# THE ECONOMICS OF DAIRY FARMING: A STUDY OF FARMERS IN AIZAWL DISTRICT, MIZORAM

**BY**

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**Submitted**

**in Partial fulfilment of the requirement of the Degree of Master of Philosophy in Economics of Mizoram University, Aizawl.**

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## CERTIFICATE

This is to certify that **Lalhmangaihsangi Ralte** has worked under my supervision and guidance on a research topic entitled, **'The Economics of Dairy Farming: A Study of Farmers in Aizawl District, Mizoram'** for the degree of the Master of Philosophy (M.Phil) in Economics, Mizoram University, Aizawl. The work embodies a record of original investigations and no part of it has been submitted for any other degree in other universities.

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**DECLARATION**

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**DECEMBER, 2019**

I Lalhmangaihsangi Ralte, hereby declare that the subject matter of this dissertation is the record of work done by me, that the contents of this dissertation did not form basis of the award of any previous degree to me or to do the best of my knowledge to anybody else, and that the dissertation has not been submitted by me for any research degree in any other University/Institution.

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(LALHMANGAIHSANGI RALTE)

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## LIST OF ABBREVIATIONS

AC : Average Cost

AI : Artificial Insemination

APL : Above Poverty Line

AR : Average Revenue

BPL : Below Poverty Line

CSO : Central Statistics Office

FAO : Food and Agriculture Organisation

FC : Fixed Costs

GDP : Gross Domestic Product

GSDP : Gross State Domestic Product

GSVA : Gross State Value Added

ICMR : Indian Council of Medical Research

IDDP : Integrated Dairy Development Programme

LLDPE : Linear Low Density Polyethylene

MC : Marginal Cost

MR : Marginal Revenue

MULCO Ltd. : The Mizoram Multi-Commodity Producers Cooperative Union Ltd.

NADRS : National Animal Disease Reporting System

NDDB : National Dairy Development Board

NLUP : New Land Use Policy

SMP : Skimmed Milk Powder

TC : Total Cost

TR : Total Revenue

VC : Variable Costs

# CHAPTER-I

# INTRODUCTION

## 1.1. INTRODUCTION

"Dairying/ Dairy Farming is a branch of agriculture that encompasses the breeding, raising, and utilization of dairy animals, primarily cows, for the production of milk and the various dairy products processed from it." (Webb, 2018). The dairy sector plays an important role in generating employment especially in rural communities in many countries. It also makes significant contribution to the national income for many countries.

On a global scale, in 2016, the global gross production value of agriculture was $3726 billion, whereas the production value of raw milk from dairy cow alone across the world was $238 billion in 2016. The value of milk represented 6.4% of the value of all agricultural products in the world in 2016. (FAO, 2018)

In India, Agriculture and Livestock production are inherently connected, with one depending on the other and are both crucial for food security of the country. Livestock sector is an important sub-sector of agriculture in the Indian economy. According to the estimates of the Central Statistics Office (CSO), the value of output of livestock sector at current prices was about Rs.9,17,910 crore during 2016-17, which contributed 4.11% of the country's Gross Domestic Product (GDP) and 25.6% of total agricultural GDP. This has shown a significant increase over the last few decades as it was only 17% in 1970. Out of this, dairy farming accounts for 67% of the livestock output and is largely responsible for the rising importance of the livestock sector in the country. (National Accounts Statistics- 2018, Central Statistical Organisation, Government of India)

Dairy Farming plays an important role in the Indian agricultural sector and for the economy as whole. India is the largest producer and consumer of milk in the world, contributing to 20% of the global milk production. Approximately 70 million rural households in India are engaged in milk production and milk production contributes almost one- third of the gross income of rural households. In the case of landless dairy farmers, milk production contributes nearly half of their gross income. Organized milk procurement, processing and marketing help farmers to earn lucrative price and empower them to have better and higher social, economic and nutritional status of living. (National Action Plan for Dairy Development, Vision 2022)

There has been a steady increase in milk production in India over the years. India produced 55.6 million tonnes of milk in 1991-92 which has increased to 176.3 million tonnes in 2017-18. Thus, the average annual growth rate can be estimated as 4.5 percent. However, there exists a wide variability in milk production among the different states. Although the per capita availability of milk is 375 grams per day in the whole country, taking as state- wise, it varies between 54 grams per day available in Mizoram to 1120 grams per day in Punjab.

