regional milk producers unions for the south, central and northern regions of the State of Kerala. The MILMA owns thirteen dairies capable of handling 12 lakhs litres milk per day, ten milk chilling units, two cattle feed plants with a cumulative capacity of 600 MT per day, one milk powder plant of 10 MT per day capacity and a training centre and about 5200 retail outlets and providing direct /indirect employment to over 32000 people in Kerala. The village dairy co-operatives are popularly known as APCOS (Anand Pattern Co-operative Society) and the operational area of an APCOS comprises of two wards of a local Panchayath. The dairy farmers of the area could take membership in the milk society. As per the Bye-law of APCOS the minimum of 25 members are required to form a dairy co-operative society. A set of diary co-operatives commonly known as Industrial Dairy Co-operatives or Traditional Dairy Co-operatives are functioning in Kerala apart from the main stream Anand Pattern Co-operatives (APCOS). These traditional milk co-operatives were established before the period of the Operation Flood Project (1980) and they had not opted for re-registration as APCOS during Operation Flood Project and continued to keep their administration independent of the three tier system of Anand Pattern followed in Kerala. Some of these traditional milk societies have their own system of collection and marketing of milk in their local areas of operation and some others

sell milk to the regional milk unions of KCMMF (MILMA, 2010). A major activity of the APCOS is the daily collection of milk from the farmers on all the 365 days of the year. The average procurement of milk from the APCOSs in the Kerala during the last two years are given in the following Table.

Table 4.4 Average milk procurement in litres per day by the Milk Unions under KCMMF, 2012-13 to 2013-14.

Regional Unions	2012-13	2013-14
TRCMPU(Trivandrum)	206516	230854 (11.79)
ERCMPU(Ernakulum)	206396	220031(6.61)
MRCMPU(Malabar)	466877	490621 (5.09)
Total	879789	941506 (7.01)

Source: Annual Report 2014, MILMA
Note: (i) Figures in parenthesis represent the percent increase in the Average Milk Procurement in litres per day by the Milk Unions under KCMMF

Table 4.4 indicates the average milk procurement in litres per day by the milk unions under KCMMF. From this Table, it could be observed that the Trivandrum Regional Co-operative Milk Producers Union has recorded an increased percent in its average milk procurement in litres per day followed by Ernakulum Regional Co-operative Milk Producers Union and Malabar Regional Co-operative Milk Producers Union. Over the years, the total milk procurement by all the milk unions have also increased. The above data is graphically represented by means of line diagram in figure 4.5.

Fig. 4.5 Average milk procurement in litres per day by the Milk Unions under KCMMF
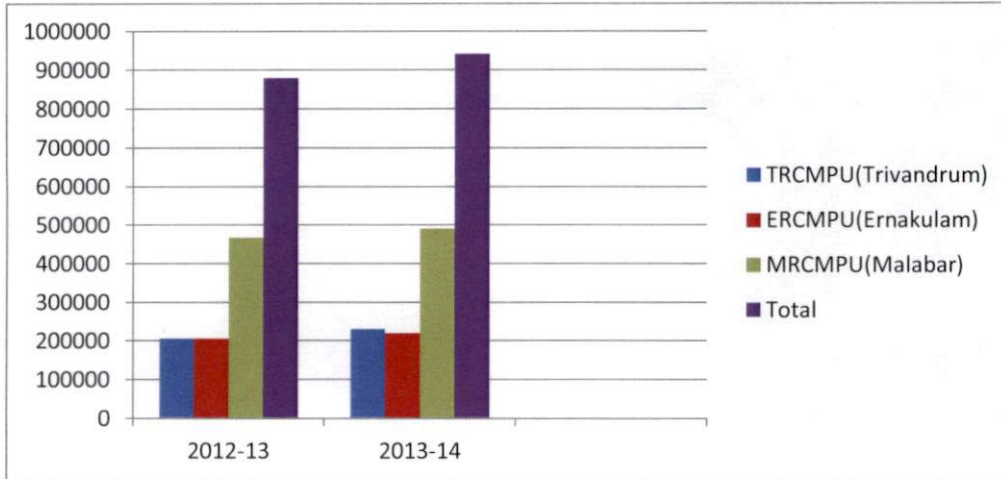
Source: Annual Report 2014, MILMA

Fig 4.5 indicates that during the last two years, the average milk procurement in litres per day by the milk unions under KCMMF has increased. There has been a 11 per cent increase in the case of Trivandrum Regional Co-operative Milk Producers Union by reporting 206515 litres per day in the year 2012-2013 to 230854 litres per day in the year 2013-2014. Erunakulam Regional Co-operative Milk Producers Union and Malabar Regional Co-operative Milk Producers Unions have also shown an increasing trend in its average milk production in litres per day at the rate of 6 per cent and 5 per cent respectively. And this has been resulted a 7 per cent growth rate in the total milk procured by all the milk unions under KCMMF.

4.1.3.2 Department of Animal Husbandry

The Animal Husbandry Department of Kerala came into existence in 1956 and has witnessed a spectacular and impressive progress over the last four years owing to meticulous planning, comprehensive efforts and result oriented interventions. Livestock sector has transformed from sustenance to substantially impacting economic development of rural Kerala evolving from backyard to commercial ventures. The state has diverse livestock wealth and animal resources. The major activities of the department are veterinary services, animal health care, disease eradication, cattle, goat, pig and poultry development, extension training for farmers and veterinarians. implementation of breeding policy, transfer of technology from lab to field, supply of good quality gem plasma, promote fodder production, effective control of animal diseases, treatment, vaccination and creating public awareness regarding proper animal care.

During the last 50 years Animal Husbandry Department has made a very significant growth. To its credit, department has 2638 institutions under the State Directorate of Animal Husbandry. Out of the same, there are 852 veterinary dispensaries and 213 veterinary hospitals headed by qualified veterinary graduates and post graduates. Apart from this, 47 veterinary poly clinics, 14 district veterinary centres, 9 mobile clinics, and 1 motor boat clinic are functioning with specialist veterinary surgeons and para-veterinary staff. Artificial insemination programme has another 1358 centres manned by qualified para-veterinary staff.

For strengthening the cattle farms;

- The department has four livestock farms, which promote dairy entrepreneurs by way of supply of good quality young ones, act as demonstrational forms.
- Procure parent stock with good production potential.
- Existing farms will be made to function as model farms so as to offer hands on training
- Support the training centres to provide specialist training to technicians of our department.

4.1.3.3 Department of Dairy Development

The Department of Dairy Development established in 1962 has statutory functions under the Kerala Co-operative Societies Act 1969 and the Milk and Milk Products Order (MMPO) 1992 issued by the Government of India under the Essential Commodities Act. The Department has the responsibility to monitor the 18 dairies registered under the MMPO in the state. The objectives of the department are to enhance milk production and rural consumption of milk, provide facilities for profitable dairying, administration of dairy co-operatives under the powers of Kerala Co-operative Societies Act, register and control milk processing plants under milk and milk products regulation under the Food Safety and Standards Authority of India and to check and ensure quality of milk produced and marketed in the state. The department is the nodal agency for fodder development and rural dairy extension services. Dairy farmers, housewives, dairy co-operators and dairy co-operative employees are imparted training in different aspects at the dairy training centres of the department. Besides developmental programmes, there are 3163 primary dairy co-operatives, three regional unions and one apex federation (MILMA) under the administrative supervision of this department. Financial assistance is extended to dairy co-operatives in addition to technical advice under the plan fund allocation. The director of dairy

development is the head of the department with headquarters at Pattom, Trivandrum. The district offices are headed by the Deputy Directors of Dairy Development. The cutting edge level of the department is the Dairy Extension Service Unit (DESU), functioning under a Dairy Extension Officer (DEO) at block level. The District Milk Quality Control Unit headed by an assistant director of dairy development i.e. Quality Control Officer (QCO) is attached to the respective district office. There are five dairy training centres of the department viz. at Trivandrum, Oachira, Kottayam, Alathur and Kozhikode each headed by a deputy director of dairy development/principal. The Dairy Development Department offers the following services to the farming community and to the general public:

- Dairy extension and advisory services in modem scientific cattle management, feeding, fodder cultivation, fodder preservation, utilization of farm waste, value addition by conversion of milk into milk products etc.

- Preparation of schemes to be implemented by the department, LSGDs and other bankable schemes.

- Assist farmers in establishing dairy units.

- Provide information regarding mechanization of farm activities.

- Provide planting materials for the propagation of fodder crops.

- Provide training in various aspects of dairying

- Conducting exhibitions, contact classes, demonstrations etc.

- Provide facilities for testing quality of milk to ensure safety of public health

- Test the quality of milk samples brought by public and provide the results

- Provide any information related to dairying as requested by the general public

- Assist farmers in organizing dairy co-operatives for marketing surplus milk

- Conduct enquiries based on complaints received from public

4.1.3.4 Production of Milk in Kerala

India continues to be the largest producer of milk in the world with a total production of 132.4 million tonnes in 2012-13 where Kerala's contribution was only 2.79million tonnes (2.38 per cent of the total milk production in India). The following Table 4.4 shows the year wise production of milk and per capita availability of milk for the last ten years.

Table 4.5 Production of milk and per capita availability of milk in Kerala for the last ten years, 2003-04 to 2012-13

Year	Milk Production (Million Tonnes)	Per capita availability (grams/day)
2003-04	2.111	173
2004-05	2.025	169
2005-06	2.063	171
2006-07	2.119	174
2007-08	2.253	183
2008-09	2.441	197
2009-10	2.509	201
2010-11	2.645	210
2011-12	2.716	223
2012-13	2.791	216
CAGR	0.028	0.022

Source: Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, GOI, 2015

Table 4.5 indicates the production of milk and per capita availability of milk in Kerala for the last ten years. Both the production and per capita availability of milk indicate a positive compound annual growth rate of 0.028 and 0.022 respectively. The above data is graphically represented by means of line diagram in figure 4.6 and figure 4.7.

Fig. 4.6 Milk production in Kerala
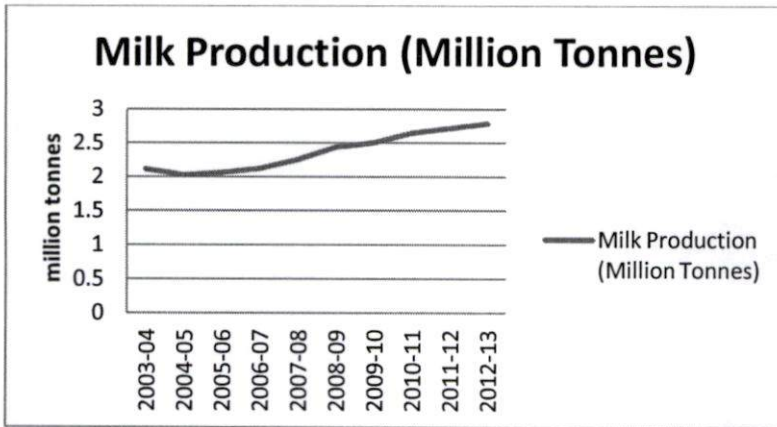
Milk Production (Million Tonnes)

Source: Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, GOI, 2015

Figure 4.6 reveals a continuous increase in the production of milk during the past 10 years though there has been a slight decrease during the years 2004-05 and 2005-06. There has been a gradual increase from 2.111million tones in the year 2003-04 to 2.791 million tonnes in the year 2012-2013.

Fig.4.7 Per capita availability of milk in Kerala
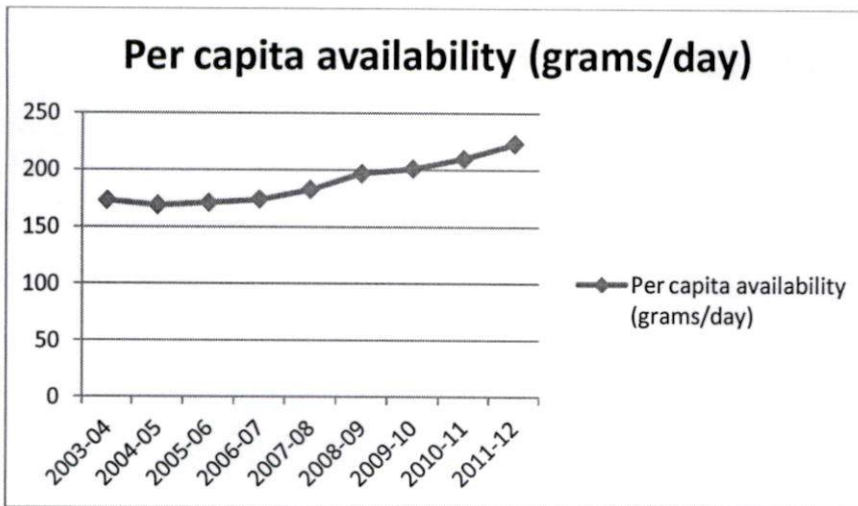
Per capita availability (grams/day)

Source: Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, GOI, 2015

Figure 4.7 shows the per capita availability of milk in Kerala. Though there has been a slight decline during the years 2004-05 and 2005-06, from the years 2006-07, there has been a consistent growth and has increased to 223 grams per day in the year 2011-12.

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After analyzing the history of dairying and comparing the performance at the international, national and state level by taking into account the production and per capita availability of milk, the first objective of the study, titled the pattern of dairying adopted by the farmers is analyzed in the same section.

4.2 Sources, types and extent of assistance and incentives

Dairying, because of its peculiar features, needs adequate and timely support to have a sustained production and growth. Because of the inherent risks involved in this activity, the farmers who undertake this profession should be supported through proper interventions which ensure them feasibility and viability for their venture. As part of the second objective of the study, the assistance and incentives from various institutional agencies such as MILMA, Animal Husbandry Department and Dairy Development Department have been studied. The awareness and availability level of each assistance have also analysed separately.

4.2.1 Incentives from MILMA

Incentives from MILMA include disbursal of paddy straw at concessional rate to dairy farmers, mediclaim insurance scheme for dairy farmers, their family and their laborers, subsidy for cattle shed development, rubber mat at subsidy rate, financial assistance for farmers whose cattle have died of foot and mouth disease, adopting heifer cows under the MILMA "Ksheeravardhini" scheme, cattle insurance premium subsidy, financial assistance for initiating calf rearing unit for scheduled women, interest subsidy for dairy farmers who have taken loan for purchasing cattle and summer Incentive.

4.2.1.1 Disbursement of paddy straw at concessional rate to dairy farmers

During summer season, the farmers are depending upon paddy straw for feeding the cattle. But it is difficult to obtain it economically. As a solution to this, in order to take paddy straw from coal lands where it is abundantly available to the societies, regional union has introduced a scheme as in the previous years. Paddy straw would be well dried and be made as round bails using bailing machine. The cost of paddy straw per Kg would be Rs. 7.25. The region will bear the transportation cost for making available it to the societies. About 3000 kg of paddy straw could be stored in one lorry. The responsibility for making available the paddy straw to dairy farmers would be solely to farmer/society. The farmers who have supplied milk more than 50 per cent to society would be eligible for availing the subsidy benefit. Otherwise the

farmers need to obtain it at the rate of Rs. 8.50 per kg. As per this, the societies which need paddy straw have to obtain the intent from the farmers and need to submit it to the P&I unit. The price of paddy straw could be charged against the milk price.

4.2.1.2 Mediclaim Insurance Scheme for dairy farmers, family and labourers

The Insurance scheme for dairy farmers, their family members and their labourers who are affiliated to APCOS would be continued to receive the benefits under this scheme. Those farmers who are already enrolled in the scheme are not required to submit new proposal. The age group that can be included in the scheme ranges from 3 to 69. The maximum amount of insurance allowance for one person, per year is Rs. 30000 whereas for one family, the amount is Rs. 50000 and for one disease, the maximum amount is Rs.20000. Beyond, if an accident death happens to the proposer, nominee can obtain Rs. 25000. Claims that have undergone hospital treatment for at least 24 hours will be considered. But this will not be made applicable for dialysis, chemotherapy, radio therapy, surgery undergone for eye, surgery undergone for teeth, lithotripsy and fracture. Insurance coverage would not be allowed for those persons who have been caught with diseases within 30 days after being enrolled in the scheme. But this will not be applicable in the case of accidents.

4.2.1.3 Subsidy for cattle shed development

As part of the clean milk production scheme launched by the Ernakulum regional union with the financial assistance from central government, the cattle shed development subsidy was envisaged for providing an amount of Rs.10000 for cattle shed development. Beneficiary should be of the member of the society which has affiliation to Ernakulum regional union. Subsidy would be allowed for farmers who are newly building cattle shed or rebuilding the existing cattle shed. A Beneficiary should get a maximum amount of Rs.10000 as subsidy.

4.2.1.4 Rubber mat at subsidy rate

The cost of one rubber mat with 25mm width having 5 years guarantee including tax amounts Rs.1775. For this, for one rubber mat regional union would provide a subsidy of Rs. 500. Thus the farmer can obtain it at the rate of Rs.1275. The price is low when compared to the market price. Rubber mats would be made available to the concerned P & I units. The subsidy would be allowed only to those member societies which have supplied 50 per cent or more than

50 per cent of the procured milk to the regional union. A farmer can get two rubber mats at subsidy rate. Those who want to purchase more than two rubber mats have to obtain it by paying the actual cost. To a society, a maximum of 30 rubber mats would be provided. Those societies which want more than 30 rubber mats are required to purchase it at actual cost. The price of rubber mat has to be obtained from the farmers to the society and will be charged against the milk price. One rubber mat weighs about 42 kg.

4.2.1.5 Financial assistance for farmers whose cattle have died of foot and mouth disease.

As a relief to the farmers who are the pouring members of the society whose cattle have died of foot and mouth disease, the regional union is providing an amount of Rs. 10000. The applicant farmer should have poured at least 200 liters of milk during the period from 2012 Dec 1 to 2013 November 30. The society to which the farmer is affiliated should be a member society of the union and the society should have supplied more than 50 per cent of the milk procured. Assistance would be provided for those farmers whose cattle have died during the period from 2013 Dec 1 to 2014 Jan 31st. Copy of the post-mortem certificate together with the evidences of treatment obtained is required to submit. The application should be submitted within 10 days of the death of the cattle. With the recommendation of P& I unit, the applicant should sent it to the Edappally office of the union.

4.2.1.6 Adopting Heifer cows under the MILMA "Ksheeravardhini" Scheme

This is a scheme for giving financial assistance for adopting good heifer cows and to rear them in order to augment the milk production. Cattle feed should be supplied to the selected heifer cows from the society at 50 per cent reduction. The other 50 per cent would be given from the regional union to the society. The cattle feed thus obtained should be compulsorily given to the heifers. The officials from MILMA should inspect and have to ensure that these heifers have the required weight. If it is found that the heifer is not having required weight, those beneficiary will be avoided from the scheme. After the calving, the milk should be poured to the society. In order to get the subsidy, the societies should submit claims, voucher etc to the concerned P & I unit. Based on this, the society can obtain 50 per cent value of the cattle feed with the milk price from the regional union.

4.2.1.7 Cattle Insurance Premium Subsidy

Cattle insurance premium subsidy is aimed at assisting the dairy farmers with an amount of Rs. 100 as subsidy for paying the insurance premium amount.

4.2.1.8 Financial assistance for initiating calf rearing unit for scheduled women

A scheme for providing five calves each for 300 scheduled women has been initiated with the financial assistance from scheduled caste development department. The scheme is offered for the scheduled women from Thrissur, Erunakulam, Kottayam, and Idukki districts which come under the area of operation of Erunakulam Regional Union. From the total expense of an amount of Rs.199250, amounts of Rs.176300 and Rs.15300 will be contributed by scheduled caste development department and regional union respectively and the remaining 7650 Rs. need to be paid by the beneficiary. As per this scheme, the beneficiaries would get five calves each which are of the age above 6 months and for up to 18 months, the sufficient feed and other concentrate mixtures will be given for feeding calves.

4.2.1.9 Interest subsidy for dairy farmers who have taken loan for purchasing cattle

The dairy farmers who have purchased cattle by taking loan will be assisted by providing interest subsidy. An Interest subsidy of Rs.1500 per cattle will be provided. A dairy farmer who own up to a maximum number of four cattle can get this assistance. Those farmers who are affiliated to the society which pour not less than 50 per cent of the total milk to the regional union will be eligible for getting this assistance. Subsidy will not be allowed to the same loans which have already received this facility. The dairy farmer should be a person who pours the entire milk to the society after taking for his own consumption and also he should have poured on an average seven litres of milk per cow to the society from the date on which he has taken loan.

4.2.1.10 Summer Incentive

To increase the production of milk considering the rising production cost due to severe drought in the summer season, the farmer, who is a member of the society, will be provided an addition of Rs.2 per litre along with the milk price.

Among the assistance and incentives provided by MILMA, financial assistance for farmers whose cattle have died of foot and mouth disease and financial assistance for initiating calf rearing unit for scheduled women have not found to be aware and availed by any of the respondent dairy farmers whereas summer incentive provided by MILMA found to have more awareness and availability level when compared to others. The respondents reportedly pointed out the easy accessibility of this incentive amount. During the summer season, the members who are permanently pouring milk to the society could get Rs. two per litre along with the milk price as an encouragement to increase production. As the payment is done directly from the society to farmers, without any procedural formalities and eligibility criteria, all the member dairy farmers could get this incentive and the respondents are highly satisfied and have a good opinion about this incentive.

4.2.2 Assistance from Animal Husbandry Department

Assistance from Animal Husbandry Department includes project to provide one pregnant heifer, 2 adult female goats and 10 (55-60 days old) chicks, cattle insurance scheme, integrated livestock development project as part of food security programme of Agriculture Department, Kerala state and milch cow programme.

4.2.2.1 Project to provide one pregnant heifer, 2 adult female goats and 10 (55-60 days old) chicks.

The major objective of the scheme is to augment milk and egg production to ensure livelihood support and food security. The other objectives are to provide goats as a subsidiary income, Provide chicks to augment income through backyard system and increase fodder production to reduce the cost of milk. The area of implementation is the entire state with preference to milk districts. The general policy of the project is to provide animals to farmers who have experience in dairying those engaged in dairying at present and willing to expand the size of his existing unit and those having at least 10 cents of land suitable for fodder cultivation in own possession or on lease. The subsidy amount is 50 per cent of the total project cost. The implementing officer's concerned will give wide publicity to the matter and prepare beneficiary list as early as possible and submit to the undersigned for approval. Fund for the scheme will be allotted as and when it is received from the head office.