With the increase in milk production, there also has been a significant increase in the price of milk in India as well. This can be shown in Table 1.1 as follows:

Table-1.1: Milk Production and Wholesale Price Index of Milk (2012-2018)

| Year | Milk Production | Wholesale Price Index (WPI) of milk | % Change in Production | % Change in Price |
|---|---|---|---|---|
| 2012-13 | 132.4 | 107.6 | - | - |
| 2013-14 | 137.7 | 116 | 4 | 7.81 |
| 2014-15 | 146.3 | 126.6 | 6.25 | 9.14 |
| 2015-16 | 155.5 | 130.5 | 6.29 | 3.08 |
| 2016-17 | 165.4 | 134.3 | 6.37 | 2.91 |
| 2017-18 | 176.3 | 139.7 | 6.59 | 4.02 |

*Source: National Dairy Development Board and Price Data from O/o Economic Adviser*

From Table 1.1, it can clearly be seen that though production of milk has been rising at an increasing rate, the change in its price shows a fluctuating trend. The price of milk increased by 9% in 2014-15, however, it increased only by 2.91% in 2016-17. There are three main reasons for the increase in milk demand viz; (i) population growth (ii) urbanization and (iii) income growth which lead to an increase in the price of milk. (Vision 2022, Dairy Development, Department of Animal Husbandry and Dairying)

At the global market, in the beginning of the year 2017, the prices of milk and milk products improved satisfactorily due to the anticipation of a reduction in milk production from the major milk exporting countries. However, by the end of May 2017, milk production in major exporting countries still remained either normal or above normal and the European Union also had the intervention stocks of previous year's milk powder. This led to slumping of world market attitudes and the prices of

dairy products fell rapidly and remained low until the end of the year. In October 2017, it was estimated that milk flow would persist upwards till mid-2018 mainly due to higher farm-gate milk prices to milk producers in Oceania and Europe. This further obstructed the market sentiments leading to extended crash in the world dairy markets. (National Dairy Development Board, Annual report 2017-18)

The fall in global prices severely affected the Indian exports of milk and milk products. Export of Skimmed Milk Powder (SMP) dropped alarmingly from 1,24,000 tonnes in 2013-14 to 14,892 tonnes in 2016-17 and declined further to 11,308 tonnes in 2017-18. Due to the fall in global price, many predominantly commodity oriented private processors had little interest in purchasing milk and they either cut their milk purchase prices to the lowest levels or lessened or shut down their operations. (National Dairy Development Board, Annual report 2017-18)

In general, weaker market sentiments persisted throughout the year in the Indian dairy sector. Also, the prices came under further pressure as flush season began. By January 2018, major private players cut down the procurement prices in major milk producing regions relative to the previous year. In e-auction, the SMP fell by Rs.99 and was traded at only Rs.151 per kg in March 2018, as compared to Rs.250 in 2017. Although butter prices remained at higher levels for most of the period, it started falling by about Rs.45 and was traded at Rs.260 per kg after December 2017. (National Dairy Development Board, Annual report 2017-18)

Despite the crash in world market, the dairy cooperatives in India worked hard to preserve the producer price of the preceding year. Due to better procurement prices by the cooperatives and the fall in procurement volume by key private players,

there was a surge in milk collection by the cooperatives by about 11%, that is, to 475.6 lakh kg per day in 2017-18. Liquid milk sale also showed an increase of about 6% to 349.6 lakh litres per day. Hence, the cooperatives had to convert additional surplus of milk into conserved commodities. (National Dairy Development Board, Annual report 2017-18)

Although the year 2017-2018 was a challenging year for the Indian dairy sector and the cooperatives had to suffer great losses due to the slump in the world market, efforts and measures taken by various government institutions and organisations like National Dairy Development Board (NDDB), National Dairy Research Institute and many dairy cooperatives across the country have made India the largest producer of milk in India today.

## 1.2. CONCEPTS AND DEFINITIONS

To enlighten the economic implications of dairy farming on an economy as well as on individual households, some key microeconomic concepts are highlighted in this section.

### 1.2.1. Cost of Production

According to Guthrie and Wallace (1969), cost of production is "all of the payments or expenditures necessary to obtain the factors of production of land, labour, capital and management required to produce a commodity. It represents money costs which we want to incur in order to acquire the factors of production". The factors of production/ inputs involved in dairy farming may include- livestock (dairy cows), land, cowshed, equipment such as dairy cans, trollies

or any kind of machines or equipment, vehicles, feeds such as fodder and concentrates, labour, water, electricity, medicines, etc.

Cost of production is further classified into- Fixed Costs (FC), Variable Costs (VC), Total Cost (TC), Average Cost (AC) and Marginal Cost (MC).

Fixed costs (FC) are costs that do not depend nor change with the quantity of output produced. They have to be incurred even at zero production. On the other hand, Variable Costs (VC) are costs that change with the change in the quantity of output. They usually increase with the increase in output and vice versa, and are not incurred in case of zero production. In other words, VC are costs that vary as a function of output. Then, Total Cost (TC) is the sum total of FC and VC, i.e. TC= FC+VC.

Although costs of production can be fixed and variable in the short-run, in the long run, however, all costs become variable.

Average cost (AC) is the total cost divided by the quantity of output produced while Marginal Cost (MC) of production is the additional cost a firm/ business must incur to produce one more unit of output. A firm/ business may face either decreasing, constant, or increasing marginal costs of production, depending on his level of output, the expense of acquiring additional inputs, and the extent to which they can be used productively. (Frakt & Piper, 2019)

Therefore, in the case of dairy farming, livestock expenses, cost of land and cost of construction of cowshed, costs of machines and equipment, etc., are all fixed costs as they have to be incurred even at zero production of milk. On the other hand

costs of fodder, concentrates, labour, water, electricity, veterinary expenses, and other miscellaneous expenses are all variable costs as they do not need to be incurred at zero production and the increase in these expenses are usually accompanied with increase in production of milk. However, in the long- run, all factors of production and costs become variable as they all vary depending on the loss incurred or profit made in the short- run.

### 1.2.2. Revenue

Revenue is another key concept in microeconomics. There are Average Revenue (AR) and Marginal Revenue (MR) besides Total Revenue (TR).

Revenue or Total Revenue (TR) refers the amount paid by buyers and received by sellers of a good, computed as the price (P) of the good times the quantity (Q) sold, i.e. TR = P x Q.

Total revenue is the income earned by a producer after selling the output before subtracting the costs or taxes. Average revenue (AR) is TR divided by the total output (Q) and shows the price (P) of the output i.e. AR=TR/Q = P. Therefore, AR is also equal to price of output (P). Marginal revenue as stated by Ferguson "is the change in total revenue which results from the sale of one more or one less unit of output."

### 1.2.3. Determinants of Revenue

Revenue of a firm or business is mainly determined by the price of the product and elasticity of demand for the product. When demand is inelastic, a rise in price of a product leads to a rise in total revenue as demand for the product will more

or less remain the same, but when demand is elastic, rise in price of product will lead to a fall in demand and thus, to a fall in total revenue. Other determinants of revenue may include- quality of the product, marketing strategy, marketing personnel, technological development, availability of finances to increase factors of production, etc. Revenue is also determined and affected largely by external factors such as- economic cycle, regulations by the government, competitors' market position, etc.