4.2.2.2 Cattle Insurance Scheme

The main objective of cattle insurance scheme is to provide comprehensive insurance cover to cattle, the premium for which is @5.9 per cent of the cost of cow/buffalo worth Rs.20000, 75 per cent of premium will be provided under the scheme Rs.885 per animal and the balance to be met from the beneficiaries. The animals can be insured in association with nearest branch of M/S UNITED INDIA Insurance .Co. Ltd., on direct submission of proposals cum veterinary surgeon certificate and premium including beneficiary portion. Beneficiaries will be selected by local veterinary surgeon/senior veterinary surgeon from among the applications received from farmers. Financially weaker section will be given preference. 30 per cent for weaker, 20 per cent for women and 50 per cent for general. However if sufficient application are not available, general category will be considered. The project will be monitored at the district level by the deputy director (AH), state level monitoring will be done by a joint director (Livestock production). Progress of the scheme and utilization of the fund shall be reported to this office in time.

4.2.2.3 Integrated Livestock Development Project

The total fund allotted for the programme under the head of account 2401-00-102-82(plan) Food Security Project is Rs. 140 lakhs for implementing 1000 units in the state. The project proposes to supply high yielding cattle and poultry to farmers who are engaged in this field, who wish to augment the number of animals, farmers already rearing cows are preferably selected as per the given norms and they are supplied with high yielding cattle selectively purchased from outside the state and poultry. Provision is made in the project for transportation of the cows. Fodder cultivation is given prime importance. Financial assistance has to be arranged through banks. Hence it is preferable to select farmers who do not have any banking liabilities. 40 per cent of the total cost will be subsidized and the balance has to be met as loan from bank and beneficiary contribution. The objectives of the scheme are to augment milk production in the state, to encourage clean milk production through concentrated production unit to support the existing dairy farmers to have vast experience in this field, for effective utilization of barren land, paddy fields and otherwise fallow areas, to increase fodder production in the state by encouraging the same and to reduce the cost of production of milk, for distributing pullets to the dairy farmers, so that the farmers can augment his income by increased egg production. The beneficiaries should have experience in dairying activity and has a flair for the same, should have

at least 25 cents of land suitable for fodder cultivation in own possession or on lease. Preference should be given to farmers who have no banking liabilities.

4.2.2.4 Food Security Programme - Milch Cow Programme

The food security project strives to augment the production of food crops as well as milk and egg in the state. To achieve the desired objectives, the food security project has a specific component of activity meant for paddy farmers to take up need based support to link with Dairy, Animal Husbandry and Fisheries Department. An amount of Rs. 250 lakh has been set apart for this purpose. The production level of the milch cows of Kerala is a matter of concern for the farmers. This has to be addressed with revision of the breeding policy. Purchasing cows from within the state does not augment the state's production of milk. These purchases only result in change of owners. In order to increase the quantum of production of milk, new cows have to be inducted from outside the state. Farmers of their own are not in a position to spend money locating good quality milch animals, purchasing them or safely transporting them to the state. It is therefore felt that assistance should be given to the farmers by way of subsidies and supplying them with good quality animals. The major objectives of the scheme are induction of 1250 milch cows in the state, augmenting milk production in the state, addressing food security issue and to support paddy farmers.

Among the assistance provided by the Animal Husbandry Department, none of the respondent farmers found to have obtained any one of these. However, the department is active in providing various facilities to the dairy farmers such as providing artificial insemination services, consultancy services, supplying medicines, feed supplements consist of minerals, vitamins, dewormers, health maintaining medicines, vaccination etc at free of cost. The respondents are highly satisfied with these services provided by the Animal Husbandry Department.

4.2.3 Incentives from Dairy Development Department

Incentives from Dairy Development Department include fodder Schemes, milk shed development programme and cattle feed subsidy.

4.2.3.1 Fodder Schemes

(i) Perennial fodder cultivation – Above 20 cents

The scheme envisages assisting cultivation of perennial fodder in a total area of 1785 ha of land providing planting Material free of cost and assistance for cultivation to farmers. Applications for assistance under the scheme will be invited from the dairy farmers for cultivation of fodder in suitable land with perennial irrigation source by the dairy extension officer concerned. The farmers rearing animals and willing to spare land or arrange land on lease for fodder production will be selected for the programme. The minimum area of cultivation for which assistance given will be limited to 20 cents and multiple of 10 cents. There will be no upper limitation of area for availing assistance and the beneficiaries will be eligible for assistance by covering at least an area of 20 cents. The selected beneficiary will have to register name at the dairy extension service unit of the concerned block by paying registration fees of Rs. 6 per cent of land. The sanctioning authority will be the district officer. The registration fees collected will be remitted by the dairy extension officer in the treasury. The cultivation will be done by using stem cuttings/rooted slips of hybrid napier (co3) which will be made available to the farmers free of cost. In order to get maximum growth and production, the requirement of stem cuttings per hectare of land is estimated as 15000. The subsidy given to the beneficiaries for cultivation of fodder under the scheme will be Rs12500/hectare of land in addition to the root slips supplied free of cost. Value of root slips supplied per hectare of land is estimated to Rs. 7500. Therefore the total subsidy for cultivating fodder in one hectare of land comes to Rs. 20000.

(ii) Perennial fodder cultivation – Below 20 cents

The scheme envisages assisting cultivation of perennial fodder by providing planting material free of cost by the Dairy Development Department, Kerala state.

(iii) Assistance for azolla cultivation

Farmers will be assisted for establishing azolla cultivation. Azolla is a fern which grows on top of water surface and multiplies profusely. The yield of crop per square meter per day is 250 gms. To feed animals one kg per day is ideal. To get a yield of one kg of azolla per day, a unit with 4 square meters is required. The total estimated cost of cultivation for one pit is Rs.900. The assistance per unit of azolla is Rs. 500. The expected cost of an azolla kit which consist of silpaulin sheet, azofert, azophose, azollaseed, collection net etc. is estimated to Rs. 375. The cost of labour, bricks, farmyard manure is estimated as Rs. 525. Each beneficiary will be given one

azolla kit worth Rs. 375 and Rs.125 as cultivation assistance. The registration fee at Rs.50 per beneficiary will be collected.

(iv) Irrigation assistance for fodder plots

This scheme envisages providing irrigation assistance for existing fodder plots having source of irrigation. Pump sets, storage tanks, connecting hose, sprinkle system, drip system etc, can be established under this scheme. Preference will be given to those beneficiaries having fodder plots with more than 50 cents area. Subsidy component will be limited to 50 per cent of the total cost or a maximum of Rs.10000 to each unit.

(v) Cultivation of fodder trees including life fencing

Fodder such as agathi, subabul, glyiricidia etc. are rich crude protein and if fed regularly can help in reducing the cost of milk production. The project envisages promoting cultivation of agathi/subabul/glyiricidia or fodder in coastal areas, river banks and other available areas. The seedlings of agathi or subabul or glyiricidia will be supplied to the farmers free of cost to encourage them to take-up cultivation of fodder trees. The dairy development department will provide Rs.5 per seedling (including transportation) supplied to the farmers. The extension officer will maintain a list of beneficiaries.

(vi) Scheme for maize cultivation for grain production

This scheme envisages cultivating maize as a pure crop by selected farmers who have sufficient land and are willing to cultivate in these land. The minimum area to be cultivated is 25 cents. The scheme will be implemented in those districts which have proximity to the feed factories and have the suitable agro climatic conditions favouring maize cultivation. The beneficiary selection will be made at the district level. Priority should be given to the lands near to the feed factories. Application for the scheme will be invited by the dairy extension officer concerned. The selected beneficiaries will sign an agreement that they will give the maize seed produced to the feed factories on the rate fixed by the board of feed factories. In the event of price of maize grains provided by feed factories is lower or feed factories are not in a position to collect the maize grains, the farmer will be freed to sell it as directed by the dairy development department. The assistance given to the beneficiaries for the cultivation of maize in one hectare of land will be Rs.12500 in addition to the seed supplied free of cost. Part of the cultivation assistance i.e. Rs 7500 (Rs. 30 per cent) will be given initially and balance Rs.500 will be

sanctioned to beneficiary only after supplying the maize grains to the feed factories. Value of seeds supplied per hectare of land is estimated to be Rs. 1625 (25 kg * Rs.65 per kg of seed, the rate per kg of seeds may change). Therefore the total assistance for cultivating maize in one hectare of land comes to Rs. 14125.

Among the fodder schemes extended by the Dairy Development Department, fodder cultivation in an area below 20 cents is found to have availed by the respondent farmers.

4.2.3.2 Milk Shed Development Programme

The project is aimed at bringing more farmers/entrepreneurs, self-help groups into the sector and to maintain the productivity of crossbred cow and to create awareness to farmers in adopting scientific management in cattle farming. In the awake of FSSAI, hygienic milk production and proper care during procurement and distribution has to be maintained. In order to achieve the above goal, providing assistance for starting mini dairy units, heifer rearing units, need based assistance to progressive dairy farmers, assistance for purchasing milking machine and cattle shed construction/ renovation are envisaged through this programme.

(i)   Mini dairy units

This project envisages establishing mini dairy units comprising of single milch animal (Godhanam – 517 units), two milch animals (620 + 30 units), five milch animals (260+10 units) and ten milch animals (155 units) in the state. Inclusion of pregnant heifers will help the farmers to produce milk throughout the year and also obtain milch animals at lesser price and the reduction in milk yield due to delay in acclimatization can be prevented. The concerned district officers will ensure the effective implementation of the project. The district officers will be the sanctioning authority for two and five cow units. Director, Dairy Development will be the sanctioning authority of ten cow units. Selected beneficiaries of all the schemes have to remit Rs.100 as registration fees. Dairy extension officer concerned will arrange training to the selected beneficiaries. Cows/ Buffaloes shall be purchased from heifer rearing units implemented by the department through MSDP. The beneficiary has to obtain the health and valuation certificate of cow/ Buffalo from veterinary surgeon and it has to be insured for 3 years. The beneficiaries of the five animal and ten animal units should cultivate fodder in minimum 25 and 50 cents of land respectively. Each beneficiary of five, ten animal units have to construct cattle shed as per the direction of the department.

(ii)   Heifer rearing units

One of the main problems raised by the farmers who are interested in taking up dairy farming is the non-availability of good quality animals to purchase. The rearing cost of dry or young animals are so high that the farmers tend to ignore young ones or cull dry ones, as it is profitable, due to the high demand and price for beef in the state. It is easier for the farmer to sell the calf at a young age and purchase a cow in milk when required. This has led to a reduction in the good quality young stock in the state and we have to depend on the neighbouring states for purchasing high yielding cross bred cows. Hence this project aims to assist farmers/NGO's/SHG etc. to establish five and ten heifer rearing units in the state. The selection for heifer rearing unit beneficiaries will be done by the district officer with the assistance of dairy extension officers as per the general norms for the selection of the department.

(iii)   Need based assistance to progressive dairy farmers

Majority of the livestock owning households in Kerala comprise of small and marginal farmers and landless laborers. The breakdown of joint family system coupled with rapid urbanization has resulted in many households abandoning this job. However, demand for milk is showing a steady increase. A wide gap exists between the requirement of milk in the state and its production. Another problem which these private entrepreneurs face is the shortage of labour. Higher wages offered by other sectors make what offered by the dairy farms look like 'peanuts'. One solution to tide over this crisis is to intensify the level of mechanization at the dairy farm level. At present, the level of mechanization in farm activities is very low. This project envisages improving the penetration of technology and thus improving productivity and overall profitability. The beneficiaries who want to get the assistance must purchase dairy farm equipments and present the bill for getting the eligible 50 per cent subsidy or a maximum amount of Rs.50,000/-. He can choose as per his requirements from the list. The farm equipment or a combination of equipments (from the provided list of equipments eligible for the aid), can be purchased. The list of items include milk cans, rubber mat, automatic water bowl, generator, irrigation system(sprinkler system), pump and motor, sprinklers, slurry pump, silage bunker, biogas plant, wheel barrow, bulk cooler, solar water heater, fan, air compressor, weighing machine, veterinary care equipments, cream separator, tattooing equipments, automatic shed cleaning equipment etc.   Dairy extension officer of the concerned block will inspect the dairy farm and make sure that the beneficiary has actually utilized the amount for the purchase of

items listed and the date of purchase. If the dairy extension officer is satisfied, he can issue the subsidy amount.

(iv)   Assistance for the purchase of milking machine

One of the major problems faced by the dairy farmers is the lack of efficient milkers. The production potential of an animal can be completely utilized only if milking is completed within the stipulated time. Milking is a skilled job, the action of the letting down hormone named oxytocine lasts for 7-8 minutes only and the milking has to be completed within this time. The scheme envisages providing financial assistance for the purchase of milking machine to the dairy farmers. The cost of the machine is estimated to be Rs. 50000 per unit (single bucket unit). The dairy farmers have to register at dairy extension service units in the concerned block. Selected beneficiaries can purchase machines from companies of his choice with the approval of the dairy development department. The subsidy amount will be 50 per cent of the total cost subject to a maximum of Rs. 25000. If any beneficiary wants a higher version with a higher cost (double bucket with milk pipe line unit), they can purchase it. But the maximum subsidy amount will be limited to Rs. 25000.

(v)   Scheme for providing assistance for the construction of cattle shed

One of the major reasons for production loss of our cross bred cattle is the occurrence of diseases like Mastitis, foot and mouth etc. which occurs due to the unhygienic conditions of the cattle shed and surroundings. A large number of cattle sheds were not properly constructed or maintained. The recent developments in ensuring food safety also make it mandatory that good farming practices are adopted by farmers. Majority of dairy farmers are not financially capable to construct or repair the cattle shed. Hence they have to be assisted financially. The main objectives of the scheme are to ensure that the animals are housed properly and hygienically, ensure clean and safe milk production and prevent economic loss by preventing diseases. Beneficiaries will be selected by dairy extension officer by giving proper advertisement through media. Deputy Director of District office will approve the selected beneficiary list submitted by dairy extension officer. It should be ensured that the floors of the sheds are made of concrete, with urine pit, dung pit and provision for drinking water as per the standard requirements. It is estimated that Rs.200 per sq. ft. is required for the new construction and Rs.150 per sq. ft. for the maintenance of existing cattle sheds. Dairy extension officer or dairy farm instructor has to

verify the site before and after completion of work. Dairy farmers have to submit a detailed estimate and plan of work prepared or approved by a qualified or licensed civil Engineer. 50 per cent of the total estimated amount subject to a maximum of Rs.50000 will be provided as subsidy to the selected beneficiaries.

Under the milk shed development programme, need based assistance to progressive dairy farmers, assistance for the purchase of milking machine and assistance for the construction of cattle shed have been utilized by the dairy farmers.

4.2.3.3 Cattle feed subsidy

The milk production of the state has shown an increasing trend during the last few years. However the demand has also grown considerably widening the gap between demand and supply. The reasons for variation in milk production and procurement by dairy co-operatives are increased production cost, high value of cattle feed, inadequate price for milk offered by the dairy co-operative society etc. There is a trend for selling milk locally to the consumers. This may increase as long as the gap between cost of production and selling price exists. In this context, the cattle feed subsidy has its significance in assisting the farmers to a certain extent. All the milk producers of the state who pour milk in the primary dairy co-operatives are the beneficiaries of the scheme. The farmers pouring milk in the dairy co-operative society will submit application for availing assistance in the prescribed proforma to the secretary of the DCS. The secretary of the DCS will prepare a statement showing the details of milk poured and eligible subsidy of Rs.1 per liter of milk, of all farmers who have poured milk in the DCS. The eligible subsidy amount will be calculated on the basis of milk poured in the DCS by the farmer during the previous month. The main objectives of the scheme are to enhance milk production and procurement, to bring more than 10000 farmers at the end of the year under dairy co-operative umbrella, to provide a helping hand to dairy farmers in the state on milk production cost, to maintain dairying as sustainable profession and to attract more young entrepreneurs in the sector by giving more employment opportunity.

Among the assistance provided under Dairy Development Department, cattle feed subsidy is found to have more awareness and have availed by the dairy farmers. The farmers who are pouring milk to the society would get an eligible subsidy of Rs. one per litre and the amount will be calculated on the basis of milk poured in the society. The amount would be

directly credited to the farmer's bank account. The scheme is aimed at bringing the dairy farmers under the dairy co-operative umbrella.

Table 4.6 indicates the awareness and availability level of the assistance and incentives received by the dairy farmers from MILMA and Dairy Development Department. Awareness and availability level of each assistance have analysed separately.

Table 4.6 Awareness and availability of assistance and incentives

Sl.No.	Assistance	No. of Respondents		Total
		Availed	Not availed	
1.	Paddy Straw assistance			
1.1	Aware	61(70)	26(30)	87(84)
1.2	Not aware	0(0)	16(100)	16(16)
1.3	Total	61(59)	42(41)	103
2.	Mediclaim insurance			
2.1	Aware	37(88)	5(12)	42(41)
2.2	Not aware	0(0)	61(100)	61(59)
2.3	Total	37(36)	66(64)	103
3.	Cattle shed subsidy			
3.1	Aware	12(57)	9(43)	21(20)
3.2	Not aware	0(0)	82(100)	82(80)
3.3	Total	12(12)	91(88)	103
4.	Rubber mat subsidy			
4.1	Aware	44(75)	15(25)	59(57)
4.2	Not aware	0(0)	44(100)	44(43)
4.3	Total	44(43)	59(57)	103
5.	Ksheeravardhini scheme			
5.1	Aware	15(75)	5(25)	20(19)
5.2	Not aware	0(0)	83(100)	83(81)
5.3	Total	15(15)	88(85)	103
6.	Cattle insurance premium subsidy			
6.1	Aware	19(68)	9(32)	28(27)
6.2	Not aware	0(0)	75(100)	75(73)
6.3	Total	19(18)	84(82)	103
7.	Bank loan subsidy			
7.1	Aware	12(52)	11(48)	23(22)
7.2	Not aware	0(0)	80(100)	8078)
7.3	Total	12(12)	91(88)	103
8.	Summer incentive			

8.1	Aware	103(100)	0(0)	103(100)
8.2	Not aware	0(0)	0(0)	0(0)
8.3	Total	103(100)	0(0)	103(100)
9.	Fodder scheme			
9.1	Aware	22(65)	12(35)	34(26)
9.2	Not aware	0(0)	99(100)	99(74)
9.3	Total	22(17)	111(83)	133
10.	Milk shed development programme			
10.1	Aware	11(44)	14(56)	25(19)
10.2	Not aware	0(0)	108(100)	108(81)
10.3	Total	11(8)	122(92)	133
11.	Cattle feed subsidy			
11.1	Aware	39(76)	12(24)	51(38)
11.2	Not aware	0(0)	82(100)	82(62)
11.3	Total	39(29)	94(71)	133

Source: Compiled from primary survey
Note: Figures in parenthesis represent percentage share to total number of respondents under each scheme

As depicted in Table 4.6, it could be observed that among the total respondents under survey, the percent of respondents who are aware and have availed the assistance is found to be less except the summer incentive scheme offered by MILMA. All the member dairy farmers who are affiliated to the society are found to be aware and have availed this assistance. This is followed by paddy straw assistance where 84 percent of the respondent farmers are aware of the assistance and among them 70 per cent have availed this assistance. Among the schemes offered by the Dairy Development Department such as fodder scheme, milk shed development programme and cattle feed subsidy, the awareness and availability level of cattle feed subsidy is found to be more when compared to others. Among the respondents who are aware of the assistance, 76 percent of farmers have availed this assistance whereas 24 percent of them have not availed this assistance.

The Table points it out that the awareness of the assistance and incentives is low for majority of the respondents and there is a need for creating awareness programmes for the dairy farmers as the institutional agencies with various support schemes are there to assist them. And also the number of respondents who are aware of the assistance have not availed the assistance. This can be due to various reasons like the procedural formalities, hesitant attitude towards the institutional agencies, lack of time etc. Since dairying is a round the clock job, which needs the

farmers to be with the cattle from morning to evening, it is practically difficult to go for cumbersome procedural formalities to deal with. This prompts them to satisfy with what they have and refuse to seek support. The dairy farmers are approaching the society only as a marketing avenue where they can get a fixed price for their produce. Other than this the farmers are not having a proper communication with the secretary for utilizing the various assistance and incentive amount they have for their support. While comparing the summer incentive offered by MILMA and cattle feed subsidy offered by Dairy Development Department, all the member dairy farmers have received the former whereas only 39 persons out of the total respondents have received the later. The summer incentive amount is directly giving to the members from the society along with the milk price whereas the cattle feed subsidy amount is getting credited to the farmer's bank account. And this is one of the reasons for their less availability level of this subsidy. Their hesitant attitude towards bank or the institutional set up's creates a negative attitude towards the schemes. Here comes the need for financial literacy programmes among the dairy farmers about the use of banking facilities and how it can be operated. By educating the farmers in this manner, the institutional agencies can introduce a onetime settlement programme that will enable the dairy farmers to get all the subsidy amounts in a year that will be credited to his bank account. Since the farmers don't have sufficient time for going before each assistance and incentive scheme, the above programme would enable them to save their time and also to ensure prompt payment. Society should strengthen its functions by ensuring an effective link between the institutional agencies and the farmers. The existing assistance and incentives would be beneficial only if it is properly penetrating to the beneficiaries and thus enabling to support them in times of crisis.

4.2.4 Extent of Assistance and Incentives

The various institutional agencies that are existing for supporting the dairy farmers have been identified and the assistance and incentives provided by these agencies have been studied. However it is pertinent to study the extent of assistance and incentives that are available for the dairy farmers or how efficiently it contributes towards reducing the cost of dairy farmers. Since dairying is a subsidiary occupation, proper support from the part of institutional agencies is required for its efficient functioning. The assistance and subsidy amounts do have a considerable effect for the dairy farmers to continue in dairying during times of adverse situations. If the amount that is available for a dairy farmer under the support programme is less, there is no use of

the support scheme or it fails to accomplish its objectives. So there is great relevance for the amount received by the dairy farmers under the assistance and incentives provided by the institutional agencies.