### 1.2.4. Profit

Profit is another important concept in microeconomics. In simple term, profit means a positive gain generated from business operations or investment after subtracting all expenses or costs. In other words, profit is Total Cost (TC) subtracted from Total Revenue (TR) i.e. Profit = TR-TC

The determinants of profit are more or less the same as the determinants of revenue including- degree of competition faced by the firm, costs of production, economic cycle, strength of demand, availability of substitutes, relative costs, economies of scale, management, etc.

A study on the economics of dairy farming may also include socio- economic factors, such as- size of the family, age, gender, occupation, experience in dairying, financial assistance, herd size and educational level of the farmer. The other uses of dairy cattle for income generation and the output distribution system followed by the farmer may also be included.

## 1.3. STATEMENT OF THE PROBLEMS

Livestock farming, particularly dairy farming plays an important role and has a great impact on the Indian Economy. It provides employment and income for many rural, marginal and landless agrarian labourers throughout India. It is the main occupation for many rural and urban farmers as it provides daily and regular income throughout the year. It is an important source of secondary income for those farmers whose crops have failed due to droughts or other natural calamities. This is also true in the case of Mizoram, a state where more than half of the population are depending on Agriculture, livestock farming and other allied activities as their main source of livelihood.

Dairy farming plays a significant role in Mizoram economy and provides income for many households. Milk and milk products are consumed by almost all households, and thus, the demand for them has been increasing rapidly in Mizoram. Consequently, the price of milk and milk products have also been increasing over the years. Besides the production of milk, dairy farming plays an important role in the cultivation of crops as wastes from cows- both urine and cow dung are used as manure for crops, which are often found more suitable and environmental friendly for sustainable agriculture. Thus, dairy farming also indirectly provides income for farmers through the cultivation and sale of crops.

However, despite the great opportunity to generate employment in the dairy sector and its great potential as a source of income, the number of cattle in Mizoram is only 9.95% out of the total livestock population which is very still low and milk production in Mizoram is 25019 tonnes in 2017-18 which still low as compared to

other north- east states like Meghalaya and Manipur, which are approximately 85000 tonnes and 82000 tonnes respectively in the same period. (Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture and Farmers Welfare, GoI)

Also, the per capita availability of milk per day in Mizoram is estimated to be 54 grams which is still well below the recommendation made by the Indian Council of Medical Research (ICMR), that is, 240 grams. (Livestock Census, 2012). Thus, it can be seen that there is a severe shortage in the supply of milk and milk products in Mizoram.

## 1.4. SIGNIFICANCE OF THE STUDY

Dairy farming is an important source of income for many households especially in the rural parts of Mizoram. In addition, demand for milk and milk products have been significantly increasing in the state. Therefore, to find out the reason for the relatively low level of cattle population and quantity of milk produced by the state, it is important to study the socio- economic conditions of the farmers, the constraints faced by them and the institutional settings of dairy farming in Mizoram.

Further, a study of the nature of costs and returns involved in dairy farming is imperative to find out whether dairy farming is indeed a profitable activity and if it is a viable source of income for households of Mizoram. A study on the nature of costs involved could also assist dairy farmers to have a better understanding and help them to enhance their management skills in this activity.

Thus, given the present scenarios of dairy sector of Mizoram, there is a need for a comprehensive study on the economics of dairy farming including- the socio-economic factors, constraints, institutional settings, costs of production, revenue and profits involved in order to assess and understand the limitations, existing opportunities and profitability, economic implications and significance of dairy farming for individual households and for Mizoram economy as a whole.

## 1.5. STUDY AREA

In Mizoram, Aizawl district stood the highest in milk production among all districts during the year 2017-18. Milk production in Aizawl district was 13902 tonnes, which accounts to 57%, i.e. more than half of the total milk production in Mizoram during the same period. (Mizoram Economic Survey, 2018-19). Major producers and suppliers of milk in Aizawl district come from the towns and villages located at the outskirts of Aizawl city. Among these towns and villages, two areas- Durtlang and Sihphir- are selected as the study areas as they are two the major milk producing towns in Aizawl district.