Table 4.7 shows the extent of assistance amount from MILMA, Dairy Development Department and also the per cent of subsidy amount to total cost incurred under dairying. The member dairy farmers who permanently pour milk to the society or those who pour not less than 500 litres of milk in a year is only eligible for availing the assistance from MILMA whereas non-members who pour milk to the society would be recommended by the secretary for making eligible for the assistance from the Dairy Development Department. The amount of subsidy received by the respondents together with its contribution to total cost is also analysed and the results are presented in Table 4.7.

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Table 4.7 Extent of the amount of Assistance and Incentives from Institutional Agencies

Sl. No. 1	Amount of subsidy from MILMA	No. of Beneficiaries	Per cent
1.1	Below 10000	58	56
1.2	10000-20000	34	33
1.3	20000-30000	8	8
1.4	30000-40000	2	2
1.5	40000-50000	1	1
1.6	Total	103	100
1.7	Average (in Rs.)	9814	
2	Amount of subsidy from Dairy Development Department		
2.1	Below 25000	49	82
2.2	25000-50000	10	16
2.3	50000-75000		
2.4	75000-100000		
2.5	100000-125000	1	2
2.6	Total	60	100
2.7	Average (in Rs.)	9707.2	
3	Per cent of subsidy to total cost (in %)	No. of Beneficiaries in MILMA	No. of Beneficiaries in Dairy Development Department
3.1	Below 10	82(80)	55(92)
3.2	10-20	14(13)	4(7)
3.3	20-30	6(6)	1(1)
3.4	30-40	1(1)	0(0)
3.5	Total	103	60
3.6	Average (in Percent)	5	4

Source: Compiled from primary survey

Note: Figures in parenthesis represent percentage share to total number of respondents under each head

From the Table, it could be observed that under the assistance amount received from MILMA, more than 50 per cent of the respondents have obtained less than Rs.10000 in a year as assistance and incentive amount followed by 33 per cent of the respondents who have obtained subsidy amounts ranging from Rs. 10000 to Rs.20000. It was also found that all the member dairy farmers are availing assistance from MILMA as summer incentive is being received by all of them. In the case of Dairy Development Department, more than 80 per cent of the respondents have obtained less than Rs.25000 followed by 16 per cent of respondents who have received

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subsidy amounts ranging from Rs.25000 to Rs.50000. However the average subsidy amount is found to be more for MILMA when compared to the Dairy Development Department. It could also be observed that only 45 per cent of the total respondents under survey have received assistance from Dairy Development Department. While analysing the per cent of subsidy amount to total cost incurred under dairying it was found that a major per cent of the respondents irrespective of the institutional agency, subsidy amount contributes to less than 10 per cent of total cost followed by 10-20 per cent of the total cost. And this is because of the inadequate fund that is to be allocated for the sustainability of dairy farmers. The perspective and attitude towards dairying from the part of the authorities should be changed from a subsidiary source of occupation to a well-recognized primary occupation. Then only it would get noticed for a better consideration which it deserves.

From the above analysis, it was found that the extent of amount of assistance and incentives is low for the respondent dairy farmers who are receiving the support from MILMA and Dairy Development Department. And also while taking into account the contribution of the per cent of subsidy amount to total cost, a major per cent of the respondents obtain below 10 per cent of their total cost incurred under dairying. The average price per litre of milk from the society is Rs.29 whereas the average price for the local sale is Rs.39. The advantage gained by the members in receiving the assistance and incentives is compensated by the non-members increased milk price. So the assistance received by the members could not cause to have an increased net income when compared to the non- members. This tilts to the need for an increased amount of subsidy rates. The subsidy rates should increase to contribute a major per cent of the total cost that would enable them to reduce the cost to the extent where they can make a significant impact in the net income. Sustainability can be ensured only by reducing the cost and increasing the net income which prompts the dairy farmer to continue and exists in this sector. In this context, the authorities should revise the subsidy rates in connection with the rising problems which is being faced by the dairy farmers as constraints to continue in this sector.

4.2.5 Attitude of farmers towards assistance and incentives

One of the factors that influence the attitude of farmers towards assistance and incentives is its extent of amount availed by them. After analysing the extent, it was found that the assistance amount constitutes a meagre per cent. There is a critical role for the institutional agencies in ensuring all sorts of assistance for the sustainability of dairy farmers. Dairying, because of its inherent risk nature needs proper intervention by way of assistance and incentives.

There are various assistance and incentives that are existing for supporting the dairy farmers. But the introduction of these schemes would be successful only if there is a positive orientation in the part of dairy farmers towards these support schemes. The assistance and incentives provided by the institutional agencies would not reach to its desired objectives unless and until the farmers co-operate with them. So it is pertinent to study the attitude of farmers towards the assistance and incentives provided to them.

Table 4.8 reflects the attitude of dairy farmers towards the assistance and incentives. Based on the knowledge, experience and approach towards the assistance and incentives, the dairy farmers were asked to express their attitude out of the five options provided such as "very good", "good", "no opinion", "bad" and "very bad".

Table 4.8 Attitude of dairy farmers towards assistance and incentives

Sl.No	Attitude	No of Respondents	Per cent
1	Very good	5	4
2	Good	19	14
3	No opinion	53	40
4	Bad	31	23
5	Very Bad	25	19
6	Total	133	100

Source: Compiled from primary survey

From the Table, it could be observed that majority of the respondents have no opinion whereas only 18 per cent of the respondents have a good opinion about the assistance and incentives. The major problem of 40 per cent of the respondents who have reportedly said "no opinion" is their lack of awareness about the assistance and incentives or their hesitant attitude towards the institutional agencies. The member respondents under survey utilize the facility of the society only as a marketing avenue for their produce. Among the respondents who are aware of the assistance and incentives, the respondents who have availed found to be less. And this is because of the long procedural time consuming process that makes the farmers reluctant to proceed with.

Since dairying is a round the clock job, starting from morning to evening, it is difficult for the farmers to leave the cattle and go before the procedural formalities which may consume more time and adversely affect their day to day livelihood income. Another reason for the negative approach towards the assistance and incentives is their financial illiteracy. It is evident from the increased number of persons who have availed the summer incentive and comparatively less number of persons who have availed cattle feed subsidy. Since summer incentive amount is being provided by MILMA along with the milk price from society directly to the dairy farmer, without any procedural formalities, it has more number of beneficiaries whereas the cattle feed subsidy which is being credited to the farmer's bank account has less number of beneficiaries. And this is only because of their fear of institutional set up's to deal with. This situation calls for the implementation of financial literacy programmes for the dairy farmers which gives them knowledge about the use of bank account, how it can be operated and how it would be beneficial for them in getting the assistance and incentives. By providing financial literacy to the dairy farmers, the agencies can introduce one time settlement or similar programmes for the farmers to obtain the subsidy amount in lump sum at one time in a year. One time settlement enables the dairy farmers to get the eligible assistance and incentives amount that will be credited to their bank account. Thus it avoids the farmer's inconvenience of going before each subsidy scheme which takes out their time. And the society should take part an active role as a link between bank and the farmers in determining the amount that should be credited to the bank account of each farmer and in ensuring that the farmers have received the amount or making sure that their bank accounts are getting credited with the assistance and incentive amount. Dairying being a subsidiary occupation should not get marginalised. It should get the consideration it deserves for its efficient functioning and thereby the sustainability of dairy farmers could be attained.

In the above objective, the various sources, types, extent and attitude of dairy farmers towards assistance and incentives have been analysed in detail. Primary data comprised of the awareness and availability of the assistance through the sample survey has also been included under this objective. Among the assistance and incentives received by the dairy farmers, the summer incentive is found have more awareness and availability when compared to others and it is the incentive scheme which is being received by all the member dairy farmers under survey.

4.3 Pattern of dairying adopted by the farmers

The pattern of dairying adopted by the farmers is discussed under two heads- feeding practices and breeding practices. The study takes into account the feeding schedule specifications prescribed by the Productivity Enhancement Department of National Dairy Development Board, Anand and also the actual feeding practices adopted by the farmers. The study thus analyses whether there is any significant difference between the feeding schedule as per the recommended standards and the actual feeding practices followed by the respondent farmers both member wise and category wise. As primary data analysis comes under this objective, for meaningful analysis, the socio- economic profile has been included under this head. This part of study is organised into three parts viz,

4.3.1 Socio-economic profile of the respondents

4.3.2 Feeding practices

4.3.3 Breeding practices

4.3.1 Socio-economic profile of the respondents

Socio-economic status is a combined total measure of the economic and sociological factors of an individual. It indicates an individual's or family's economic and social position in relation to others based on income, education and occupation. For analysing the socio-economic characteristics of the respondents, the indicators such as age, education, gender, years of farming experience, type of family, occupation, Income from primary occupation and total family income of the respondents are considered which are depicted in Table 4.9

Table 4.9 Socio-economic profile of the respondents

Sl.No.	Characteristics	Unit	Members	Non Members	Total
1	**Sex**	Number			
1.1	Male		65	13	78(59)
1.2	Female		38	17	55(41)
2	**Age level**	Years			
2.1	25-35		9	3	12(9)
2.2	36-45		27	3	30(23)
2.3	46-55		20	9	29(21)
2.4	56-65		34	10	44(33)
2.5	Above 65		13	5	18(14)
3	**Education Level**	Number			
3.1	Below SSLC		42	16	58(44)
3.2	SSLC Pass		44	10	54(41)
3.3	Pre Degree/Plus Two		7	1	8(6)
3.4	Diploma		4	2	6(4)
3.5	Degree or above		6	1	7(5)
4	**Type of Family**	Type			
4.1	Nuclear		78	15	93(70)
4.2	Joint		31	9	40(30)
5	**Years of farming experience**	Years			
5.1	Less than 5		10	4	14(11)
5.2	6 – 15		29	9	38(29)
5.3	16 – 25		33	13	46(35)
5.4	Above 25		31	4	35(26)
6	**Landholding**	In Cents			
6.1	Less than 100		77	15	92(69)
6.2	100 – 200		15	11	26(20)
6.3	200 – 300		5	2	7(5)

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6.4	300 − 400		4	1	5(4)
6.5	400 − 500		2	1	3(2)
7	**Occupation**				
7.1	Agriculture		45	11	56(42)
7.2	Government sector		6	3	9(7)
7.3	Business		15	3	18(13)
7.4	Others		37	13	50(38)
8	**Income from primary occupation**	In Rs.			
8.1	Less than 1 Lakh		12	2	14(10)
8.2	1 Lakh - 2 Lakhs		65	23	88(66)
8.3	2 Lakhs - 3 Lakhs		16	2	18(14)
8.4	3 Lakhs - 4 Lakhs		6	3	9(7)
8.5	4 Lakhs - 5 Lakhs		4	0	4(3)
9	**Income from dairying**	In Rs.			
9.1	Less than 2 Lakhs		98	30	128(96)
9.2	2 Lakhs - 3 Lakhs		3	0	3(2)
9.3	3 Lakhs − 4 Lakhs		1	0	1(1)
9.5	5 Lakhs − 6 Lakhs		1	0	1(1)
10	**Annual family income**	In Rs.			
10.1	Less than 5 Lakhs		84	28	112(84)
10.2	5 Lakhs - 10 Lakhs		16	2	18(13)
10.3	10 Lakhs - 15 Lakhs		1	0	1(1)
10.4	15 Lakhs - 20 Lakhs		2	0	2(2)
11	**% of Income from dairying to total Income**	In %			
11.1	Below 15		68	21	89(67)
11.2	15 − 30		29	7	36(27)

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11.3	30 – 45		4	2	6(4)
11.4	45 – 60		2	0	2(2)
12	**Categories**				
12.1	Category 1		45	12	57(43)
12.2	Category 2		30	15	45(34)
12.3	Category 3		25	3	28(21)
12.4	Category 4		3	0	3(2)

Source: Compiled from primary survey
Note: Figures in parenthesis represent percentage share to total

Table 4.9 reveals that both male and female respondents are engaged in dairying and majority (59 per cent) are male. In both the member and non-member category, male respondents are more when compared to the female respondents.

Thirty three per cent of the dairy farmers fall under the age category ranging from 56 to 65. Only nine per cent fall in the category of 25 to 35 years of age. The participation of youth seems to be less and this tilts to the fact that the present generation is not interested to undertake this profession.

It could be observed that majority of the dairy farmers (44 per cent) have education level below SSLC. But none of them found to be illiterate. The dairy farmers who qualified SSLC constitute 41 per cent of the total respondents. Education level holds less significance as far as a dairy farmer is concerned. An educational qualification up to fifth standard is more than enough for a dairy farmer. And this is a sector where people of less education, who cannot aspire for regular income jobs, can depend upon for meeting their livelihood expenses. It is because of this reason that this sector is being dominated by people of less education. This also reveals that educated group is not actively taking part in this profession. Higher the education level, higher is their preference for other employment opportunities.

As seen in the present era, majority of the respondents (70 per cent) belong to nuclear family and only 30 per cent of the respondents are having joint family.

Thirty five per cent of the dairy farmers (35 per cent) are those who have dairying experience ranging from 16 to 25 years followed by those with 6 to 15 years. From this, it could be implied that the farmers have taken up this profession traditionally and they are well versed with managing the dairying activities with this strong base of experience.

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It could be observed from the survey that majority of the respondents (69 per cent) have less than 100 cents of land. Only two per cent of the respondents have more than four acres of land.

With regard to the occupation of the sample respondents, the main occupation of 42 per cent of the respondents is agriculture. Only seven per cent of the total respondents are employed in government sector. These respondents are undertaking dairying as their subsidiary occupation.

Majority of the respondents (66 per cent) have income from primary occupation ranging from one lakh to two lakhs and only three per cent of the respondents have Primary income ranging from four lakhs to five lakhs per year.

Income from dairying is obtained by deducting all expenses incurred under dairying from the income earned out of dairying. And the survey revealed that majority of the respondents both in the member and non- member group earn net income less than two lakhs Rupees per year.

As regard to their total family income, majority of the respondents (84 per cent) have less than five lakhs per year and only three percent of the respondents have their annual income more than ten lakhs. Total family income constitutes both their income from primary occupation together with the income from dairying.

Since dairying is a subsidiary occupation, the contribution of income from dairying to total family income is analysed and it could be observed that majority of the respondents (67 per cent) irrespective of the member and non- member group contribute to less than 15 per cent of their total family income from dairying. Only two per cent of the respondents contribute more than 45 per cent of their family income from dairying.

The respondents are classified based on their cattle population. Category one belongs to the respondents who have one to two cattle. Category two consists of respondents who have cattle population ranging from three to five. Category three includes dairy farmers who have six to ten cattle and category four denotes the farm units who have more than ten numbers of cattle. Majority of the dairy farmers are those who have one to two cattle.

4.3.2 Feeding practices

The quantity and quality of the feed and water provided largely determines the dairy animal's health and productivity, and the quality and safety of its milk. Dairy animals should be provided with sufficient feed and water daily, according to their physiological needs. The quality and quantity of the feed, including appropriate fibre, should reflect the animal's age, body weight, stage of lactation, production level, growth, pregnancy and climate. Feeding practices vary during different stages in the growth of cattle.

Feeds are generally classified as concentrates and roughages.

4.3.2.1 Concentrates

Concentrates are generally called as hard feeds. Concentrates for dairy feeding come in a perplexing variety of different individual ingredients, descriptions and forms, each with their own advantages and limitations. Concentrate feeds include pellet feed, maize, soya bean, sorghum, Cholam, groundnut oil cake, coconut oil cake, gingely oil cake etc. Concentrates are good for providing highly concentrated sources of nutrients to supplement forages, supplying valuable starch, sugar and proteins for ruminant digestion and offering a broad choice from individual ingredients to complete balanced supplements.

4.3.2.2 Roughages

Roughages include all green grass and paddy straw. It consists of 90 per cent moisture and the remaining 10 per cent is dry matter. Roughages are bulky feeds that are characterized by being high in fiber and low in energy. The digestive tracts of herbivores are structured so that they retain large quantities of forage where microbial fermentation breaks down the fibrous plant material. The nutrients in roughages are made available largely through microbial digestion. The types of roughages used by such animals as a feedstuff are pasture grasses and other grazed forages; hay and dehydrated forages; silage from grasses, legumes or cereal crops; and crop residues and crop by-products such as straw, stubble, and hulls. The roughage sources utilized in a feeding program depends on the nutrient content that each contains. Nutrient content of roughages is determined by their stage of harvest. Generally, the earlier the stage of harvest, the higher will be the energy and protein content. Digestibility and palatability will also be higher. Straw is a valuable low-cost feed that can be used effectively for feeding.

Table 4.10 Feeding schedules for dry cows (Quantity in kg.)

Items	Quantity in Kg		
	Example 1	Example 2	Example 3
Paddy straw	7	6	7
Green grass	4	10	4
Pellet feed	2	1	-
Coconut oil cake	-	-	1

Source: Productivity Enhancement Department, National Dairy Development Board, Anand

Table 4.10 indicates the feeding schedule for dry cows. Among the feed items provided, paddy straw and green grass constitutes the roughages and pellet feed together with coconut oil cake constitute the concentrate feed. The Table shows three combinations of feeding schedule for dry cows. The first combination prescribes 7 kg of paddy straw, 4 kg of green grass and 2 kg of pellet feed. The second combination prescribes 6 kg of paddy straw, 10 kg of green grass and 1 kg of pellet feed. The third combination substitute pellet feed by giving 1 kg of coconut oil cake, at the same time paddy straw and green grass have to be provided as 7 kg and 4 kg respectively.

Table 4.11 Feeding schedule for a cow that produces 5 litres of milk per day

Items	Quantity in Kg		
	Example 1	Example 2	Example 3
Paddy straw	7	5	7
Green grass	4	10	4
Pellet feed	4	3	-
Coconut oil cake	-	-	2
Thavidu	-	-	1

Source: Productivity Enhancement Department, National Dairy Development Board, Anand

Table 4.11 shows the feeding schedule for a cow that produces 5 litres of milk per day. The feed items include paddy straw, green grass, pellet feed, coconut oil cake and thavidu. Among these feed items, paddy straws together with green grass constitute roughages and pellet feed, coconut oil cake and thavidu constitute the concentrate feed. For a milching cow, more quantity of feed need to be provided when compared to a dry cow. As the milk production is directly related to the feeding schedule, prominence has to be given for feeding the cattle. The

Table reflects three combinations of feeding schedule. The first combination prescribes 7 kg of paddy straw, 4 kg of green grass and 4 kg of pellet feed. The second combination prescribes only 3 kg of pellet feed and 5 kg of paddy straw, but it is compensated by providing a quantity of 10 kg for green grass. The third combination prescribes 7 kg of paddy straw, 4 kg of green grass and the pellet feed is substituted by providing 3 kg of other concentrate mixtures such as coconut oil cake and thavidu in quantities of 2 kg and 1 kg respectively.

4.3.2.3 Comparison of Recommended feeding schedule and actual feeding practices followed by respondent farmers – One sample t- test

After analyzing the feeding schedule recommended by the National Dairy Development Board, Anand, one sample t- test has been employed to find out whether there is significant difference between the actual feeding practices and the recommended feeding schedule. Both member wise and category wise analysis of data have been done. The feed items include concentrates, paddy straw and green grass and each feed item is analysed separately during milching and dry period by taking into account the actual feeding practices which is followed by the respondent farmers and the recommended feeding schedule prescribed by the Productivity Enhancement Department of National Dairy Development Board, Anand. The actual feeding practices have been compiled from the primary data which has obtained from the respondent farmers and the recommended feeding schedule has been obtained from the secondary data.

Table 4.12 describes the quantity of feeds given by the members and non- members during milching period. The quantity of feeds given by the respondent farmers is compared with the required quantity prescribed by the Productivity Enhancement Department of National Dairy Development Board, Anand.

Table 4.12 Quantity of feeds given by respondents during milching period: Member wise

Sl. No.	Quantity of feeds (in Kg)	Members	Non members
1	**Green grass**		
1.1	Less than 4	0(0)	0(0)
1.2	4	7(7)	5(17)
1.3	Above 4	96(93)	25(83)
1.4	Total	103	30
1.5	Average Quantity	7	6
1.6	Recommended Quantity	4	4
1.7	t value	9.211^{**} {0.000}	7.681^{**} {0.000}
2	**Paddy straw**		
2.1	Less than 8	88(85)	25(83)
2.2	8	14(14)	5(17)
2.3	Above 8	1(1)	0(0)
2.4	Total	103	30
2.5	Average Quantity	6	6
2.6	Recommended Quantity	8	8
2.7	t value	-14.999^{**} {0.000}	-7.090^{**} {0.000}

Source: Compiled from primary survey
Note: Figures in single bracket represent percentage to total
Note: Figures in double bracket represent p value of t-statistic

Table 4.12 makes it clear that more than 80 percent of the respondent farmers both in the member group and non- member group give more than four kilograms of green grass during milching period. The prescribed quantity of green grass that has to be given for a cow during milching period is four kilogram. And the average kilogram of feed that is found to be giving by the farmers both in the member and non- member group is seven and six kilograms respectively. The result of One sample t- test for both the member and non -member group revealed that there is significant difference in the quantity of green grass given by the respondent farmers and the recommended quantity of green grass that have to be given for the cattle. Since green grass is cheap and abundant in its availability, the average consumption is more than the required quantity.

It is evident that more than 80 percent of the respondent farmers both in the member group and non- member group give less than eight kilograms of paddy straw during milching period. The prescribed quantity of paddy straw that have to be given for a cow during milching period is eight kilogram. And the average kilogram of paddy straw that is found to be giving by the farmers both in the member and non- member group is six kilograms. The result of one sample t- test for both the member and non -member group revealed that there is significant difference in the quantity of paddy straw given by the respondent farmers and the recommended quantity of paddy straw that have to be given for the cattle. The average consumption of paddy straw per milching cow is less than the required prescribed quantity.

Table 4.13 describes the quantity of feeds given by the members and non- members during dry period. The quantity of feeds given by the respondent farmers is compared with the required quantity prescribed by the Productivity Enhancement   Department of National Dairy Development Board, Anand.

Table 4.13 Quantity of feeds given by respondents during dry period: Member wise

Sl.No	Quantity of feeds (in Kg)	Members	Non members
1	Concentrates		
1.1	Less than 2	61(59)	16(53)
1.2	2	39(38)	14(47)
1.3	Above 2	3(3)	0(0)
1.4	Total	103	30
1.5	Average Quantity	1	1
1.6	Recommended Quantity	2	2
1.7	t value	$-6.451^{**}\{0.000\}$	$-5.277^{**}\{0.000\}$
2	Green grass		
2.1	Less than 4	5(5)	2(7)
2.2	4	28(27)	10(33)
2.3	Above 4	70(68)	18(60)
2.4	Total	103	30
2.5	Average Quantity	6	5
2.6	Recommended Quantity	4	4
2.7	t value	$-4.875^{**}\{0.000\}$	$4.252^{**}\{0.000\}$
3	Paddy straw		
3.1	Less than 7	88(85)	20(67)
3.2	7	15(15)	10(33)
3.3	Above 7	0(0)	0(0)
3.4	Total	103	30
3.5	Average Quantity	5	5
3.6	Recommended Quantity	7	7
3.7	t value	$-16.922^{**}\{0.000\}$	$-6.338^{**}\{0.000\}$

Source: Compiled from primary survey
Note: Figures in single bracket represent percentage to total
Note: Figures in double bracket represent p value of t-statistic

From the Table, it could be observed that more than 50 percent of the respondent farmers both in the member group and non- member group give less than two kilograms of concentrates during dry period. The prescribed quantity of concentrate that have to be given for a cow during

dry period is two kilogram. And the average kilogram of feed that is found to be giving by the farmers both in the member and non- member group is one kilogram which is less than the prescribed quantity. The result of one sample t- test for both the member and non- member group revealed that there is significant difference in the quantity of concentrate given by the respondent farmers and the recommended quantity of concentrate that have to be given for the cattle.

More than 60 percent of the respondent farmers both in the member group and non-member group give more than four kilograms of green grass during dry period. The prescribed quantity of green grass that have to be given for a cow during dry period is four kilogram. And the average kilogram of feed that is found to be giving by the farmers both in the member and non- member group is six and five kilograms respectively. The result of one sample t- test for both the member and non- member group revealed that there is significant difference in the quantity of green grass given by the respondent farmers and the recommended quantity of green grass that have to be given for the cattle. Since green grass is abundantly available, easily accessible and cheapest in cost, the average consumption of green grass is more than the required prescribed quantity.

More than 65 percent of the respondent farmers both in the member group and non-member group give less than seven kilograms of paddy straw during dry period. The prescribed quantity of paddy straw that have to be given for a cow during dry period is seven kilograms. And the average kilograms of paddy straw that is found to be giving by the farmers both in the member and non- member group is four and five kilograms respectively. The result of one sample t- test for both the member and non- member group revealed that there is significant difference in the quantity of paddy straw given by the respondent farmers and the recommended quantity of paddy straw that have to be given for the cattle. The average consumption of paddy straw per dry cow is less than the required prescribed quantity for all the member and non-member respondents.

Table 4.14 shows the quantity of feeds given by the respondent farmers during milching period. The respondents are grouped into four categories based on their cattle population. Category one includes those farmers who own cattle from one to two, category two includes the respondents who have three to five cattle and the third category consist of respondents who have cattle population ranging from six to ten. The fourth category consists of farm units who own more than ten cows.

Table 4.14 Quantity of feeds given by respondents during milching period: Category wise

Sl.No	Quantity of feeds (in Kg)	Categories of Respondents			
		Category1	Category 2	Category 3	Category 4
1	**Green grass**				
1.1	Less than 4	0(0)	0(0)	0(0)	0(0)
1.2	4	5(9)	6(13)	1(4)	0(0)
1.3	Above 4	52(91)	39(87)	27(96)	3(100)
1.4	Total	57	45	28	3
1.5	Average Quantity	6.4	6.3	6.7	22.6
1.6	Recommended Quantity	4	4	4	4
1.7	t value	13.017**{.000}	11.415**{.000}	10.171**{.000}	
2	**Paddy straw**				
2.1	Less than 8	48(84)	41(91)	21(75)	3(100)
2.2	8	8(14)	4(9)	7(25)	0(0)
2.3	Above 8	1(2)	0(0)	0(0)	0(0)
2.4	Total	57	45	28	3
2.5	Average Quantity	5.7	5.7	5.8	2.3
2.6	Recommended Quantity	8	8	8	8
2.7	t value	-11.125**{.000}	-11.286*{.000}	-7.154**{.000}	

Source: Compiled from primary survey
Note: Figures in single bracket represent percentage to total
Note: Figures in double bracket represent p value of t-statistic

The Table points to the fact that a major percent of the respondents in all the first three categories provide more than four kilograms of grass for a milching cow. It could also be observed that, in the farm category, 100 percent of the respondent farmers give more than four kilograms of green grass for their cattle. The average quantity of green grass that have to be given for a cow during milching period is four and the result of one sample t- test revealed that there is significant difference in the quantity recommended and given among all the categories of respondents. The average consumption of green grass is found to be more when compared to the required quantity. Since the dairy farmers under study are household dairy farmers, they let the cattle out for freely graze the pasture lands where green grass is available in plenty.

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The Table makes it clear that a major percent of the respondents in all the first three categories provide less than eight kilograms of paddy straw for a milching cow. It could also be observed that, in the farm category, 100 percent of the respondent farmers give less than eight kilograms of paddy straw for their cattle during milching period. The average quantities of paddy straw that have to be given for a cow during milching period is eight and the result of one sample t- test revealed that there is significant difference in the quantity recommended and given among all the four categories of respondents. The average consumption is found to be less when compared to the required quantity. The average consumption of paddy straw during milching period for the first three categories is six kilograms whereas for farm units, the average consumption of paddy straw is two kilogram, both less than the recommended quantity of eight kilograms.

Table 4.15 shows the quantity of feeds given by the respondent farmers during dry period. The respondents are grouped into four categories based on their cattle population. Category one includes those farmers who own cattle from one to two, category two includes the respondents who have three to five cattle and the third category consist of respondents who have cattle population ranging from six to ten. The fourth category consists of farm units who own more than ten cows.

Table 4.15 Quantity of feeds given by respondents during dry period: Category wise

Sl.No	Quantity of feeds (in Kg)	Categories of Respondents			
		Category1	Category 2	Category 3	Category 4
1	**Concentrates**				
1.1	Less than 2	48(84)	21(47)	8(29)	0(0)
1.2	2	9(16)	24(53)	20(71)	0(0)
1.3	Above 2	0(0)	0(0)	0(0)	3(100)
1.4	Total	57	45	28	3
1.5	Average Quantity	0.49	1.5	1.7	6
1.6	Recommended Quantity	2	2	2	2
1.7	t value	$-15.011^{**}\{0.000\}$	$-6.205^{**}\{0.000\}$	$-3.286^{**}\{0.003\}$	
2	**Green grass**				
2.1	Less than 4	2(4)	4(9)	1(4)	0(0)
2.2	4	17(29)	15(33)	6(21)	0(0)
2.3	Above 4	38(67)	26(58)	21(75)	3(100)
2.4	Total	57	45	28	3
2.5	Average Quantity	5.0	4.8	5.3	20.6
2.6	Recommended Quantity	4	4	4	4
2.7	t value	$8.030^{**}\{.000\}$	$5.174^{**}\{.000\}$	$5.730^{**}\{.000\}$	
3	**Paddy straw**				
3.1	Less than 7	44(77)	39(87)	22(79)	3(100)
3.2	7	13(23)	6(13)	6(21)	0(0)
3.3	Above 7	0(0)	0(0)	0(0)	0(0)
3.4	Total	57	45	28	3
3.5	Average Quantity	4.6	4.6	4.4	1.6
3.6	Recommended Quantity	7	7	7	7
3.7	t value	$-10.953^{**}\{.000\}$	$-11.608^{**}\{.000\}$	$-8.276^{**}\{.000\}$	

Source: Compiled from primary survey
Note: Figures in single bracket represent percentage to total
Note: Figures in double bracket represent p value of t-statistic

From the Table, it could be revealed that majority of the respondents in category two and three give two kilograms of concentrates during dry period, whereas in the category one majority of the farmers give less than two kilograms of concentrates. It could also be observed that the respondents in the farm category give more than two kilograms of concentrates. The average quantity of concentrates that have to be given for a cow during dry period is two and the result of one sample t- test revealed that there is significant difference in the quantity recommended and given among the first three categories of respondents.

The Table makes it clear that a major percent of the respondents in all the first three categories provide more than four kilograms of grass for a dry cow. It could also be observed that, in the farm category, 100 percent of the respondent farmers give more than four kilograms of green grass for their cattle during dry period. The average quantity of green grass that have to be given for a cow during dry period is four and the result of one sample t- test revealed that there is significant difference in the quantity recommended and given among all the first three categories of respondents. The average consumption is found to be more when compared to the required quantity. Since the dairy farmers could get the green grass from the nearby places and also by freely allowing the cattle for grazing, it is the cheapest feed item when compared to the others. Collecting and cutting green grass is one of the major employment opportunities which is generated out of dairying.

The Table points to the fact that a major percent of the respondents in all the first three categories provide less than seven kilograms of paddy straw for a dry cow. It could also be observed that, in the farm category, 100 percent of the respondent farmers give less than seven kilograms of paddy straw for their cattle during dry period. The average quantities of paddy straw that have to be given for a cow during dry period is seven and the result of one sample t- test revealed that there is significant difference in the quantity recommended and given among all the four categories of respondents. The average consumption is found to be less when compared to the required quantity. The average consumption of paddy straw during dry period for the first three categories is five kilograms whereas for farm units, the average consumption of paddy straw is two kilograms, both less than the recommended quantity of seven kilograms.

4.3.3 Breeding Practices

Under the head breeding practices, the insemination method adopted by the farmers together with the various kinds of breeds of cattle of the respondent farmers have been discussed. Breeding practices involve both natural and artificial. The various kinds of breeds that

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have been found in the study areas are holstein friesians, jersey, crossbreed cattle, vechur cow, Sunandhini and kasargod dwarf cow.

4.3.3.1 Insemination method

From the study, it could be noted that majority of the dairy farmers are adopting artificial insemination method due to its peculiar advantages over natural breeding practices. Natural breeding practice involves natural mating by using indigenous breeding bull. Artificial insemination is the technique in which semen with living sperms is collected from the male and introduced into female reproductive tract at proper time with the help of instruments. This has been found to result in a normal offspring. In this process, the semen is inseminated into the female by placing a portion of it either in a collected or diluted forms into the cervix or uterus by mechanical methods at the proper time and under most hygienic conditions. The first scientific research in artificial insemination of domestic animals was performed on dogs in 1780 by the Italian scientist Lazanno Spal banzani. His experiments proved that the fertilizing power reside in the sperm atozpoa and not into liquid portion of semen. Few further studied under research station conditions helped this technique to be used commercially all over the world including India. Artificial insemination is not merely a novel method of bringing about impregnation in females. Instead, it is a powerful tool mostly employed for livestock improvement. In artificial insemination the germplasm of the bulls of superior quality can be effectively utilized with the least regard for their location in faraway places. By adoption of artificial insemination, there would be considerable reduction in both genital and non-genital diseases in the farm stock.

(i) Symptoms of Heat

For adopting artificial insemination, the cattle should show the following symptoms of heat. The various symptoms of heat are

- The animal will be in an excited condition. The animal will be in restlessness and nervousness.
- The animal will be below frequency.
- The animal will reduce the intake of feed
- Peculiar movement of limbo sacral region will be observed.
- The animals which are in heat will lick other animals and smelling other animals.

- The animals will standstill when other animals try to mount. This period is known as standing heat. This extends 14-15 hours.
- Frequent maturation (urination) will be observed.
- Clear mucous discharge will be seen from the valve, sometimes it will be string like the mucous will be seen stick to the near the pasts of valve.
- Swelling of the valve will be seen and the tail will be in raised position.
- Milk production will be slightly decreased.

(ii) Advantages of Artificial insemination

Artificial insemination is the disposition of semen into the female genital tract by means of instruments. There are several advantages by the artificial insemination over natural mating or servicing.

- There is no need for maintenance of breeding bull for a herd. Hence the cost of maintenance of breeding bull is saved.
- It prevents the spread of certain diseases and sterility due to genital diseases
  Eg: -contagious abortion, vibriosis.
- By regular examination of semen after collection and frequent checking on fertility makes early detection of inferior males and better breeding efficiency is ensured.
- The progeny testing can be done at an early age.
- The semen collected can be taken to the urban areas or rural areas for insemination.
- It makes possible the mating of animals with great differences in size without injury to either of the animal
- It is helpful to inseminate the animals that refuse to stands or accepts the male at the time of oestrum.
- It helps in maintaining the accurate breeding and calving records.
- It increases the rate of conception.
- It helps in better record keeping.
- Old, heavy and injured sires can be used.

(iii) Disadvantages of Artificial Insemination

- Requires well-trained operations and special equipment.
- Requires more time than natural services.

- Necessitates the knowledge of the structure and function of reproduction on the part of operator.
- Improper cleaning of instruments and in sanitary conditions may lead to lower fertility.
- If the bull is not properly tested, the spreading of genital diseases will be increased.
- Market for bulls will be reduced, while that for superior bull is increased.

4.3.3.2 Breeds

The various kinds of breeds that have been found in the study areas are holstein friesians, jersey, crossbreed cattle, vechur cow, sunandhini, kasargod dwarf cow.

(i) Holstein Friesians

Holstein Friesians are a breed of cattle known today as the world's highest production dairy animals. Originating in Europe, Friesians were bred in what is now the Netherlands and more specifically in the two northern provinces of North Holland and Friesland, and northern Germany. The animals were the regional cattle of Friesians and the Saxons. The Dutch breeders bred and oversaw the development of the breed with the goal of obtaining animals that could best use grass, the area's most abundant resource. Over the centuries, the result was a high producing, black and white dairy cow. It is black and white due to artificial selection by the breeders. Holsteins have distinctive markings and outstanding milk production. They are large, black and white marked animals that vary from mostly black to mostly white or they can also be red and white. A healthy calf weighs 40 to 45 kg or more at birth. A mature holstein cow typically weighs 580 kg (1280 pounds) and stands 147 cm (58 inches) tall at the shoulder. Holstein heifers should be bred by 13 to 15 months of age, when they weigh over 360 kg (794 pounds). Generally breeders plan for holstein heifers to calve for the first time between 23 and 26 months of age. The gestation period is about nine and a half months.

(ii) Jersey cattle

Jersey cattle are a small breed of dairy cattle originally bred in the channel island of jersey. The breed is popular for the high butter fat content of its milk and lower maintenance costs attending its lower body weight as well as its genial disposition. The jersey cow is quite small, ranging from only 400 to 500 kilograms. The main factors contributing to the popularity of the breed has been their greater economy of production due to the ability to carry a large

number of effective milking cows per unit area due to lower body weight, hence lower maintenance requirements and superior grazing ability, calving ease and a relatively lower rate of dystocia leading to their popularity in crossbreeding with other dairy, High fertility, High butterfat conditions and the ability to thrive on locally produced food. Jerseys come in all shades of brown, from light tan to almost black. They are frequently fawning in color. All purebred jerseys have a lighter band around their muzzle, a dark switch (long hair on the end of the tail) and black hooves; although recent years color regulations have been relaxed to allow a broadening of the gene pool. They are calm and docile animals, but tend to be a little more nervous than other dairy cow breeds. They are also highly recommended cows for first time owners and marginal pasture.

(iii) Cross-bred

A cross breed or cross-bred usually refers to an organism with purebred parents of two different breeds, varieties or populations. Cross breeding is used to maintain health and viability of organisms. Irresponsible cross breeding can also produce organisms of inferior quality.

(iv) Vechur cow

Vechur cow, an indigenous cattle variety of Kerala, a rare breed of Bosindicus, is the smallest cattle breed in the world. It yields the maximum milk in the world for a cow of this size. It's not the quantity of the milk but its quality that gave it an international fame. Vechur cow was earlier believed to have gone extinct from its birthplace due to high crossbreeding. But to the surprise of many, they survived this doomed future. Named after the village where it is believed to have evolved, this dwarf cattle breed is well adapted to the hot, humid tropical climate of Kerala. They require minimum food and are highly resistant to diseases. Farmers are of the opinion that these cute cattle of Kerala are more intelligent and lovable compared to other crossbreeds common in Kerala. Vechur bulls despite their small size are very strong and were used in the earlier times to plough the marshy paddy fields. The medicinal property of vechur cow's milk has been accepted by ayurveda too. Its milk is easily digestible due to smaller fat globule size and hence ideal food for children and convalescents. Recent studies proved the medicinal property of the lactoferrin protein in the milk of vechur cow. It is said that the milk contains arginine, an amino acid with specific therapeutic functions like wound healing, cell proliferation, cell signalling and management of cardio- vascular diseases.

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(v) Sunandhini

Sunandhini is the formal name given to the composite breed of cattle evolved by crossing the non-descript cattle with exotic donor breeds (Brown Swiss, Jersey and HF) limiting the exotic inheritance to 50 per cent. The origin of sunandhini breed can be traced back to the import of 22 brown swiss bulls and 46 cows during the period from 1965 to 1967 from Switzerland. The bulls were mated to a stock of 143 nondescript cows to produce the crossbred stock. The crossbred female born from such matings were inseminated with frozen semen of 75 per cent brown swiss bulls to produce the 62.5 per cent crossbreds. Originally conceived as a multipurpose breed for milk and meat, the sunandhini with 62.5 per cent exotic inheritance from brown swiss did change in its genetic content as well as quality to become a dairy breed in conformity with the needs and wishes of the farmers of Kerala. It has acquired genes from the jersey breed in large proportions; HF and American brown swiss genes too were incorporated. Germplasm in the form of proven bull semen of jersey, HF and American brown swiss, high pedigreed embryos of these breeds and genetically evaluated jersey and HF bulls from many parts of the world were used in the programme. On the zebu side, genes from breeds like Sahiwal, Gir, Rati and Kankrej were also introduced in proportions. Thus sunandhini has a wide genetic base ideal for a new breed. However it brings heterogeneity in the external appearance of the animals. Sunandhini is thus a synthetic breed having genes from the above mentioned breeds with around 50 per cent level of exotic inheritance. Over generations, the inheritance from the brown swiss is gradually decreasing with the proportionate increase from jersey and of rate from HF.

The breed characteristics fixed for Sunandhini cows

- Mature body weight – 350 kg
- Age at first calving – 30 months
- First lactation milk yield – 2500 kg
- Overall lactation milk yield – 3400 kg
- Milk fat percentage – 4.0

(vi) Kasargod cow

Kasargod cow is a dwarf variety of cattle breed found in Kasargod, the northern most districts in the state of Kerala, India. One of the smallest breeds of native cows available in Kerala, Kasargod dwarfs are well to hot and humid climate. Kasargod cows are excellent milkers because their feed to milk ratio is high as compared to other hybrid cows.

Pattern of dairying has been analysed in detail with the feeding practices and breeding practices adopted by the dairy farmers. Comparisons have been made member wise and category wise with the recommended standards and it could be found out that there is significant difference in the feeding practices adopted by dairy farmers and prescribed standards. Artificial breeding practice through insemination method is being adopted by all the respondent farmers and analysed its major advantages. The various kinds of breeds that have been found in the study areas together with their characteristic features were also analysed under the objective.

4.4 Economics of dairying

Economics of dairying helps to study the feasibility of undertaking dairying. It involves the income and expenditure pattern of dairy farmers. As far as a dairy farmer is concerned, the economics of dairying holds great significance. Various expenses incurred under dairying and income generated out of it have been analysed for finding out the feasibility of undertaking dairying activity. The major expenses such as feed cost, labor cost and transportation cost have been considered both category wise and member wise. Independent samples t-test has been done separately for members and non- members in each category. Sale of milk, which is one of the major income from dairying have been taken for member, non- member and farm for studying its percentage share to total income.

4.4.1 Expenses incurred under dairying

The various expenses for a dairy farmer include feed cost, labour cost, veterinary cost, transportation cost, fodder production cost and insurance cost. Among these, veterinary cost and insurance cost constitute a meagre percent. The major expenses such as feed cost, labour cost and transportation cost are analysed separately both category wise and member wise for studying its percentage share to total expense.

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Table 4.16 indicates the percentage share of feed cost to total cost. The respondent farmers are grouped into four categories namely those who have one to two cattle, those who have three to five cattle and those who have six to ten cattle and farm units of those who have more than ten cattle

Table 4.16 Percentage of feed cost to total cost

per cent of Feed cost to total cost (in %)	No. of respondents								Total
	Category 1(1-2 cattle)		Category 2(3-5 cattle)		Category 3(6-10 cattle)		Category 4(More than 10 cattle)		
	Member	Non-member	Member	Non-member	Member	Non-member	Member	Non-member	
Below 25	1(2)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1(1)
25-50	5(11)	0(0)	6(20)	1(7)	2(8)	0(0)	0(0)	0(0)	14(10)
50-75	39(87)	12(100)	24(80)	14(93)	23(92)	3(100)	2(67)	0(0)	117(88)
75-100	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1(33)	0(0)	1(1)
Total	45(34)	12(9)	30(23)	15(11)	25(19)	3(2)	3(2)	0(0)	133
Average cost (in Rs.)	40473	50359	91327	97416	172887	189227			
Average cost category wise (in Rs.)	42554		93357.		174638		1002336		
t value	-1.925*{.020}		-2.167*{.012}		.145^{NS}{.885}				

Source: Compiled from primary survey
Note : Figures in single bracket represent percentage to total
Note : Figures in double bracket represent p value of t- statistic

Table 4.16 indicates the percentage share of feed cost to total cost for four categories of respondents which is again categorized as members and non- members. Feed cost is a major share of the total cost which includes the cost of both concentrates and roughages. Concentrates include pellet feed and other hard feeds. From the Table, it could be observed that a major percent of the respondent farmers irrespective of the four categories incur more than 50 per cent, but less than 75 percent of feed cost to the total cost. The survey also revealed that the feed cost

is comparatively less for members when compared to the non-members in the first two categories. In the farm category, 100 percent of the respondent farmers incur feed cost between 50 to 100 percent of the total cost. From this, it could be implied that feed cost constitutes a major share of the total cost for all the four categories. In order to know whether there is significant difference between members and non- members in the percent of feed cost to total cost, Independent samples t-test was used. The results of Independent samples t-test as revealed in Table 4.14 depicts that there is significant difference in the percent of feed cost to total cost for members and non- members in the first and second category. Since the members are receiving various assistance in the form of subsidies, the average percent of feed cost is found to be less for members when compared to the non- members. In order to check whether there is any significant difference between the four categories of respondents, Analysis of variance (ANOVA) test has been used and the results of which are given in Table 4.17.