Durtlang and Sihphir are located to the north of Aizawl- the capital of Mizoram, and are both popularly known as one of Aizawl's biggest suppliers of milk and vegetables. Many households in these two areas are depending on livestock and dairy farming- besides the cultivation of crops- as their main and supplementary sources of livelihood. According to Census, 2011, there are 2076 households in Durtlang and around 70 households are engaged in dairy farming. Sihphir is located further from Aizawl than Durtlang to the north and is less

densely populated than Durtlang area. There are 1349 households in Sihphir, out of which around 60 households are engaged in dairy farming.

## 1.6. OBJECTIVES OF THE STUDY

1. To study the socio- economic conditions of the dairy farmers in Aizawl District, Mizoram.
2. To examine the institutional settings of dairy farming in terms of ownership, sub- contract, labour, marketing, etc. in Aizawl District, Mizoram.
3. To study and analyse the nature of the cost of production, and the cost and benefit situation in dairy farming in Aizawl District, Mizoram.
4. To examine the marketing channels of dairy productions and their relative efficiencies in Aizawl District, Mizoram.

## 1.7. HYPOTHESES

1. Milk production is an increasing function of the amount of feeds.
2. Substantial amount of income could be earned from sale of milk which justifies the profitability of dairy farming.

## 1.8. METHODOLOGY

**Data source:** Durtlang and Sihphir were selected for the study areas. Data were obtained from two sources- Primary and Secondary sources. Primary were obtained through sample survey of dairy farmers in the study areas by following stratified random sampling design. Stratification was made according to herd size

owned by the farmers and required numbers of samples were collected from each stratum. The required information were obtained using questionnaire schedule covering the socio- economic conditions, labour input, cost, income, etc. and are depending on the recollection of the farmers.

To ensure collection of accurate information, it was found to be more appropriate to have smaller sample size rather than large sample. Accordingly, sample size is determined at 40 which were allocated proportionally between the two study areas.

Secondary data were obtained from sources like Economic Survey of Mizoram, published and unpublished annual reports and census reports from Directorate of Animal Husbandry & Veterinary, Government of Mizoram, books, journals, e-resources, and other study materials.

**Analytical Tools:** The secondary data collected from different sources are examined using simple statistical tools of descriptive statistics (mean, standard deviation, percentage, etc.). The nature of cost and revenue are analysed from the computed total cost, average cost, total revenue, etc. To examine the cost- benefit condition and profitability of dairy farming, tools of cost- benefit analysis and paired t- test are adopted. Further, to examine and measure the strength of relationship between the factors of production and the output, log-linear regressions are estimated.

## 1.9. LIMITATIONS OF THE STUDY

It is an understatement that every research has its own limitations irrespective of any field of study. For the present study, sincere efforts have been given to collect updated, relevant and accurate information from the respondents as much as possible. However, despite these efforts there are certain limitations of the study due to certain factors beyond control, both on the researcher's part as well as on the part of the respondents. The following are the main limitations of the study:

**1. Time constraints of the respondents:** The primary data of the present study were acquired through interview schedule. However, the respondents are dairy farmers and are extremely busy with their daily work. Therefore, the researcher had to make the interview durations as short as possible and this might, to a small extent, affect the accuracy of the responds of the respondents.

**2. Lack of interest of the farmers:** As a number of questions were asked, few respondents were not sincere enough and showed lack of interest in the interview. Few respondents were reluctant to provide full and exact response to some questions. This might slightly affect the accuracy of the findings of the study to a small extent.

**3. Locations and constraints on time and transportation costs:** Since the study was conducted on two towns and since most of the residents of the respondents are scattered far apart from each other, a lot of travelling was required from one location to another and there were cases where the respondents were not available. A lot of time and cost of transportation were required for the field study and this created some constraints on the part of the researcher.