Table 4.17 Analysis of variance of percent of feed cost to total cost among four categories

Sl.No	Categories	Average cost category wise (in Rs.)	F	p value
1	Category 1	42554		
2	Category 2	93357.	3.231^*	0.025
3	Category 3	174638		
4	Category 4	1002336		

The results of ANOVA test point to the fact that there is significant difference among the respondents in the percent of feed cost to total cost. In order to know in which among the categories does this significant difference exists, Post- hoc test has been applied and the results are shown in Table 4.18.

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Table 4.18 Results of post- hoc test of percent of feed cost to total cost among four categories

Sl. No.	Mean percent	Type of respondents	Category 1 (1-2 cattle)	Category 2 (3-5 cattle)	Category 3 (6-10 cattle)	Category 4 (more than 10)
1	58.1053	Category 1(1-2 cattle)		0.590^{NS}	0.996^{NS}	0.047^{*}
2	56.4000	Category 2(3-5 cattle)	0.590^{NS}		0.842^{NS}	0.015^{*}
3	57.7500	Category 3(6-10 cattle)	0.996^{NS}	0.842^{NS}		0.045^{*}
4	68.6667	Category 4(more than 10)	0.047^{*}	0.015^{*}	0.045^{*}	

The results of Post- hoc test reveal the fact that significant difference exists between categories four with other three categories of respondents in the percent of feed cost to total cost. The average percent of feed cost to total cost is found to be more for farm units when compared to other three categories. As the quantity of each feed except paddy straw is more for farm units, the same is reflected in their cost also.

Table 4.19 indicates the percentage share of labour cost to total cost. The respondent farmers are grouped into four categories namely those who have one to two cattle, those who have three to five cattle and those who have six to ten cattle and farm units of those who have more than ten cattle.

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Table 4.19 Percentage of labor cost to total cost

per cent of labor cost to total cost (in %.)	No. of respondents								Total
	Category 1(1-2 cattle)		Category 2(3-5 cattle)		Category 3(6-10 cattle)		Category 4(More than 10 cattle)		
	Member	Non-member	Member	Non-member	Member	Non-member	Member	Non-member	
Below 20	0(0)	1(8)	0(0)	0(0)	0(0)	0(0)	3(100)	0(0)	4(3)
20-40	37(82)	9(75)	21(70)	14(93)	20(80)	2(67)	0(0)	0(0)	103(77)
40-60	8(18)	2(17)	9(30)	1(7)	5(20)	1(33)	0(0)	0(0)	26(20)
Total	45(34)	12(9)	30(23)	15(11)	25(19)	3(2)	3(2)	0(0)	133
Average cost (in Rs.)	23847	22813	59434	55845	105018	118625			
Average cost category wise (in Rs.)	23629		58238		106476		236000		
t value	1.767^{NS}{.083}		1.688^{NS}{.099}		$-.146^{NS}${.885}				

Source: Compiled from primary survey
Note : Figures in single bracket represent percentage to total
Note : Figures in double bracket represent p value of t- statistic

Table 4.19 indicates the percentage share of labour cost to total cost for four categories of respondents which is again categorized as members and non-members. Labour cost is the second major cost next to feed cost in dairying. The labour that comes under dairying includes cleaning shed, watering and feeding animals, cutting grass for feeding purpose, milking, sale of milk and processing of milk and milk products. Since dairying is a round the clock job, it requires labour for its profitable survival. It starts from the early morning by doing various activities like cleaning cattle, feeding (collecting roughages like green grass), milching, taking milk to the society for sale etc. It could be seen that majority of the individual dairy farmers are doing all these activities by themselves. As dairying is an income generating activity, it could be considered as an employment generation, and for those who undertake all these activities by themselves, opportunity cost has been considered. From the Table, it could be inferred that irrespective of the four categories of respondents, 77 percent of the respondent farmers incur

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more than 20 percent, but less than 40 percent of the labour cost to total cost. The labour cost is found to be more for members when compared to the non- members in the first two categories of respondents. It could also been seen that 100 percent of the farm respondents incur less than 20 percent of labour cost to total cost. This implies that labour cost is less for dairy farms because of its large scale rearing when compared to the other three categories of respondents. The results of Independent samples t-test revealed that there is no significant difference between members and non- members in the percent of labor cost to total cost for all the three categories of respondents. In order to examine whether there is significant difference in the percent of labor cost to total cost, Analysis of variance (ANOVA) test has been used and the results are presented in Table 4.20.

Table 4.20 Analysis of variance of percent of labour cost to total cost among four categories

Sl.No.	Categories	Average cost category wise (in Rs.)	F	p value
1	Category 1	23629		
2	Category 2	58238	10.313^{**}	0.000
3	Category 3	106476		
4	Category 4	236000		

The results of ANOVA test as depicted in Table 4.20 point to the fact that there is significant difference among the four categories of respondents. In order to find out in which among this significant difference exists, Post- hoc test has been applied and the results of which are given Table 4.21.

Table 4.21 Results of post- hoc test of percent of labour cost to total cost among four categories

Sl.No	Mean percent	Type of respondents	Category 1 (1-2 cattle)	Category 2 (3-5 cattle)	Category 3 (6-10 cattle)	Category 4 (more than 10)
1	33.0526	Category 1 (1-2 cattle)		0.064^{NS}	0.250^{NS}	0.000^{**}
2	36.3556	Category 2 (3-5 cattle)	0.064^{NS}		0.991^{NS}	0.000^{**}
3	35.89	Category 3 (6-10 cattle)	0.250^{NS}	0.991^{NS}		0.000^{**}
4	16	Category 4 (more than 10)	0.000^{**}	0.000^{**}	0.000^{**}	

The results of post- hoc test of percent of labour cost to total cost among four categories of respondents reveal the fact that significant difference exists between categories four with other three categories of respondents. The average percent of labor cost to total cost for farm units is found to be less when compared to the other three categories of respondents and it is because of the per labour investment for more number of cattle and the advantage of economies of large scale rearing available for them.

Table 4.22 indicates the percentage share of transportation cost to total cost. The respondent farmers are grouped into four categories namely those who have one to two cattle, those who have three to five cattle and those who have six to ten cattle and farm units of those who have more than ten cattle.

Table 4.22 Percentage of transportation cost to total cost

Per cent of Transportation cost to total cost (in %)	No. of respondents								Total
	Category 1(1-2 cattle)		Category 2(3-5 cattle)		Category 3(6-10 cattle)		Category 4(More than 10 cattle)		
	Member	Non-member	Member	Non-member	Member	Non-member	Member	Non-member	
Below 10	37(82)	10(83)	28(93)	15(100)	25(100)	3(100)	2(67)	0(0)	120(90)
10-20	7(16)	2(17)	2(7)	0(0)	0(0)	0(0)	0(0)	0(0)	11(8)
20-30	1(2)	0(0)	0(0)	0(0)	0(0)	0(0)	1(33)	0(0)	2(2)
Total	45(34)	12(9)	30(23)	15(11)	25(19)	3(2)	3(2)	0(0)	133
Average cost (in Rs.)	5244	6052	10325	9611	15432	16556			
Average cost category wise (in Rs.)	5414		10087		15553		200800		
t value	$-0.799^{NS}\{.428\}$		$0.510^{NS}\{.613\}$		$-0.273^{NS}\{.787\}$				

Source: Compiled from primary survey
Note : Figures in single bracket represent percentage to total
Note : Figures in double bracket represent p value of t- statistic

Table 4.22 describes the percentage share of transportation cost to total cost for four categories of respondents which is again categorized as members and non-members. Transportation cost is the cost incurred by a dairy farmer for undertaking various activities like collecting the feed from the society, taking milk to the society, for making local sale etc. From the Table, it could be noted that, irrespective of the cattle population, 90 percent of the member and non- member respondent farmers incur below ten percent of transportation cost to total cost. In the case of farm also, a major percent of the total respondents incur transportation cost below ten percent of the total cost. Independent samples t-test revealed the fact that the transportation cost is independent of membership in all the three categories of respondents. In order to examine whether there is significant difference among the four categories of respondents in the percent of transportation cost to total cost, Analysis of variance (ANOVA) test has been done and the results of which are given in Table 4.23.

Table 4.23 Analysis of variance of percent of transportation cost to total cost among four categories

Sl.No.	Categories	Average cost category wise (in Rs.)	F	p value
1	Category 1	5414		
2	Category 2	10087	10.137^{**}	0.000
3	Category 3	15553		
4	Category 4	200800		

The results of ANOVA test as depicted in Table 4.23 tilt to the fact that significant difference exists among the four categories of respondents in the percent of transportation cost to total cost. In order to examine among which categories this significant difference exists, Post-hoc test has been employed and the results are shown in Table 4.24.

Table 4.24 Results of post- hoc test of percent of transportation cost to total cost among four categories

Sl.No.	Mean percent	Type of respondents	Category 1 (1-2 cattle)	Category 2 (3-5 cattle)	Category 3 (6-10 cattle)	Category 4 (more than 10)
1	7.4386	Category 1 (1-2 cattle)		0.093^{NS}	0.003^{**}	0.004^{**}
2	6.0889	Category 2 (3-5 cattle)	0.093^{NS}		0.462^{NS}	0.000^{**}
3	5.0714	Category 3 (6-10 cattle)	0.003^{**}	0.462^{NS}		0.000^{**}
4	13.333	Category 4 (more than 10)	0.004^{**}	0.000^{**}	0.000^{**}	

The results of Post- hoc test of percent of transportation cost to total cost among four categories reveal the fact that significant difference exists between category four with other three

categories of respondents and also between category one and three. The percent of transportation cost is found to be more for category four when compared to the other three categories. As the farm units require bulk quantities of feed when compared to other categories of respondents, transportation cost will be incurred each day for collecting green grass, paddy straw etc and this makes them difference in cost when compared to other categories.

4.4.2 Sources of income from dairying

The various sources of income for a dairy farmer include sale of milk, sale of cowdung, sale of cattle, sale of curd, ghee and gobar gas. Since sale of milk remains the major portion of income and other sources constitutes a meagre percent, income from sale of milk is analysed separately for member, non- member and farm for studying its percentage share to total income.

Table 4.25 shows the percentage share of income from sale of milk to total income for members, non- members and farm. Income from sale of milk is a major source of income for dairy farmers for meeting their livelihood expenses. Any problem in earning this amount will make dairying less profitable and sustainable. The major two sources of marketing avenues for the dairy farmers are societies and local sale. The average price received by the farmer respondents for one litre of milk from the society is twenty nine rupees and through local sale is rupees thirty nine.

Table 4.25 Sale of milk to total income

Percentage (in %)	Group			Total
	Member	Non member	Farm	
25-50	2(2)	1(3)	0(0)	3(2)
50-75	10(10)	7(23)	1(33)	18(14)
75-100	88(88)	22(74)	2(67)	112(84)
Total	100	30	3	133

Source: Compiled from primary survey

From the Table, it could be observed that about eighty four percent of the total respondents earn more than seventy five percent of their total income from the sale of milk. In the member category, eighty eight percent of the total respondents earn more than seventy five percent of the income from the sale of milk. And only two percent of respondents earn between twenty five to fifty percent. In the non- member category, seventy four percent of the total respondents earn more than seventy five percent of their income from the sale of milk.. Only

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twenty three percent of the total respondents earn fifty to seventy five percent of income from sale of milk. In the case of farm also, a major percent of the respondents earn more than seventy five percent of their income from the sale of milk.

4.4.3 Contribution of net income from dairying to total income

Net income from dairying is obtained by deducting the cost incurred under dairying from the gross income earned under dairying. The percentage of contribution of net income from dairying towards the total income of the dairy farmers is analysed category wise and member wise. Independent samples t-test is used for comparing members and non- members and Analysis of variance (ANOVA) test is used for knowing whether there is any significant difference between the four categories of respondents.

Table 4.26 indicates the contribution of net income to total income of the dairy farmers. The dairy farmers are categorized into four categories namely those who have one to two cattle, those who have three to five cattle , those who have six to ten cattle and the farm units who have cattle population above ten in number is categorized as the fourth category.

Table 4.26 Contribution of net income from dairying to total income

per cent of net income to total income (in %)	No. of respondents								Total
	Category 1(1-2 cattle)		Category 2(3-5 cattle)		Category 3(6-10 cattle)		Category 4(More than 10 cattle)		
	Member	Non-member	Member	Non-member	Member	Non-member	Member	Non-member	
Below 15	31(69)	9(75)	19(63)	11(73)	18(72)	1(33)	1(33)	0(0)	90(68)
15 – 30	13(29)	2(17)	8(27)	3(20)	6(24)	2(67)	2(67)	0(0)	36(27)
30 – 45	1(2)	1(8)	1(3)	1(7)	0(0)	0(0)	0(0)	0(0)	4(3)
45 – 60	0(0)	0(0)	2(7)	0(0)	1(4)	0(0)	0(0)	0(0)	3(2)
Total	45(34)	12(9)	30(23)	15(11)	25(19)	3(2)	3(2)	0(0)	133

Source: Compiled from primary survey

From the Table, it could be obtained that irrespective of all the four categories, majority of the respondents have contribution from their net income of dairying to the total income below

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15 percent. Only five percent of the respondents could contribute above 30 percent of their total income from the net income of dairying. This tilts to the fact that the net income contribution from dairying to total income constitutes a meagre percent which the farmers can use it for meeting the day to day livelihood expenses. In order to check whether there is any significant difference between the members and non- members in their contribution of net income from dairying to total income, Independent samples t-test was used and the results of which are given in Table 4.27.

Table 4.27 Results of Independent samples t-test of percentage of net income to total income for members and non- members

Sl.No.	Membership	t value	p value
1	Members	0.640^{NS}	0.523
2	Non-members		

The results of Independent samples t-test as depicted in Table 4.27 reveal that there is no significant difference between members and non- members in their contribution of net income from dairying to total income. However, the average percent of net income is found to be more for members when compared to the non- members. In order to know whether there is significant difference among the four categories of respondents, Analysis of variance (ANOVA) test has been employed and the results are shown in Table 4.28.

Table 4.28 Analysis of variance of percent of net income from dairying to total income among four categories of respondents

Sl.No.	Categories	F	p value
1	Category 1		
2	Category 2	0.998^{NS}	0.396
3	Category 3		
4	Category 4		

The results of ANOVA as shown in Table 4.28 tilt to the point that there is no significant difference among the four categories of respondents in their contribution of net income from

dairying to their total income. The average percent of each four categories hovers around ten and below ten percent. It could also be observed that the average percent of the contribution of net income is found to be more for category two of those who have three to five cattle followed by category one of those who have one to two cattle.

4.4.4 Benefit Cost Ratio

Benefit cost ratio (BCR) is a ratio attempting to identify the relationship between costs and benefits of a proposed project. Project with a benefit cost ratio greater than one have greater benefits than costs. Benefit cost ratio has been employed in the study to know the benefit and cost analysis of dairy farmers. Benefit cost ratio has been obtained by dividing the gross income by gross expenses. The gross income of a dairy farmer consists of income from sale of mik, value added items, cattle, cowdung and also from the use of gobar gas. The various expenses of a dairy farmer consist of feed cost, labor cost, transportation cost, veterinary cost, insurance cost and fodder production cost. Category wise and member wise classification of benefit cost ratio has been analysed and the results of which are presented in Table 4.29.

Table 4.29 Benefit cost ratio of dairy farmers

| Sl. No | Benefit cost ratio class | No. of respondents | | | | | | | |
| | | Category wise | | | | | Member wise | | |
		Category 1	Category 2	Category 3	Category 4	Total	Members	Non members	Total
1	0 – 1	9(16)	10(22)	9(32)	1(33)	29(22)	22(21)	7(23)	29(22)
2	1 – 2	42(74)	33(73)	19(68)	2(67)	96(72)	74(72)	22(73)	96(72)
3	2 – 3	6(10)	2(5)	0(0)	0(0)	8(6)	7(7)	1(4)	8(6)
4	Total	57	45	28	3	133	103	30	133

Source: Compiled from Primary Survey

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From the Table, it could be observed that majority of the respondents irrespective of cattle population and memberships have benefit cost ratio ranging from one to two. Only six per cent of the respondents have benefit cost ratio ranging from two to three. This tilts to the fact that a major per cent of the respondents under survey has more benefits than costs. In order to know whether there is significant difference in the benefit cost ratio among the four categories of respondents, Analysis of variance (ANOVA) test has been done and the results of which are presented in Table 4.30

Table 4.30 Results of Analysis of variance of benefit cost ratio among four categories of respondents

Sl.No	Categories	Mean ratio	F value	p value
1	Category 1	1.4105		
2	Category 2	1.2511		
3	Category 3	1.0857	3.758^*	.013
4	Category 4	1.1667		
5	Total	1.2827		

The results of ANOVA test indicate the fact that significant difference exists in the benefit cost ratio among four categories of respondents. In order to know whether in which categories, does this significant difference exists, post- hoc test has been done and the results pointed it out that significant difference exists between category one and three. Category one of those who have one to two cattle have more benefit cost ratio when compared to category three of those respondents who have six to ten cattle. In order to know whether there is significant difference between members and non- members in their benefit cost ratio, Independent samples t- test has been done and the results are presented in Table 4.31.

Table 4.31 Results of Independent samples t-test of benefit cost ratio among members and non-members

Sl.No	Membership	Mean ratio	t value	p value
1	Member	1.2913	$.409^{NS}$	.683
2	Non member	1.2533		

The results of Independent samples t-test reveal that there is no significant difference between members and non- members in their benefit cost ratio. This also highlights the fact that the impact of assistance and incentives received by the member dairy farmers has not reflected in their benefit cost ratio.

Economics of dairying has been worked out by finding out the benefit cost ratio for both category wise and member wise. While analysing the benefit cost ratio based on the cattle population, the mean ratio is found to be more for category one when compared to other three categories of respondents. Member wise analysis of benefit cost ratio made it clear that there is no significant difference between members and non- members in their benefits and costs. The members who have received assistance and incentives could not make an impact in their benefit cost ratio or the members could not make a significant increase over non- members. Though the assistance and incentives could make an impact in reducing the cost of members, it is not getting reflected in their benefit cost ratio. This points to the need of an increased amounts of subsidy rates that would enable the member dairy farmers to reduce their cost to the extent that they can make an impact in the benefit cost ratio when compared to the non- members.

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4.5 Impact of assistance and incentives on the sustainability of dairying with respect to Thrissur District.

The study results reported that the dairy farmers have received assistance and incentives from MILMA and dairy development department. So it is pertinent to study the impact of these assistance and incentives and how effectively it supports the dairy farmer to make him sustainable in this field. For analysing the impact, the dairy farmers under survey have been categorised into three groups as those who are having one to two cattle, those who have three to five cattle, those who have six to ten cattle and finally the farm units who have cattle population more than ten in number. All the three farms under survey have cattle population above 20 in number. In each category, the respondents are again grouped into two categories, as members and non- members. Independent samples t-test for studying the difference of members and non-members in their production, marketable surplus, gross income, cost and net income has been used. Along with this, the Cobb- Douglas production function to study the contribution of each cost to total production has also been employed.

4.5.1 Impact of assistance and incentives on production, marketable surplus, gross income, cost and net income

Impact of assistance and incentives have been analysed on the production of milk, marketable surplus, gross income, cost and net income of the dairy farmers. Both member wise and category wise analysis of data have been done on each item. Independent samples t-test has been done for finding out whether the production, marketable surplus, gross income, cost and net income is independent of membership. Analysis of variance (ANOVA) test has also been employed to know whether there is significant difference in each item between the respondents based on their cattle population. Post- hoc test has been done in order to know in which category does this significant difference occurs.

Table 4.32 indicates the production of milk per cow per year for the dairy farmers and the dairy farmers are classified into four categories namely those who are having one to two cattle, those who are having three to five cattle, those who are having six to ten cattle and farm units. In each category, the dairy farmers are again grouped into two categories namely, members and non-members.

Table 4.32 Production of milk per unit per year of total respondents

Milk per cow (in ltrs.)/ year	No. of Respondents						Category 4(More than 10)	Total
	Category 1(1 − 2)		Category 2(3 − 5)		Category 3 (6 − 10)			
	Member	Non-Member	Member	Non-Member	Member	Non-Member		
Below 1000	1(2)	0(0)	0(0)	0(0)	1(4)	0(0)	0(0)	2(2)
1000 − 2000	12(27)	5(42)	8(27)	5(33)	9(36)	1(33)	1(33)	41(31)
2000 − 3000	22(48)	4(33)	14(46)	8(54)	15(60)	2(67)	0(0)	65(49)
3000 − 4000	7(16)	1(8)	6(20)	2(13)	0(0)	0(0)	2(67)	18(13)
Above 4000	3(7)	2(17)	2(7)	0(0)	0(0)	0(0)	0(0)	7(5)
Total	45(34)	12(9)	30(23)	15(11)	25(19)	3(2)	3(2)	133
Average production (in ltrs)	2467.50	2371.90	2557.50	2237.60	1998.30	2287.70		
Average production category wise (in ltrs)	2447.40		2450.90		2029.30		2723.00	

Source: Compiled from primary survey
Note: Figures in parenthesis represent percentage of each to total respondents in each category

The Table depicts the productivity per cow for all the four categories of respondents. The maximum per cow productivity is found to be 2000-3000 litres for a major percent of the total respondents. While comparing the percent of respondents who have production capacity above four thousand litres, nine percent of the total respondents in the first category produce above four thousand litres whereas in the second category, only four percent of the respondents found to have production capacity above four thousand litres. In order to find out whether there is any significant difference between the productivity of cattle among members and non-members, Independent samples t-test was used and the results of which are given in Table 4.33.

Table 4.33 Results of Independent samples t-test of milk production: Membership wise

Sl.No	Variables	Mean production (in Ltrs)	t value	p value
1	Members	2387.30	0.493[NS]	0.623
2	Non-members	2296.30		

The results of Independent samples t-test as shown in Table 4.33 reveal that there is no significant difference between the per cow productivity of members and non- members. Production capacity of the cattle mainly depends upon the intake of feed and the breeds used by the dairy farmers. For a majority of the respondents both in the member and non- member group, the mostly rearing breed is holstein friesians followed by jersey and crossbreed. And the feeding practices adopted by the members and non- members are also found to be same. Though there is no significant change in the production, the average per cow productivity of members is found to be more when compared to the non- members and this is because of the advantage available for the members in obtaining the feed at subsidized rate. In order to examine whether there is any significant difference between the productivity of cattle for four categories of respondents Analysis of variance (ANOVA) test has been done, the results of which are given in Table 4.34.

Table 4.34 Analysis of variance of milk production among four categories of respondents

Sl.No.	Categories	Mean Production (in ltrs.)	F	p value
1	Category 1	2447.40	1.836[NS]	0.144
2	Category 2	2450.90		
3	Category 3	2029.30		
4	Category 4	2723.00		

The results of ANOVA as depicted in Table 4.34 reveal that there is no significant difference between the productivity per cow among four categories of respondents. This reveals the fact that the productivity and cattle population is independent of each other. However, slight

variations can be seen in category three group of respondents with less per cow productivity and category four with comparatively more per cow productivity. The most commonly used breed among the category three group of respondents is jersey which is rich in butter fat content and less in quantity when compared to holstein friesians and this cause to reflect a reduced milk production among category three. The average per cow productivity of category four consists of farm respondents is found to be more as there is significant difference in the feeding practices adopted by them. The feeds such as concentrates and green grass is providing more when compared to the other three categories of respondents. However the increased production is not getting reflected to a significant change while comparing the other three categories of respondents.

Table 4.35 indicates the percentage of marketable surplus to total production per cow per year for the dairy farmers and the dairy farmers are classified into four categories namely those who are having one to two cattle, those who are having three to five cattle, those who are having six to ten cattle and farm units. In each category, the dairy farmers are again grouped into two categories namely, members and non-members.

Table 4.35 Marketable surplus to total production per unit per year of total respondents

Percentage of marketable surplus per cow/year (in %)	No. of Respondents								Total
	Category 1(1-2)		Category 2(3-5)		Category 3(6-10)		Category 4(More than 10)		
	Member	Non member	Member	Non member	Member	Non member	Member	Non member	
20-40	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
40-60	1(2)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1(1)
60-80	2(5)	1(8)	1(3)	1(7)	1(4)	2(67)	0(0)	0(0)	8(6)
80-100	42(93)	11(92)	29(97)	14(93)	24(96)	1(33)	3(100)	0(0)	124(93)
Total	45(34)	12(9)	30(23)	15(11)	25(19)	3(2)	3(2)	0(0)	133
Average Quantity of marketable surplus (in litres)	2767.10		5457.5		7992.16		36017.33		

Source: Compiled from primary survey
Note: Figures in parenthesis represent percentage of each to total respondents in each category

Marketable surplus is the quantity of milk available for sale after deducting the quantity taken for own consumption from the total production. The Table points it out that more than 90 percent of the dairy farmers irrespective of cattle population have 80-100 percent of marketable surplus per cow per year and the average quantity of marketable surplus is found to be more for farm category when compared to that of other three categories. Independent samples t-test was employed to know whether there is significant difference between the quantity available for marketable surplus among members and non-members.

Table 4.36 Results of Independent samples t-test for the percent of marketable surplus to total production: Membership wise

Sl.No.	Membership	Average Quantity (in litres)	t value	p value
1	Member	5853.95	1.636^{NS}	0.104
2	Non-member	4406.25		

The results of Independent samples t-test as shown in Table 4.36 reveal that there is no significant difference in the percent of marketable surplus to total production among members and non-members. However, the average quantity of marketable surplus is found to be more for members when compared to the non- members. The two marketing avenues both for members and non- members are societies and through local sale. As the members are entitled to permanently pour milk to the society, the quantity required for local sale together with the society constitute more quantity when compared to the non-members whereas the non-members can increase or decrease the quantity for own consumption based on their need. So that the marketable surplus of non-members may decrease when compared to the members. In order to know whether there is significant difference in the per cent of marketable surplus to total production among four categories of respondents, Analysis of variance (ANOVA) test has been done and the results of which are presented in Table 4.37

Table 4.37 Analysis of variance of marketable surplus among four categories of respondents

Sl.No	Categories	Average Quantity (in ltrs)	F	p value
1	Category 1	2767	0.719^{NS}	0.542
2	Category 2	5457		
3	Category 3	7992		
4	Category 4	36017		

The results of ANOVA as shown in Table 4.37 reveal that there is no significant difference in the percent of quantities available for marketable surplus among the four categories of respondents. This point to the fact that the marketable surplus doesn't vary in accordance with the cattle population. Since the prominence of these dairy farmers is to earn income out of the sale of milk, the marketable surplus is more for all the categories of dairy farmers and the quantity available for own consumption is less. However, the average quantity of marketable surplus varies between these categories. The average quantity of marketable surplus is more for farm when compared to that of other three categories. This tilts to the fact that even farm is oriented towards selling more quantity of milk rather than using it for the preparation of value added items and for own consumption.

After analysing the quantity of marketable surplus available for the dairy farmers, marketing avenues have been examined. The respondents are classified as members and non-members and the major two marketing avenues identified for the dairy farmers under study are through societies and local sale. Marketing avenues together with the number of respondents who sell milk to the society and local sale have been analysed and the results are presented in Table 4.38.

Table 4.38 Marketing avenues of the dairy farmers

Sl.No	Marketing avenue	No. of members	No. of non- members
1	MILMA (N=133)	103 (77)	30(23)
2	Local sale (N=133)	98(73)	30(23)

Source: Compiled from primary survey
Note: Figures in parenthesis represent percentage of each to total number of respondents

As depicted in Table 4.38, it could be noted that all the member dairy farmers and the non- member dairy farmers pour milk to the society. And the local sale is made by the members except five in number and all the non-members. Members are those dairy farmers who permanently pour milk to the society or supply not less than 500 litres of milk in a year and the farmers who have all the rights and powers of society. The member dairy farmers are eligible for the assistance and incentives provided through the society, but non- members are those dairy farmers who may or may not pour milk to the society and not eligible for enjoying any of the privileges from the society. The non- members even pour a certain quantity of milk to the society

which is subject to changes in order to avoid the inconveniences that may cause for local sale for a minimum price of Rs.29 per litre. The inconveniences such as measuring, cleaning vessels, taking milk to different vessels, door delivery of milk etc make local sale difficult that prompt the non- members to sell their produce to society.

Table 4.39 indicates the gross income per cow per year for the dairy farmers and the dairy farmers are classified into four categories namely those who are having one to two cattle, those who are having three to five cattle, those who are having six to ten cattle and farm units. In each category, the dairy farmers are again grouped into two categories namely, members and non-members.

Table 4.39 Gross income per cow per year of total respondents

| Gross income per cow per year (in Rs.) | No. of respondents | | | | | | | | Total |
| | Category 1(1-2 cattle) | | Category 2(3-5 cattle) | | Category 3(6-10 cattle) | | Category 4(more than 10 cattle) | | |
	Member	Non-member	Member	Non-member	Member	Non-member	Member	Non-member	
Below 50000	6(13)	0(0)	3(10)	2(13)	2(8)	0(0)	0(0)	0(0)	13(10)
50000-100000	28(63)	9(75)	16(54)	10(67)	20(80)	1(33)	0(0)	0(0)	84(63)
100000-150000	10(22)	2(17)	9(30)	3(20)	3(12)	2(67)	2(67)	0(0)	31(23)
150000-200000	1(2)	1(8)	1(3)	0(0)	0(0)	0(0)	1(33)	0(0)	4(3)
200000-250000	0(0)	0(0)	1(3)	0(0)	0(0)	0(0)	0(0)	0(0)	1(1)
Total	45(34)	12(9)	30(23)	15(11)	25(19)	3(2)	3(2)	0(0)	133
Average gross income	81866	85259	92821	78070	79080	98870			
Average gross income category wise	82581		87904		81200		132230		

Source: Compiled from primary survey
Note: Figures in parenthesis represent percentage of each to total respondents in each category

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Gross income for a dairy farmer comprises of income from sale of milk together with value added items, sale of cattle, sale of cowdung, and income from the production of gobar gas. The Table indicates that majority of the respondents irrespective of cattle population earn gross income ranging from Rs. 50000 – 100000 per cow per year. These dairy farmers could get a quantity of above six litres per cow per day. Since the main source of income for these dairy farmers is generated out of the sale of milk, gross income mainly depends upon the productivity of cattle and also the feeding practices. In order to examine whether there is significant difference between the gross income of members and non-members, Independent samples t-test was used and the results of which are shown in Table 4.40.

Table 4.40 Results of Independent samples t-test for gross income of total members and non-members

Sl.No.	Membership	Mean gross income (in Rs.)	t value	p value
1	Member	85847.00	0.417^{NS}	0.678
2	Non-member	83026.00		

The results of Independent samples t-test as depicted in Table 4.40 reveal the fact that there is no significant difference between members and non-members in their gross income that is earned out of dairying. The main source of income for all the respondent farmers under study is from the sale of milk which is directly related to the per cow productivity. As the feeding practices and breeds used by both the members and non- member farmers are almost same, their productivity per cattle also does not significantly differ. In order to know whether there is any significant difference between the gross incomes among four categories of respondents, Analysis of variance (ANOVA) test has been done, the results of which are given in Table 4.41.

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Table 4.41 Analysis of variance of gross income among four categories of respondents

Sl. No	Categories	Mean Gross income (in Rs.)	F	p value
1	Category 1	82581		
2	Category 2	87904		
3	Category 3	81200	2.541^*	0.05
4	Category 4	132230		

The results of ANOVA as shown in Table 4.41 reveal that there is significant difference between the gross income per cow per year among four categories of respondents. Post-hoc test has been done in order to know, among which categories does this significant difference occur and the results of which are shown in Table 4.42.

Table 4.42 Results of post- hoc test of gross income among four categories of respondents

Sl.No	Mean	Type of respondents	Category 1 (1-2 cattle)	Category 2 (3-5 cattle)	Category 3 (6-10 cattle)	Category 4 (more than 10)
1	82581	Category 1 (1-2 cattle)	-	$.838^{NS}$	$.998^{NS}$	$.048^*$
2	87904	Category 2 (3-5 cattle)	$.838^{NS}$	-	$.820^{NS}$	$.098^{NS}$
3	81200	Category 3 (6-10 cattle)	$.998^{NS}$	$.820^{NS}$		$.047^*$
4	132230	Category 4 (more than 10)	$.048^*$	$.098^{NS}$		$.047^*$

The results of post-hoc test indicate that significant difference exists between category one and four and between category three and four. Among the categories of respondents, the least gross income per cow is found to be for the third category whereas category four has the

maximum gross income when compared to others. Since a major source of gross income for dairy farmers under study is from the sale of milk, gross income is directly related to production and it could be found out that the mostly used breed among category three group of respondents is jersey which is high in butter fat content and less in quantity. The gross income is more for category four consists of the farm respondents as they have income from the use of gobar gas, value added items etc which is additional to the sale of milk.

Table 4.43 indicates the total cost incurred by a dairy farmer per cow per year and the dairy farmers are classified into four categories namely those who are having one to two cattle, those who are having three to five cattle, those who are having six to ten cattle and farm units. In each category, the dairy farmers are again grouped into two categories namely, members and non-members.

Table 4.43 Total cost per unit per year among total respondents

Cost per cow/year (in Rs.)	No. of respondents								Total
	Category 1(1-2 cattle)		Category 2(3-5 cattle)		Category 3(6-10 cattle)		Category 4(More than 10 cattle)		
	Member	Non-member	Member	Non-member	Member	Non-member	Member	Non-member	
20000-30000	1(2)	0(0)	2(7)	0(0)	0(0)	0(0)	0(0)	0(0)	3(2)
30000-40000	16(36)	1(8)	11(37)	5(33)	12(48)	2(67)	0(0)	0(0)	47(35)
40000-50000	20(44)	6(50)	15(50)	9(60)	12(48)	1(33)	2(67)	0(0)	65(49)
Above 50000	8(18)	5(42)	2(6)	1(7)	1(4)	0(0)	1(33)	0(0)	18(14)
Total	45(34)	12(9)	30(23)	15(11)	25(19)	3(2)	3(2)	0(0)	133
Average cost	42272	53380	39446	43320	40386	39664			
Average cost category wise	44611		40737		40308		53095		

Source: Compiled from primary survey
Note: Figures in parenthesis represent percentage of each to total respondents in each category

The cost of production incurred by a dairy farmer includes, feed cost, labor cost, veterinary cost, transportation cost, fodder production cost and insurance cost. The Table makes

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it clear that majority of the respondents irrespective of the cattle population incurs cost ranging from Rs. 40000 – 50000 per cow per year and only 14 percent of the total respondents incur cost above Rs. 50000. The major cost that constitutes the total cost is feed cost and all other costs come next to the feed cost. As most of the dairy farmers are undertaking dairying activities by themselves, labour cost contributes to a meagre percent. In order to examine whether there is significant difference between the total cost of members and non-members, Independent samples t-test was used and the results of which are shown in Table 4.44.

Table 4.44 Results of Independent samples t-test for total cost per unit per year among members and non-members

Sl.No.	Membership	Mean cost (in Rs.)	t value	p value
1	Members	41306	-3.380^{**}	0.001
2	Non-members	46978		

The results of Independent samples t-test as shown in Table 4.44 highlight the fact that there is significant difference between members and non-members in their total cost that is incurred for dairying irrespective of the cattle population. The average cost is found to be more for non-members than members. As the members are getting various assistance and incentives, it significantly cause to reduce the cost. The various assistance such as supply of paddy straw at concessional rate, availability of feed at half price under Ksheeravardhini scheme, cattle insurance premium subsidy, rubber mat subsidy, cattle shed subsidy, mediclaim insurance scheme , bank loan subsidy, summer incentive etc which are disbursed under MILMA significantly affect in reducing the total cost of members. In order to examine whether there is any significant difference between the total cost among four categories of respondents, Analysis of variance (ANOVA) test has been done, the results of which are given in Table 4.45

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Table 4.45 Analysis of variance of total cost among four categories of respondents

Sl.No	Categories	Mean Cost	F	p value
1	Category 1	44611		
2	Category 2	40737	4.394^{**}	0.006
3	Category 3	40308		
4	Category 3	53095		

The results of ANOVA as shown in Table 4.45 indicate that there is significant difference between the total cost incurred per cow per year among four categories of respondents. As there is significant difference among the respondents, post-hoc test has been done to know in which categories, does this significant difference occurs and the results of which are shown in Table 4.46.

Table 4.46 Results of post- hoc test of total cost among four categories of respondents

Sl.No	Mean	Type of respondents	Category 1 (1-2 cattle)	Category 2 (3-5 cattle)	Category 3 (6-10 cattle)	Category 4 (more than 10)
1	44611	Category 1 (1-2 cattle)	-	0.082^{NS}	0.103^{NS}	0.293^{NS}
2	40737	Category 2 (3-5 cattle)	0.082^{NS}	-	0.996^{NS}	0.056^{NS}
3	40308	Category 3 (6-10 cattle)	0.103^{NS}	0.996^{NS}	-	0.050^{*}
4	53095	Category 4 (more than 10)	0.293^{NS}	0.056^{NS}	0.050^{*}	-

The results of post- hoc test as shown in Table 4.46 reveal that significant difference exists between the cost of the dairy farmers of category three and four. The total cost structure is different for farmers who own cattle from three to five and the farm dairy farmers who own

cattle above ten. The average cost is found to be least for category three group of respondents. Since majority of the respondents in the third category are members and are getting the assistance and incentives, they can get the advantage of cost reduction. The subsidy rates could contribute to decrease their cost when compared to the non- members. The average cost is more for farm when compared to the other three categories. And this is because of the additional expenses that have to be incurred by a farm for the proper management practices that have to be done for rearing more number of cattle. The farm owners under survey are those who have cattle above 20 in number. So the proper maintenance of cattle shed and its management practices increase the cost structure. The costs such as feed cost, labor cost, veterinary cost and transportation cost etc found to be more for farm when compared to other categories. Since the household dairy farmers undertake this as a subsidiary occupation, the cost under all heads is less as the farmers themselves are undertaking majority of the tasks whereas in the case of farm, hiring of labor and other expenses requires a fixed stable expense. The feed cost contributes to the major share to the total costs and as there is significant difference in the feeding practices between farm and other three categories, the same reflects in the total costs also.

Table 4.47 indicates the net income earned by a dairy farmer per cow per year and the dairy farmers are classified into four categories namely those who are having one to two cattle, those who are having three to five cattle, those who are having six to ten cattle and farm units. In each category, the dairy farmers are again grouped into two categories namely, members and non-members.

Table 4.47 Net income per unit per year of total respondents

Net income per cow/year (in Rs.)	No. of respondents								Total
	Category 1(1-2 cattle)		Category 2(3-5 cattle)		Category 3(6-10 cattle)		Category 4(More than 10 cattle)		
	Member	Non-member	Member	Non-member	Member	Non-member	Member	Non-member	
Below 50000	30(67)	9(75)	17(57)	11(73)	19(76)	1(33)	0(0)	0(0)	87(65)
50000-100000	14(31)	3(25)	11(37)	4(27)	6(24)	2(67)	2(67)	0(0)	42(32)
100000-150000	1(2)	0(0)	1(3)	0(0)	0(0)	0(0)	1(33)	0(0)	3(2)
150000-200000	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	
Above 200000	0(0)	0(0)	1(3)	0(0)	0(0)	0(0)	0(0)	0(0)	1(1)
Total	45(34)	12(9)	30(23)	15(11)	25(19)	3(2)	3(2)	0(0)	133
Average net income	39594	31880	53375	34749	38694	59205			
Net income category wise	37970		47167		40891		79133		

Source: Compiled from primary survey
Note: Figures in parenthesis represent percentage of each to total respondents in each category

Net income per cow per year is obtained by deducting the cost incurred per cow per year from the gross income. From the Table, it could be observed that more than 50 percent of the respondents earn net income below Rs. 50000 per cow per year. Among this, there are respondents who have net loss. Net loss occurs when the cost incurred exceeds the gross income and that is mainly due to the rising feed cost and the milk price which is not reasonable. In order to examine whether there is significant difference between the net income of members and non-members irrespective of the cattle population, Independent samples t-test was used and the results of which are shown in Table 4.48.

Table 4.48 Results of Independent samples t-test for net income per unit per year among members and non-members

Sl. No.	Membership	Mean net income (in Rs.)	t value	p value
1	Member	44541	1.385^{NS}	0.168
2	Non-member	36047		

The results of Independent samples t-test as shown in Table 4.48 reveal the fact that there is no significant difference between members and non-members in their net income earned out of dairying. Though the members could reduce their cost due to the availability of assistance and incentives, the advantage is not getting reflected in their net income. The average milk price per litre from the society is Rs. 29 whereas the price per litre for local sale is Rs.39. The cost reduction advantage availed by the members is getting compensated with the increased milk price earned by the non- members. So the subsidy rates should increase to enable the member farmers to significantly reduce the cost to a level where they can reflect a considerable increase in their net income when compared to the non- members. In order to examine whether there is any significant difference between the net income among four categories of respondents, Analysis of variance (ANOVA) test has been done, the results of which are given in Table 4.49.

Table 4.49 Analysis of variance of net income among four categories of respondents

Sl.No	Categories	Mean Net income	F	p value
1	Category 1	37970	2.445^{NS}	0.067
2	Category 2	47167		
3	Category 3	40891		
4	Category 3	79133		

The results of ANOVA as shown in Table 4.49 indicate that there is no significant difference between the net income earned per cow per year among four categories of respondents. Net income is the income earned by a dairy farmer after deducting the cost incurred by him. So it mainly depends upon the cost structure and the sudden rise in the cost and also a fall in price for their produce will adversely affect their net income. The average net income is found to be more for farm respondents when compared to others as they have income from the

use of gobar gas, value added items etc which is additional to the income from the sale of milk. It could also be observed that due to the increased cost, the average net income is found to be less for respondents in category one. Though there is significant difference in the cost structure among members and non- members, it does not reflect in their net income. The assistance received by the member dairy farmers is compensated by the increased milk price of non-members. So in order to make an impact in the net income of the dairy farmers, it is pertinent to increase the subsidy amounts and milk price in relation to the changing market situations. Whenever there is an increase in the feed cost, proportionate increase should also come in the milk price. There is no relation between increased cattle population and net income per cow. It mainly depends upon how efficiently the dairy farmer could rear the cattle with reduced cost and also productive capacity of the cattle. Efficient feeding practices and the resistant capacity of the cattle to diseases influence in a considerable level for the remunerative return from dairying.

4.5.2 Impact of dairying in the asset creation of dairy farmers

Dairying has its uniqueness because of its peculiar features. At the same time, because of its existence as a subsidiary occupation, it cannot be compared as another income generating profession. The percent of net income from dairying out of total income earned by the respondent farmers has compared category wise in order to know whether there is significant difference between the respondent farmers. The farmers are categorised into four groups namely "poor", "average", "good" and "very good" based on the average facilities they have at their home. The results of which are given in Table 4.50.

Table 4.50 Net income from dairying and the average facilities at home

Percent of net income from dairying to total income (in %)	No of respondents				
	Category 1 (poor)	Category 2 (Average)	Category 3 (Good)	Category 4 (Very good)	Total
Below 10	11(18)	19(30)	26(41)	7(11)	63(48)
10 – 20	4(11)	8(23)	20(57)	3(9)	35(26)
20 – 30	4(15)	7(26)	11(41)	5(18)	27(20)
Above 30	2(25)	2(25)	3(38)	1(12)	8(6)
Total	21(16)	36(27)	60(45)	16(12)	133

Source: Compiled from primary survey
Note: Figures in parenthesis represent percentage of each to total respondents in each category

From the Table, it could be observed that, for majority of the respondents, dairying income contributes to below 10 percent of their total income and even the farm respondents earn below 30 percent of their income from dairying out of their total income. The farmers are categorised on the basis of the assets possessed by them. The assets which are taken into consideration include fridge, TV, cooking gas, cycle, two wheeler, car, washing machine, mobile, land phone connection and computer. In order to know whether there is significant difference between the net income earned out of dairying among these four categories of respondents, Kruskal Wallis H test has been used and the results of which are given in Table 4.51

Table 4.51 Results of Kruskal Wallis H test of net income from dairying among four categories of respondents

Sl.No	Categories	Chi-square	p value
1	Poor		
2	Average	1.403^{NS}	0.705
3	Good		
4	Very good		

The results of Kruskal Wallis H test tilt to the fact that there is no significant difference in the net income earned out of dairying among the four categories of respondents categorised on the basis of average facilities at home and this pointed it out that there is no relation between the assets created by the dairy farmers and the net income earned out of dairying. Since majority of the respondents under survey undertakes dairying as a subsidiary occupation which gives them either a subsidiary income or a means for meeting their day to day livelihood expenses, the assets created out of dairying doesn't make sense to a larger extend. For dairy farmers who undertake agriculture as the main occupation, continue in dairying mainly for meeting the fertilizer needs for their farm land which could be easily obtained from the cowdung which is one of the by-product of cow. For as far as the farmer is concerned, he could reduce his expenditure which he could otherwise incur a huge amount for purchasing fertilizer. Another group of respondents give prominence for dairying for meeting their day to day expenses without reaching a situation of borrowing or falling in debt. Thus it can be assumed that the assets possessed by the respondent farmers has purchased by utilizing their primary source of income.