**4. Recollection of the respondents:** Most of the questions enquired during the interviews were to be answered from the recollection of the respondents/ farmers. In this case, it was difficult for some of the respondents to provide exact answers in the case of figures like amount of money, dates and years, etc. as they did not keep proper records unlike some others. Therefore, some respondents provided approximate guesses for some of the questions. Due to this, the study may lack exactness in certain areas.

These are the main limitations existed in the present study. The researcher has made maximum efforts to reduce these limitations and make the findings of the study as accurate as possible. However, these limitations including human error of the researcher were not possible to reduce to zero. Keeping in view these limitations, the accuracy of the findings of the study may be affected to a limited extent.

## 1.10. SCHEME OF CHAPTERIZATION

The present study is structured into 5 chapters as follows:

Chapter I : Introduction.

Chapter II : Review of Literature.

Chapter III : Dairy Farming in Mizoram: An Overview.

Chapter IV : Analysis of Data and Interpretation.

Chapter V : Findings, Suggestions and Conclusions.

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# CHAPTER-II

# REVIEW OF LITERATURE

## 2.1. INTRODUCTION

India is the largest producer and consumer of milk in the world and evidently a large number of households, i.e. around 70 million households in India are engaged in dairy farming. Dairy farming provides employment and daily income for many households and constitutes almost one- third of the total income among rural households in India. Milk production has also been increasing significantly over the past 10 years at the rate of 4.8% Compound annual growth rate (Ministry of Agriculture and Farmers' Welfare, Government of India, 2018).

Due to the growing significance of the activity, several researches have been done in the field of dairy farming. This chapter presents the reviews of such literatures, particularly those studies and researches related to the social and economic aspects of dairy farming, as follows.

## 2.2. REVIEW OF RELATED LITERATURES

Rajadurai (2002) conducted a study on 'Economics of Milk Production in Madurai District of Tamil Nadu' and found that for all the respondents, the cost of feeds comprised of two- third of the total cost incurred in dairy farming. The study also found that the cost of milk production per local bred cow was higher than that of a crossbred cow as local bred cow produced lower amount of milk in comparison.

Mankar (2003) conducted an economic analysis of milk production and disposal pattern in Wardha district of Maharashtra. The study found that in terms of feed, green fodder and concentrates were mostly provided for all types of breed of milch cows, including local and crossbred cows.

Venkatasubramanian *etal* (2003) studied the dairy development, challenges and achievements in India and stated that dairy sector achievements are still insignificant when viewed against the constraints faced by the farmers. Some roots of these constraints are high pressure of population and poor socio-economic conditions of the dairy farmers.

Das (2004) in a study on economics of milk production in Burdwan district of West Bengal studied the average daily maintenance cost of buffalo, crossbred cow and local bred cow. He found that it was highest for crossbred cow, that was Rs.40.20 while for buffalo it was Rs.35.20, and the lowest for local bred cow, that was Rs.32.28. The net return was the highest for crossbred cows in terms of litre while there was a negative return for local bred cows.

Sharma *etal* (2004) studied the contribution of dairy and crop enterprise to the total economy of the rural families in semi-arid region of Rajasthan and found that dairy enterprise provided maximum employment of 338 man days, while crop farming provided only 219 man days. And also crop farming contribution was 64.81 per cent and dairy farming contributed 35.19 per cent to the total income of the household.

Desai (2005) undertook the economic analysis of production, utilization and disposal pattern of milk in rural areas of Bidar district (Karnataka) and found out that the average maintenance cost per day per animal was Rs. 28.72 for local cows and Rs. 38.85 for crossbred. The total cost of feed was 68.76 per cent and 82.11 per cent for local cows and crossbred cows out of gross costs respectively.

Malik *etal* (2005) studied the existing dairy farming practices in Uttar Pradesh and found out that the major problem faced by the dairy farmers in the study areas were non- availability of veterinary and Artificial Insemination facilities in the village.