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4.5.3 Impact of dairying in employment generation

Dairying proves to be an employment generating activity by engaging more number of persons to be involved in various activities. Since dairying is a round the clock job, it requires continuous monitoring and various activities associated with this, that start from beginning of the day towards the end of the day requires more labour to get invested in it. Though dairying is a subsidiary occupation, it is an income generating activity with regular return. Dairying involves various activities from cleaning shed, milking animals, cutting grass for feeding purposes, collecting and taking milk to the society etc.

Table 4.52 shows the number of persons employed under dairying among the classification of respondents who have availed the assistance from MILMA and Dairy Development Department. The Table indicates the category wise classification of persons employed under dairying among those who have received and not received the assistance from MILMA and also among those who have received and not received the assistance from Dairy Development Department.

Table 4.52 Persons employed under dairying

Sl.No	No. of persons employed	Availability		Total
		Availed	Not availed	
1	Classification on the basis of assistance from MILMA			
1.1	1	8(8)	2(7)	10(8)
1.2	2	64(62)	19(63)	83(62)
1.3	3	28(27)	7(23)	35(26)
1.4	4	3(3)	2(7)	5(4)
1.5	Total	103	30	133
2	Classification on the basis of assistance from Dairy Development Department			
2.1	1	6(8)	4(7)	10(8)
2.2	2	44(60)	39(65)	83(62)
2.3	3	20(28)	15(25)	35(26)
2.4	4	3(4)	2(3)	5(4)
2.5	Total	73	60	133

Source: Compiled from primary survey
Note: Figures in parenthesis represent percentage of each to total respondents in each category

From the Table, it could be noted that majority of the respondents irrespective of the classification, reportedly pointed it out that two persons in their home are involved in undertaking dairying activities. They can be both husband and wife or others family members. This is in the case of nuclear families where there are only four or five members. In order to examine whether there is significant difference in the employment generated in a family among those who have and haven't received assistance from MILMA and Dairy Development Department, Mann Whitney U test has been employed and the results of which are presented in Table 4.53.

Table 4.53 Results of Mann Whitney U test for the persons employed under dairying

Sl.No	Availability	No of respondents	Mean number of persons	t value	p value
1	Assistance from MILMA				
1.1	Availed	103	2	-.175^{NS}	.861
1.2	Not availed	30	2		
2	Assistance from Dairy Development Department				
2.1	Availed	60	2	-.226^{NS}	.821
2.2	Not availed	73	2		

Source: Compiled from primary survey

The results of Mann Whitney U test as depicted in Table 4.53 reveal the fact that there is no significant difference between the number of persons employed under dairying among the respondents who have received and not received assistance and incentives from MILMA and Dairy Development Department.

The assistance and incentives received by the dairy farmers have no impact in generating employment under dairying in a household. It could also be reflected from the survey that many of them consider dairying as an activity which gives them more self-satisfaction as it gives relaxation to their mind and health. And also they can get nutritious and good quality milk. So they value it more than monetary terms.

4.5.4 Cobb- Douglas Production function

Cobb-Douglas production function has been employed to analyze the relationship of various costs to total production. The dependent variable of the model is production and the independent variables are feed cost, labor cost, veterinary cost, transportation cost and insurance cost.

The general form of Cobb-Douglas production function is as follows:

$$Y = AX_1^{b1}+X_2^{b2}+X_3^{b3}+X_4^{b4}+X_5^{b5} \ldots\ldots\ldots (1)$$

Where A = constant, X_1 = feed cost (in rupees), X_2 = labor cost (in rupees), X_3 = veterinary cost (in rupees), X_4 = transportation cost (in rupees), X_5 = insurance cost (in rupees)

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The function can be estimated in logarithmic form as follows:

$$\log Y = \log A + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 \ldots\ldots\ldots\ldots(2)$$

Table 4.54 Results of Cobb-Douglas production function for relationship of various cost to total production.

Sl.No.	Variables	Coefficient (B)	p value	t statistic
1	A(Constant)	1.741^{**}	0.007	2.849
2	X_1(Log feed cost)	0.199^{*}	0.029	2.264
3	X_2(Log labour cost)	0.475^{**}	0.000	3.982
4	X_3(Log veterinary cost)	-0.449^{**}	0.001	-3.677
5	X_4(Log transportation cost)	0.623^{**}	0.000	8.884
6	X_5(Log insurance cost)	0.081^{NS}	0.259	1.146

$R^2=0.958$ Adjusted $R^2= .952$

Cobb- Douglas production function will be

$$Y = \log 1.741 + 0.199 \log X_1 + 0.475 \log X_2 + 0.623 \log X_4 + 0.081 \log X_5 - 0.449 \log X_3$$

The adjusted R^2 of .952 indicates that 95 percent of the production is explained by the costs such as feed cost, labor cost, veterinary cost, transportation cost and insurance cost. Feed cost, labor cost, veterinary cost and transportation cost significantly affect the production at one percent and five percent level of significance. It can be inferred that one rupee increase in the feed cost leads to 19 paisa increase in the production, one rupee increase in the labor cost leads to 47 paisa increase in the production, one rupee increase in transportation cost leads to 62 paisa increase in the production. However, one rupee change in veterinary cost leads to 44 paisa decrease in the milk production. One of the major reasons which adversely affect the milk production is the occurrence of diseases in their cattle. By this, the dairy farmer has to incur a large amount of rupees which he cannot compensate from his daily milk selling price. So whenever there is rising veterinary cost, it will negatively affect the production. Even though the insurance cost is positively related to the production, it is not significant. And that is because of the decreased number of respondents who have taken insurance coverage for their cattle. So insurance cost is not a significant expense as far as a dairy farmer is concerned.

It could be inferred from the analysis that the costs such as feed cost, labor cost and transportation cost have positive impact on the milk production. Hence the intervention of various institutional agencies in these areas will have an impact on milk production and thereby the income of the dairy farmers.

4.5.5 Cobb- Douglas Production function (for members)

Cobb-Douglas production function has been employed to analyze the relationship of various costs to total production for the member dairy farmers who are affiliated to a society authorized under MILMA. The dependent variable of the model is production and the independent variables are feed cost, labor cost, veterinary cost, transportation cost and insurance cost.

The general form of Cobb-Douglas production function is as follows:

$$Y = AX_1^{b1}+X_2^{b2}+X_3^{b3}+X_4^{b4}+X_5^{b5} \ldots\ldots (1)$$

Where A = constant, X_1 = feed cost (in rupees), X_2 = labor cost (in rupees), X_3 = veterinary cost (in rupees), X_4 = transportation cost (in rupees), X_5 = insurance cost (in rupees)

The function can be estimated in logarithmic form as follows:

$$\log Y = \log A + b_1\log X_1+ b_2\log X_2+ b_3\log X_3+ b_4\log X_4+ b_5\log X_5 +b_6\log X_6 \ldots\ldots\ldots(2)$$

Table 4.55 Results of Cobb-Douglas production function for relationship of various costs to total production. (For members)

Sl.No.	Variables	Coefficient (B)	p value	T statistic
1	A(Constant)	1.959^{**}	.007	2.880
2	X_1(Log feed cost)	$.210^*$	.037	2.176
3	X_2(Log labour cost)	.444**	.002	3.388
4	X_3(Log veterinary cost)	-.419**	.004	-3.120
5	X_4(Log transportation cost)	.582**	.000	6.936
6	X_5(Log insurance cost)	$.105^{NS}$	.195	1.323

R^2= .955 Adjusted R^2= .948

Cobb- Douglas production function will be

$Y = \log 1.959 +.210 \log X_1 + .444 \log X_2 +.582 \log X4 +.105 \log X_5 - .419\log X_3$

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The adjusted R^2 of .948 indicates that 94 percent of the production is explained by the costs such as feed cost, labor cost, veterinary cost, transportation cost and insurance cost. Feed cost, labor cost, veterinary cost and transportation cost significantly affect the production at one percent and five percent level of significance. It can be inferred that one rupee increase in the feed cost leads to 21 paisa increase in the production, one rupee increase in the labor cost leads to 44 paisa increase in the production, one rupee increase in transportation cost leads to 58 paisa increase in the production. However, one rupee change in veterinary cost leads to 41 paisa decrease in the milk production. As the occurrence of diseases in their cattle adversely affect the milk production, the dairy farmer has to incur a large amount of rupees which he cannot compensate from his daily milk selling price. So whenever the veterinary cost increases, it will negatively affect the production. Even though insurance cost is positively related to the production, it is not significant. And that is because of the decreased number of respondents who have taken insurance coverage for their cattle. So insurance cost is not a significant expense as far as a dairy farmer is concerned. It could be inferred from the analysis that the assistance given for feed cost reduction have a significant impact on the production. While considering the total dairy farmers both members and non- members, one rupee change in feed cost leads to 19 paisa increase in the production whereas while taking only the member farmers, one rupee change in feed cost leads to 21 paisa increase in the production. Summer incentive for promoting the production during summer season and also assistance for the proper maintenance of cattle shed and for purchasing related materials have positive impact on the milk production. As feed cost is one of the major expenses as far as a dairy farmer is concerned, assistance for supporting the farmer in reducing this cost will have a significant effect in their income and in their profitability. Summer incentive is another major advantageous assistance for the dairy farmer. During drought season, the production cost consistently increase because of the unavailability of feed which makes it difficult for the farmer to compensate it from the milk price. So an additional incentive price for the dairy farmer during this period will encourage the farmer to sustain in this field and to continue with the production. These assistance and supports ensure viability of dairying and thus sustains the existing dairy farmers and also attract new farmers and thereby ensure sustained milk production in the state. The survey also made it clear that though these assistance and supports have a significant impact on the cost reduction, this is not getting reflected in the net income of the dairy farmers. There is no significant difference between the members and non- members in their net income. This is because of the cost reduction which is

beneficial for the members are compensated by the increased rate of milk price of non- members. And this points to the need for an increase of subsidy rates and assistance amount for the dairy farmers. Whenever there is a rising price in the feed cost, in proportionate to that the price for milk together with the subsidy amounts should also increase. Then only it will result in an increased net income for members when compared to that of non- members. It could also be observed that among the member group itself, there is a need for creating awareness about the various schemes which are available for them. Most of the dairy farmers are taking the advantage of society only for pouring milk and for receiving a stable price for their produce. And they are less concerned of the various assistance and incentives which is available for them. Many of the farmers reported that the increased procedural formalities make them difficult and are less interested for getting it. Since dairying is a round the clock job, the dairy farmers are not able to spend more of their time to invest for these matters. They are least concerned or bothered about the assistance mainly because of their ignorance and lack of time to understand and invest for making it available for them.

4.5.6 Problems faced by the farmers and suggestions

To make dairying as a profitable and viable venture, problems that hinder the farmers in making good production and income should be analysed. Proper and timely interventions can be made only after analysing the actual problems encountering by the farmers. The institutional agencies can interfere to support the farmers when and only the areas where the assistance needed is identified. The respondents were given a series of problems to list in the order of their severity. Scores were given to each problem in order to finally arrive the problems in rank order. Scores ranging from one to six were given in the order of the severity from the most rising issue to the least concerned problem. And finally the sum of scores of each problem was found out to rank the problems. On the basis of this, the results are presented in Table 4.56.

Table 4.56 Problems faced by the dairy farmers

Sl. No.	Problems	Score	Rank
1	Rising feed cost	296	1
2	Inadequate milk price	335	2
3	Diseases	456	3
4	Lack of credit	494	4
5	Low milk production	546	5
6	Not getting assistance and incentives	667	6

Source: Compiled from primary survey

Table 4.56 reveals the problems faced by the farmers in undertaking dairying as their occupation. Among the problems faced by the farmers, rising feed cost ranks the first. Feed cost is one of the major items of variable expenses that have to incur for dairying. There has been a wide fluctuation in the feed costs over the period and this will adversely affect the farmers in meeting their expenses. The situation is more severe as there is no proportionate increase in milk price and that is the problem that has been ranked second by the farmers. The farmers have reportedly said that when the milk price increases, there has been more than proportionate increase in the feed cost. Milk price and feed cost is the two major shares of income and expenses. And if expense exceeds the income, it will cause burden to the dairy farmers. Outbreaks of diseases are the third problem ranked by the farmers. As it affects the health of the cattle, it will adversely affect its productivity and also the milk yield. This is an unexpected and unfortunate matter that can happen to the cattle of a dairy farmer. The major fixed expense that comes under dairying is the purchasing price of the cow. For a good productive cow to purchase, a farmer has to incur an amount of Rs. 45000 and if caught by any diseases very shortly, it will endanger the farmer in financial crisis as it cause no production and more expenses to be incurred for treating the disease. Swelling of udder, foot and mouth disease etc. are major diseases that have been found among the cattle in the surveyed area. An amount of Rs. 2000 will be incurred at a time if there occurs a disease to the cattle including its treatment and medical expenses. For a farmer it's a huge amount to bear. At this situation the farmer is not getting anything after meeting the expenses. The fourth problem that has been ranked by the farmers is

the lack of credit. Financial support needs to make available to the farmers in all stages of dairying. Due to the unexpected loses that can happen by way of decreased milk price, rising feed cost, an increased expenditure on diseases etc., the farmer may be in a difficult condition to meet his livelihood expenses. Those who find their major portion of income from dairying find it difficult to continue and in such a situation, proper financial assistance should be made available to the farmers to overcome the situation. The fifth problem that has been ranked by the dairy farmers is the low milk production. The farmers have said that sometimes the milk production is low and this will adversely affect their income level and profitability. This problem is closely interconnected with the diseases which is one of the major reasons for low production of milk. Less productivity of cattle is another reason for this problem. The farmers ranked sixth position for not reaching the assistance and incentives to them. One of the reasons for this problem is the farmers less contact with the society. They go to the society for pouring milk and there comes less discussion between the secretary and the members. Many of the members are not even aware of the assistance and incentives available to them. The members are only bothered about pouring milk and getting the milk price. Some of the farmers are of the opinion that they try hard from their part for getting the assistance made available to them. But the long procedural formalities make them difficult to get the benefits that have been set apart for them. They have fed up trying for this and said that since the dairying is a round the clock job, they don't have sufficient time to spend for making clear all the formalities. For them, it is more time and energy consuming. Since it is tedious and rigorous, they are so much discouraged for going before these benefits and are satisfied with what they have. Many of the respondents pointed out that the classification of those below poverty line and above poverty line should be removed. They have opined that many of the assistance are extended for SC/ST and BPL category. But they may be those who have enough financial base. And those who don't have such a financial base may belong to APL category. In such a situation, inequality in distribution occurs and those who are really eligible for the assistance get rejected. The farmers are of the opinion that more practical outlook is needed by the government in fixing the eligibility criteria's. Government is spending, but not achieving the desired objectives. The farmers pointed out that younger generation is hesitant to come to this sector and this should be changed to make the sector more attractive. One of the farmer opined that dairying should also come under employment guarantee scheme and thus can be ensured it as a stable income generating activity. Some of them have suggested that proper mechanism should be there for the procurement and selling of value added items. The farmers

should be encouraged to undertake the preparation of value added items to fetch more income and long term profit. Despite all these problems, the farmers are willing to continue in this sector. They said that the dairying income yields them no savings, just to meet the expenses. But the mental satisfaction and relaxation that get out of it makes them attractive to stick on this sector. The farmers opined that, "if work hard, can get good income". As most of the household farmers surveyed are doing self-labor, their major expense is only the feed cost. And if there is no occurrence of any diseases, then also the situation is favourable to them. Dairying would be more profitable if going along with agriculture. Because the farmers will get many more additional advantages of using cow dung as a good manure for their agricultural crops, thus reducing the fertilizer cost along with getting good and nutritious milk, preparation and selling of value added items that yields another source of income, by effectively utilizing the biogas facility, LPG cooking gas can be saved and thus adds to the monetary benefits. Dairying sector is profitable if more prominence is given for its effective functioning. A dairy farmer though owns only a single cow should be promoted by giving him due importance and consideration. The dairy farmers should be made known that they are undertaking a noble job and should be given proper assistance to remain in this sector. By making this sector more attractive, it is possible to attract more potential younger generation to come to this field and also to increase the milk production in the country.

4.5.7 Conclusion

The study made it clear that though the assistance and supports have a significant impact on the cost reduction, the same is not getting reflected in the net income of the dairy farmers. There is no significant difference in the net income among the members and non- members. The advantage of cost reduction enjoyed by the members through the assistance and incentives are getting compensated by the increased rate of milk price received by the non- members through local sale. This necessitates an increase in the subsidy rates and assistance amount for the dairy farmers. The subsidy rates should be increased to contribute a substantial portion of the total cost that would enable them to reduce the cost to the extent where they can make a significant impact in the net income. Sustainability can be ensured only by reducing the cost and increasing the net income which prompts the dairy farmer to continue and exist in this sector. In this context, the authorities should revise the subsidy rates in consonance with the rising problems which is being faced by the dairy farmers as constraints to continue in this sector. Whenever there is a rise in the price of feed cost, proportionate increase should also be made in the milk price and subsidy rates. Then only it will result in an increased net income for members when compared to that of non-members.

It could also be observed that among the member group itself, there is a need for creating awareness about the various schemes which are available for them. Most of the dairy farmers are taking the advantage of society only for pouring milk and for receiving a stable price for their produce. They are least concerned of the various assistance and incentives which are available for them. The study also made it clear that the increased procedural formalities and the fear of institutional set up to deal with make them difficult and are less interested for getting it. This situation calls for the implementation of financial literacy programmes for the dairy farmers which will give them knowledge about the use of bank account, how it can be operated and how it would be beneficial for them in getting the assistance and incentives. By providing financial literacy to the dairy farmers, the agencies can introduce one time settlement or similar programmes for the farmers to obtain the subsidy amount in lump sum at one time in a year. One time settlement enables the dairy farmers to get the eligible assistance and incentive amount that will be credited to their bank account. Thus it avoids the farmer's inconvenience of going for each subsidy scheme of different institutions which takes out their time. The society should take part an active role as a link between bank and the farmers in determining the amount that should

be credited to the bank account of each farmer and in ensuring that the farmers have received the amount or making it sure that their bank accounts are getting credited with the assistance and incentive amount.

Dairying, because of its inherent unique features, both positive and negative, the dairy farmer should get proper and timely support to adjust with the changing market situations. The dairy farmers being investing their time and labour for this round the clock job, should get the rewards also in the same scale. But the reality is different, because of the uncertain and unpredictable situations, the dairy farmer who undertake the hard ships and pain, fall in loss and some time in debt trap also. In the long run, the dairy farmer has to compensate the huge fixed expenses that he has invested in terms of purchasing price of cows, construction of cattle shed etc from the daily milk production. The dairy farmer is solely depending upon the production for reimbursing the invested amount and this gets totally distracted whenever the cattle is getting caught with any diseases. As this adversely affect the production itself, they cannot generate income out of it which in turn make them difficult to meet all expenses incurred out of it and may make them fall in loss. This questions the sustainability of dairying and the dairy farmer. So the institutional agencies need to give more support and assistance for sustaining these farmers in this field by increasing their subsidy rates and amounts and also creating more awareness for the dairy farmers about the existing schemes of assistance and incentives which are available for them.

SUMMARY OF FINDINGS & CONCLUSION

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CHAPTER 5

SUMMARY OF FINDINGS AND CONCLUSION

Dairy industry is one of the most rapidly developed industries in India. Today, India is the largest producer of milk in the world and it is an important economic activity of our country which contributes to the main source of income to the majority of rural population, particularly the weaker sections. It provides subsidiary occupation in rural areas and gainful employment to the underemployed. A dairy holding enterprise is a profitable complementary enterprise in agriculture and can also be compared with a manufacturing or production enterprise where the milch animal is the machine, the raw material is feed and fodder, and the final product is milk. It is because of this profitable nature, most of the cultivating households irrespective of the size of their land holding continues to rear cattle and has become an integral part of Indian agriculture. However due to the recent hike in the production cost and other problems which they are facing, the farmers are forced to quit this sector and there exist a demand - supply gap in the milk production which may even force to depend on the neighbouring states for meeting the consumption needs. And this questions the viability of dairying. To ensure sustainability of dairy farmers, dairying should be sustainable and then only self sufficiency in milk production can be achieved. The dairy farmers should get the maximum assistance for exploring the profitable avenues in the dairying profession and it is the need of the hour.

The study titled 'Economics of Dairying in Thrissur District' has been conducted with the objectives of examining the pattern of dairying adopted by farmers, identifying the sources, types and extent of assistance and incentives provided to the dairy farmers and studying the impact of assistance and incentives on the sustainability of dairying.

For the data analysis, both the primary and secondary data have been used. Secondary data regarding the various assistance and incentives received by the farmers have been collected from Dairy Development Department, Animal Husbandry Department and Kerala Co-operative Milk Marketing Federation (Thrissur Dairy). Data regarding the societies have been collected from the procurement and inspection (P&I) wing of Thrissur dairy. For collecting the primary data, multi-stage random sampling was used to select 133 respondents from Thrissur district. In the first stage, from each Taluk, two Anand Pattern Co-operative Societies (APCOS) have been

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selected for which the societies in the Taluks have been ranked based on the quantity of milk supplied to MILMA during the last three years. From the rank list prepared, societies which ranked first and last have been selected. Thus the sample size of APCOS has become ten, i.e., two societies each from five Taluks. In the second stage, from each of the societies, 10 farmers who are pouring members for the last three years were selected randomly. As a control group for comparison, three farmers who are not the members of the society, but residing within the area of operation of the society also were selected. Thus the sample size is 130 dairy farmers, consisting of 100 member farmers of APCOS and 30 non- member farmers. In addition to this, not less than three commercial dairy units, from the study area have also been included for the study. Pre-tested structured interview schedule have been used for collecting data from the respondents.

The major statistical tools used for the study were One sample t- test, Independent samples t- test, ANOVA test, Post- hoc test for multiple comparison , Cobb- Douglas production model, Kruskal Wallis H test and Mann Whitney U test.

5.1 Major Findings

The major findings of the study are summarised and presented in the sequence given below:

5.1.1 Pattern of dairying adopted by the dairy farmers

5.1.2 Sources, types and extent of assistance and incentives provided to the dairy farmers

5.1.3 Impact of assistance and incentives on the sustainability of dairying

5.1.1 Pattern of Dairying adopted by the dairy farmers

The pattern of dairying adopted by the farmers includes feeding practices and breeding practices. For studying the feeding practices adopted by the farmers, the analysis has been done taking into account the feeding schedule specifications prescribed by the Productivity Enhancement Department of National Dairy Development Board, Anand and also the actual feeding practices adopted by the farmers. Comparisons with standard specifications have been made both member - wise and category - wise. While comparing the actual quantity given and the recommended quantity, it could be obtained that concentrates and paddy straw are not giving up to the recommended quantity whereas green grass is providing more than the required

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prescribed quantity. Among these, the quantity of concentrates and green grass given by the farm respondents are more than the required quantity whereas the quantity of paddy straw given is found to be less when compared to the other three categories. The study reported that artificial insemination method is being adopted by all the respondent farmers and the various kinds of breeds that have been found in the study areas are Holstein Friesians, Jersey, Crossbreed cattle, Vechur cow, Sunandhini and Kasargod dwarf cow.

5.1.2 Sources, types and extent of assistance and incentives provided to the dairy farmers

The various institutional agencies from which the farmers are receiving assistance and incentives include MILMA, Animal Husbandry Department and Dairy Development Department. The various assistance received by the respondent farmers are availability of paddy straw at concessional rate, mediclaim insurance, subsidy for cattle shed development, rubber mat subsidy, Ksheeravardhini scheme, cattle insurance premium subsidy, interest subsidy for bank loan, summer incentive, assistance for fodder scheme, milk shed development programme and cattle feed subsidy. While analysing the primary data, awareness and availability level of respondent farmers towards each scheme has also been analysed and it has been found that the awareness level of the dairy farmers is poor and the situation should be changed by creating more awareness programmes. Among the assistance and incentives provided under MILMA, the awareness and availability of Summer Incentive is found to be more when compared to others. The Scheme is for supporting the dairy farmers when the production cost increases during times of drought. The Scheme provides an addition of Rs 2/- along with the milk price for compensating the farmers' additional cost. Cattle feed subsidy is found to have more awareness and availability among the assistance provided by Dairy Development Department. It was found that subsidy amount contributes less than 10 per cent of the total cost in the case of a major per cent of the respondents irrespective of the institutional agency. Regarding the attitude of dairy farmers towards assistance and incentives, majority of the respondents have no opinion which is mainly due to their lack of awareness about the assistance and incentives or their hesitant attitude towards the institutional agencies. Among the respondents who are aware of the assistance and incentives, those who have availed are found to be less. The reluctance of the farmers can be attributed to the long procedural time consuming process to avail the assistance.

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5.1.3 Impact of assistance and incentives on the sustainability of dairying

The impact of assistance and incentives is studied upon the members and non members in their production, marketable surplus, gross income, cost and net income. Member - wise and category - wise analysis of data has been done. It was revealed that there is no significant difference in production and net income of dairy farmers in the case of both member – wise and category – wise analysis. But significant difference was found in the case of gross income for category – wise analysis which is based on their cattle holding. But while taking the cost, there is found to be significant difference among members and non members. As the members are receiving various assistance and incentives, it is enabling them to reduce their costs. But it is not getting reflected in their net income due to the negligible amount of assistance. Cobb-Douglas production function was employed separately for total respondents and also for total members to analyze the relationship of various costs to total production. The dependent variable of the model is production and the independent variables are feed cost, labour cost, veterinary cost, transportation cost and insurance cost. It could be inferred that one rupee increase in the feed cost leads to 19 paisa increase in the production, one rupee increase in the labour cost leads to 47 paisa increase in the production, and one rupee increase in transportation cost leads to 62 paisa increase in the production. However, one rupee change in veterinary cost leads to 44 paisa decrease in the milk production. One of the major reasons which adversely affect the milk production is the occurrence of diseases in their cattle. By this, the dairy farmer has to incur a large amount which he cannot compensate from his daily milk selling price. So whenever there is rising veterinary cost, it will negatively affect the production. Even though insurance cost is positively related to production, it is not significant, which can be attributed to the decreased number of respondents who have taken insurance coverage for their cattle. Insurance cost is not a significant expense as far as a dairy farmer is concerned. While using Cobb-Douglas production function, it was observed that one rupee increase in feed cost leads to 19 paisa increase in production for total respondents, comprising of members and non – members, whereas 22 paisa increase in the case of members alone. This tilts to the fact that the members who are affiliated to the society could make a significant impact in reducing their feed cost through various assistance received by them. However, the advantage available for them through these assistance and incentives do not lead to increase in their net income. The results of Kruskal Wallis H test show

that there is no significant difference in the net income earned out of dairying among the four categories of respondents classified on the basis of average facilities at home. Hence it can be concluded that there is no relation between the assets created by the dairy farmers and the net income earned by them out of dairying.

Since majority of the respondents under study undertake dairying as a subsidiary occupation which gives them either a subsidiary income or a means for meeting their day to day livelihood expenses, creation of assets out of the income from dairying is not possible. It could also be observed from the study that for majority of the respondents, two family manpower are involved in undertaking dairying activities. The analysis made it clear that the assistance and incentives received by the dairy farmers have no impact in the employment generated by dairying in a household.

Economics of dairying has been worked out by finding out the benefit cost ratio; most of the respondents, irrespective of cattle population and membership have benefit cost ratio ranging from one to two. There is no significant difference between members and non members in their benefit cost ratio. This also highlights the fact that the impact of assistance and incentives received by the member dairy farmers has not reflected in their benefit cost ratio. By making an impact in cost reduction, sustainability can be ensured partially. But for ensuring sustainability as a whole, it should reflect in their net income. The study also made it clear that though these assistance and supports have a significant impact on the cost reduction, this is not getting reflected in the net income of the dairy farmers. There is no significant difference between the members and non members in their net income. The cost reduction which is beneficial for the members are compensated by the increased rate of milk price of non members through local sale. Unless and until, the dairy farmers are able to make an impact in their net income, it cannot be said that they are sustainable in dairying. This points to the need for an increase of subsidy rates and increase in assistance amount for the dairy farmers. Whenever there is a rising feed cost, a proportionate increase in return together with the subsidy and assistance amounts should also be ensured. Then only it will result in an increased net income for members when compared to that of non members.

It was found that the extent of amount of assistance and incentives is meagre for dairy farmers who are receiving the support from MILMA and Dairy Development Department since they obtain below 10 per cent of their total cost as subsidy amount. While examining the attitude of dairy farmers towards the assistance and incentives, majority of the respondents have no opinion. The major reason for this attitude is their lack of awareness about the support programmes or their hesitant attitude towards institutional agencies. It could also be observed that among the member group itself, there is a need for creating awareness about the various schemes which are available for them. Most of the dairy farmers are taking the advantage of society only for pouring milk and for receiving a stable price for their produce. They are not much concerned about the various assistance and incentives which are available for them. The study revealed that the increased procedural formalities, ignorance and lack of time make the dairy farmers hesitant to approach the institutional agencies for obtaining the incentives and assistance.

5.2 Conclusion

The various institutional agencies that are existing for supporting the dairy farmers are MILMA, Animal Husbandry Department and Dairy Development Department. The schemes of MILMA and Dairy Development Department have significant impact on reducing the cost of dairy farmers whereas Animal Husbandry Department is providing various services for supporting the dairy farmers. The study clearly revealed that though the assistance and incentives received by the members could make a significant impact by way of reducing the cost, the same is not getting reflected in their net income. The meagre amount of assistance and lack of awareness for availing assistance and incentives among the member farmers are found to be the reasons for not reflecting the impact in their net income. While comparing the number of beneficiaries who have received the assistance in cash, and by way of credit to their bank accounts, the latter was found to be very less. The situation calls for the need for providing financial literacy to the dairy farmers to avoid the fear of institutional set up. After providing financial literacy to the dairy farmers, the institutional agencies can introduce one time settlement or similar programmes for the farmers to obtain the subsidy amount in lump sum at one time in a year. The society should take an active role as a link between bank and the dairy farmers in determining the amount that should be credited to the bank account of each farmer

and in ensuring that their bank accounts are getting credited with the assistance and incentives. If the Government agencies make proper interventions by way of creating more awareness among the dairy farmers, implement financial literacy programmes and increase the amount of assistance and incentives, it would enable the farmers to make significant impact in their net income thereby ensuring sustainability of dairying.

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ABSTRACT

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ECONOMICS OF DAIRYING IN THRISSUR DISTRICT

By

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ABSTRACT OF THE THESIS

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ABSTRACT

Dairy is a vital part of the global food system providing economic, nutritional and social benefits to a large proportion of the world's population. It has assumed one of the most important roles in providing employment and income generating opportunities for rural population. The advent of dairying has been a boon for dairy farmers and of particular importance to those segments of the society that have been traditionally weak, the small landholders, landless labourers and women. Agriculture, being only seasonal, the dairy industry provides off-season work, steady income and keeps the rural population employed throughout the year.

The study titled ' Economics of Dairying in Thrissur District' has been conducted with the objectives of examining the pattern of dairying adopted by farmers, identifying the sources, types and extent of assistance and incentives provided to the dairy farmers and studying the impact of assistance and incentives on the sustainability of dairying. The assistance and incentives provided to the dairy farmers, the pattern of dairying adopted and the impact of assistance and incentives on the sustainability of dairying have been studied at the district level of Thrissur using both secondary and primary data. Secondary data regarding the various assistance and incentives received by the farmers have been collected from Dairy Development Department, Animal Husbandry Department and Kerala Co-operative Milk Marketing Federation (MILMA) (Thrissur Dairy). Data regarding the societies have been collected from the Procurement and Inspection (P&I) wing of Thrissur dairy. For collecting primary data, multi-stage random sampling method was employed. 133 respondents were selected from five taluks of Thrissur district. In the first stage, from each taluk, two Anand Pattern Co-operative Societies (APCOS) have been selected for which the societies in the taluks have been ranked based on the quantity of milk supplied to MILMA during the last three years. From the rank list prepared, societies which ranked first and the last have been selected. Thus the sample size of APCOS has become ten, i.e., two societies each from five taluks. In the second stage, from each of the societies, 10 farmers who are pouring members for the last three years have been selected randomly. As a control group for comparison, three farmers who are not the members of the society, but residing within the area of operation of the society have been selected. Thus the sample size is 130 dairy farmers, consisting of 100 member farmers of APCOS and 30 non

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member farmers. In addition to this, three commercial dairy units from the study area, with a minimum cattle holding of 20, have also been included for the study. Pre-tested structured interview schedule has been used for collecting data from the respondents. The major statistical tools used for the study were one sample t test, independent samples t test, Kruskal Wallis H test, Mann Whitney U test, ANOVA , post hoc test for multiple comparison and Cobb- Douglas production function.

The pattern of dairying adopted by the farmers is discussed under two heads- feeding practices and breeding practices. For studying the feeding practices adopted by the farmers, the study takes into account the feeding schedule specifications prescribed by the Productivity Enhancement Department of National Dairy Development Board, Anand and also the actual feeding practices adopted by the farmers. Comparisons with the standards have been made both member - wise and category - wise. Based on the cattle population, while comparing the actual quantity given and the recommended quantity, it could be observed that concentrates and paddy straw are not given upto the recommended quantity whereas green grass is provided more than the prescribed quantity. Among these, the quantity of concentrates and green grass given by the farm respondents are more than the required quantity whereas the quantity of paddy straw given is found to be less when compared to the other three categories. With respect to the breeding practices, artificial insemination method is being adopted by all the respondent farmers and the various kinds of breeds that have been found in the study areas are Holstein-Friesian, Jersey, Crossbreed cattle, Vechur cow, Sunandhini and Kasargod dwarf cow.

The sources from which the farmers are receiving assistance and incentives include MILMA, Animal Husbandry Department and Dairy Development Department.The various assistance received by the respondent farmers are availability of paddy straw at concessional rate, mediclaim insurance for dairy farmers, subsidy for cattle shed development, rubber mat subsidy, Ksheeravardhini scheme, cattle insurance premium subsidy, interest subsidy for bank loan, summer incentive, assistance for fodder scheme, milk shed development programme and cattle feed subsidy. Among these, the summer incentive scheme which is being provided by MILMA is found to be the most acceptable and fully availed scheme among members. None of the respondents is found to be receiving any of the selected assistance from Animal Husbandry

Department. However the farmers are receiving various services free of cost such as artificial insemination, free medicines and vaccination.

The impact of assistance and incentives is studied upon the members and non members in their production, marketable surplus, gross income, cost and net income. Member - wise and category - wise analysis of data have been done. It was found that cost - wise, there is significant difference among members and non members. As the members are receiving various assistance and incentives, it enables them to reduce their costs. But it is not getting reflected in their net income. Cobb-Douglas production function was employed separately for total respondents and also for total members. From Cobb- Douglas production function, it was observed that one rupee increase in feed cost leads to 19 paisa increase in production for all respondents, and 22 paisa increase in production for members. This tilts to the fact that the members who are affiliated to the society could make a significant impact in their feed cost through various assistance received by them. However, the advantage available to them through these assistance and incentives does not lead to increase in their net income. This indicates that though they can reduce their cost, dairying is not sustainable unless it is reflected in their net income. It was found that the extent of amount of assistance and incentives is meagre for dairy farmers who are receiving the support from MILMA and Dairy Development Department since they obtain below 10 per cent of their total cost as subsidy amount.

While examining the attitude of dairy farmers towards the assistance and incentives, majority of the respondents have no opinion. The major reason for this attitude is their lack of awareness about the support programmes or their hesitant attitude towards institutional agencies. It could also be observed that the assistance and incentives received by the dairy farmers have no impact on the employment generated by dairying in a household. Since majority of the respondents under study undertakes dairying as a subsidiary occupation which gives them either a subsidiary income or a means for meeting their day to day livelihood expenses, it could not make an impact in the asset creation of dairy farmers. Both category - wise and member - wise benefit cost ratio was analysed and it was found that majority of the respondents have benefit cost ratio ranging from one to two.

For ensuring sustainability of dairying, there should be significant impact on the net income of farmers. Whenever there is a rising feed cost, a proportionate increase in return should also be ensured. Subsidy rates and amounts should also increase that would enable them to reduce the cost to the extent where they can make a significant impact on the net income. There is also an increasing need for creating more awareness among the dairy farmers about the existing schemes of assistance and incentives which are available for them. For reducing the production gap for milk in the State, the existing dairy farmers should be retained and the younger generation to be attracted for which dairy farming should be made sustainable through proper institutional support enabling them to earn a reasonable net income.

ANNEXURE

Kerala Agricultural University

College of Co-operation Banking and Management
"ECONOMICS OF DAIRYING IN THRISSUR DISTRICT"
Interview Schedule for Dairy farmers

1. Name of the society (if member)　　　　　:

2. Demographic details of Respondent　　　　:

Sl .No	Name of Family Members	Sex	Relation	Age	Education	Occupation		Monthly Occupational Income	
						Main	Subsidiary	Main	Subsidiary

3. Details of Housing:-

　　1.　Whether having a title deeds　　:　yes/no

　　2.　Type of house　　:　i. Owned/rented　　ii. Hut/tiled/terraced

　　3.　Consumable durables possessed :　Fridge / TV /Cooking gas /Cycle / Two wheelers/ Car/ Wash in machine / Mobile/phone/computer/others/(specify)

4. Asset Details :-

Sl. No.	Types of Assets	Value (Rs.)	Annual Asset Income
Physical Assets			
	Land		
	Building		
Financial Assets			
	Deposits		
	Investment and Gold		
	Chitty		
	Pension		
	Other Assets Specify……….		

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5. Monthly expenditure:-

Expenditure	Amount
Food	
Clothing	
Education	
Medicne	
Others	

6. Land use pattern:-

Sl. No.	Pattern	Area
1.	Gross Land	
2.	Area used for dairying	
3.	Cultivable area	
4.	Uncultivable Area	
5.	Area used for fodder cultivation	

7. Years of farming experience (Dairying)   :

8. Details of Dairying:-

Sl. No.	Cattle	Breed	Number		Production / unit / /day(ltr)	Age of cow (In terms of no. delivery)
			Milching	Dry		
1	Cow A					
2	Cow B					
3	Cow C					
4	Cow D					
5	Cow E					
6	Buffalo					
7	Calves					

9. Breeding Practices Adopted: -

a) Are you following Natural or Artificial breeding practices?

b) If artificial, which agency do you approach for it :-

c) On an average how many times you have to take the cow for artificial insemination for one occasion:-

d) Are you satisfied with the veterinary services provided for artificial insemination: Yes / No

e) If natural, why are you not opting for artificial insemination method?

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10. Feeding Practices Adopted:-

    a) Feeds used for rearing cattle   :   Specify Hay/   etc..

    b) Quantity of Concentrates feed per day   :   Cost per Kg:

    c) Quantity of roughage feed per day

                      1) Green grass   :   Cost Per Kg :

                      2) Straw   :   Cost Per Kg :

                      3)Others if any   :   Cost Per Kg :

    d) Proportion of concentrates and roughages in your feed :

    e) Whether you have fodder cultivable area of your own: Yes / No

    f) If yes; land area used for fodder cultivation   :

    g) Type of Fodder cultivated   :

11. Income and Expenditure Pattern of Dairying:-

Sl No.	Monthly Income and Expenditure Pattern	Amount
	Income	
	Sale of Milk	
	Other sources (Sale of cow dung , Sale of Cattle, calves)	
	Gobar gas plant- fuel generated out of it – savings in fuel)	
	Value added products – curd, ghee etc?	
	Expenditure	
	Feed Cost	
	Labour Cost	
	Veterinary Cost	
	Fodder production Cost (if incurred)	
	Transportation Cost	
	Miscellaneous Cost	
	Interest expenses	
	Insurance	
	Fixed Cost a) Depreciation of Cow shed b) Depreciation of Cows c) Depreciation of equipments d) Interest on fixed capital	
	Other expenses if any…..	
	Net Profit from Dairying	

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12. Method of Sale of Milk:-

Sl. No	Avenues	Quantity	Rate/ litre	Amount
1.	Society			
2.	Domestic Sale			
3.	Other marketing avenues			

13. Do you have access to formal financial sources of credit for purchasing the cattle: Yes/No.

If Yes,

Sl. No	Source	Amount of credit	Interest rate	Term of repayment	Amount Outstanding
1	Public sector banks(specify)				
2	Private sector banks (specify)				
3	Co-operative banks				
4	Regional Rural Banks				
5	Others (specify)				

14. Society to which you are affiliated   :

15. Source of Assistance and incentives   :

16. Employment generation:-

     a)   No. of persons employed under Dairying

                Family members   :

                        Others   :

     b)   Time spent for dairying

                Family members   :

                        Others   :

17. Easiness with respect to the marketing of the produce with the society:-

Highly Satisfied ☐   Satisfied ☐   Not satisfied ☐   Dissatisfied ☐

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18. Assistance and Incentives provided by the Institutions:-

Sl.No	Institutions	Period(From 2011 to 2014)	Type of Assistance and Incentives	Awareness of farmers (Aware/Not aware)	Physical	Financial value
1.	**MILMA**					
	Disbursal of Paddy straw at free of cost					
	Mediclaim Insurance Scheme					
	Cattle shed subsidy					
	Rubber mat subsidy					
	Financial assistance for the cattles which have dead due to Foot and moth disease					
	Ksheera Vardhini Scheme					
	Assistance to Scheduled women for purchasing cattle					
	Insurance Premium subsidy					
	Bank Loan Subsidy					
	Summer Incentive					
2.	**Animal Husbandry Department**					
	Disbursement of one pregnant heifer, 2 adult female goats and 10 chicks					
	Disbursement of one cow and 5 chicks					
	Implementation of cattle Insurance Scheme					
	Milch Cow Programme					
3.	**Dairy Development Department**					
	Fodder Schemes					
	Milk Shed Development Programme					
	Cattle Feed Subsidy					

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19. Impact of Assistance and Incentives:-

Sl. No	Institutions	Production(Milk in litres)	Productivity (Milk per cow)	Income augmentation	Employment generation	Marketing	Asset Creation	Change in the standard of living
1.	**Milma**							
	Disbursal of Paddy straw at free of cost							
	Mediclaim Insurance Scheme							
	Cattle shed subsidy							
	Rubber mat subsidy							
	Financial assistance for the cattles which have dead due to Foot and moth disease							
	Ksheera Vardhini Scheme							
	Assistance to Scheduled women for purchasing cattle							
	Insurance Premium subsidy							
	Bank Loan Subsidy							
	Summer Incentive							
2.	**Animal Husbandry Department**							
	Disbursement of one pregnant heifer, 2 adult female goats and 10 chicks							
	Disbursement of one cow and 5 chicks							
	Implementation of cattle Insurance Scheme							
	Milch Cow Programme							
3.	**Dairy Development Department**							
	Fodder Schemes							
	Milk Shed Development Programme							
	Cattle Feed Subsidy							

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20. Ranking of Constraints associated with Dairying:-

Sl. No.	Constraints	Rank
1.	Rising feed cost	
2.	Inadequate milk price	
3	Diseases	
4.	Lack of credit	
5.	Low milk production	
6.	Not getting assistance and incentives	

21. Are you satisfied with the existing institutional arrangements for the promotion of Dairying?

22. Are you willing to continue Dairying?

23. Do you have any suggestions for further improvement?

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