Rots. C. A *etal* (2005) studied the economic and environmental feasibility of a Perennial Cow Dairy Farm. The study found that compared with the traditional 100-cow farm, use of the perennial 128-cow herd reduced supplemental protein and mineral feed purchases by 38%, reduced nitrogen losses by 17%, increased annual milk sales by 21%, maintained a phosphorus balance, and increased annual net return to farm management by $3200.

Shergill (2006) studied the 'Commercial Dairy Farming in Punjab: Problems and Strategy for Further Development' and from this study, it was reported that, in Pubjab, the feed cost was the major cost component in the total expenses incurred in dairy farming.

Singh (2006) conducted a study on economics of milk production and marketed surplus in Imphal, West district of Manipur and found that there was a significant difference in the net return between a local bred cow and a crossbred cow. Net return form a crossbred cow was Rs.48.70 while local cow it was Rs.4.27 in milk production.

Sirohi et al. (2007) conducted a study on 'Economics of Milk Production: Variations Across Productivity Levels', and found that the average maintenance cost per day is Rs.62 for a crossbred cow producing an average of 7 litres per day, while a

high producing milch cow could yield almost 24 litres per day and the average maintenance cost per day is Rs. 97 for these type of cows.

Singh (2008) made a study on economic analysis of milk production in Varanasi District of Uttar Pradesh. The study found that net return from milking buffalo was highest for large farmers and lowest for landless farmers, while there was negative return among the small and medium category.

Das (2010) studied 'Certain Economic Traits and Input- Output Relationship with Milk Production of Crossbred and Indigenous Cattle in Kampur District of Assam'. A calculation on the net profit from both breeds, the study showed that the average income from a cross- bred cow was Rs.6257.09 whereas from a local bred cow, it was Rs.2447.28.

Feroze *etal* (2010) studied how the livestock sector is performing in the North-Eastern region. The study found Milk production has increased in all the NE states except Mizoram during the period of 1998-99 and 2005-06. Increase in milk production is higher than the national average only in two states, i.e., Nagaland and Sikkim.

Rathore *etal* (2010) in their study on the 'Existing management practices followed by the cattle keepers in Churu district of Rajasthan' have observed that, regarding the feeding practices, majority of the dairy farmers in Churu district of Rajasthan practiced group feeding and grazing in fallowed or harvested field. Home-made concentrate mixture was also prevalent in the area.

Raut (2010) undertook a study on the 'Retrospect and Prospects of Commercial Dairy Farming in Maharashtra' and his findings showed that majority of the respondents i.e. around 60% had the cattle/ herd size not more than 20 and more than 80% of the respondent families had an annual income between Rs.150000 to Rs.500000 from dairy farming.

Saiprasad (2010) undertook an economic analysis of dairy production system in Nanded district of Maharashtra. The study showed that green fodder and dry fodder were given at a normal quantity for crossbred cows as well as for buffalos. However, the study found that concentrates were not given at an optimal quantity to buffalos. The study suggested that concentrates should be provided more often as this will increase the milk production per milch cow.

Timsina *etal* (2010) studied the economics of dairy farming in Phulbari village Chitwan, District of Nepal. The study showed that dairy can be an important tool to address poverty as it provides daily cash for the farmers. For this, the farmers need to be motivated for the commercialization of dairy farming with suitable production and marketing adjustments.

Kumar *etal* (2011) studied the smallholder dairy farmers' access to modern milk marketing chains in India and found that traditional milk supply chain although slowly replaced, is still dominant although modern milk supply chain is growing. The modern supply chain is found to be inclusive of all dairy farmers.

Rahman, S (2011) studied the sustainability of dairy- based Self- Help Groups in Kamrup District, Assam. The study found that majority of the members,

i.e. 48% were in young age category, i.e. below the age of 35 years old while among the non-members, 70% were in the middle age group, i.e. 35-50.

Rajput *etal* (2012) studied the training needs of dairy farmers for improved dairy farming practices and its relations to their socio- economic traits in Bundelkhand region and reported that 14.38% of the respondents in the study areas are illiterate, 10% up to primary school, 25% up to middle level, 14% secondary level and only 11.25% were graduate or above. The study also showed that 75% of the farmers sold less than 1 litre of milk per day.

International Dairy Federation (2013) in the IDF factsheet, 2013 highlighted the economic importance of dairying. Consumption of dairy products is consequently expected to increase by 20% or more before 2021, according to FAO and OECD. Thus, dairy production and dairy processing industries appear to become crucial for the current and future global food security challenges.

Naik etal (2013) in their 'Analysis of Existing Dairy Farming in Goa' found that dairy farmers in Goa mainly provide ground maize and cotton seed cake as the ingredients for home- made concentrate feeds. Most of the farmers used naturally grown karad grasses only during the rainy season.

Gururaj (2014) in his thesis studied the contribution of dairy farming in employment and household nutrition in drought prone area of Raichur district, Karnataka. The study found that the average employment generated from irrigated area is more than the un-irrigated area. Dairy farming plays an important role in

providing employment, income and food security for the community in drought prone areas.

Kumar *etal* (2014) undertook farm level analysis of production and marketing behaviour of dairy farmers, in three major milk producing states, namely Punjab, Bihar and Uttar Pradesh of India. The study found that the largest portion of milk production comes from buffalo, followed by cow and then goat. Uttar Pradesh is the largest milk producing state in the country with around 21 million tonne of milk produced in 2010–11.

Rathod *etal* (2014) reported that 20.67% of the dairy farmers in western Maharashtra were illiterate, 37.33% had higher secondary school education and 29.33 of the dairy farmers had college level educational qualification.

Das *etal* (2015) conducted a study on the 'Socio- economic Status of the Rural Dairy Farmers in Lower Brahmaputra Valley of Assam. The findings of the study showed that majority i.e. 77% of the dairy farmers in the study area were in the middle age group and majority of the families had the family size of 4 to 7 members. Also majority of the dairy farmers had primary to secondary school level of educational qualification.

Hagone *etal* (2015) in their study on the 'Decision Making Pattern of Tribal Women in Dairy Enterprise in Melghat region of Amravati District in Maharashtra' found that majority of the dairy farmers i.e. 75% in the study area belonged to the middle- age group. The study also showed that majority of the families i.e. 61.33%

are joint families. 60% of the dairy farming households produce 5 to 34 litres of milk per day and around 75% were calculated to sell 5 to 28 litres of milk per day.

Pandey *etal* (2015) revealed that majority of the respondents, i.e. 76.67% in Gwalior District of Madhya Pradesh were engaged in dairy farming as a subsidiary occupation while only 23.33% of the respondents used dairy farming as their main occupation.

Lalrinsangpuii *etal* (2016) studied resource use efficiency in milk production on sample households. Linear, Cobb-Douglas and Semi-logs milk production functions were tried to study resource use efficiency. The study revealed that concentrate feeds miscellaneous expenses had positive and significant influence on milk production from both local and crossbred cows.

Lalrinsangpuii *etal* (2016) studied the economics of milk production and its constraints in Mizoram and found that the cost of feed for crossbred cows is higher than that of the local cows. The high cost of feed poses great problems for the farmers and needs to be made more easily accessible.

Lalrinsangpuii *etal* (2016) studied the production and consumption pattern of milk and meat in North Eastern India and found out that the dairy sector is growing slower in this region than at the national level. However, it is an important source of income and employment generation and helps effectively in reducing rural inequality.

Panda *etal* (2018) made a comparison between hand milking and machine milking in dairy farms and found that milking method is generally determined by the

size of the dairy farms. For large firms, machine milking is important and is more efficient, however, compared with hand milking, machine milking somewhat degrade the hygiene of milk.

## 2.3. CONCLUSION

Reviews of related research studies and literatures have unveiled remarkable findings on dairy sector in the country. Different studies focus on different areas related to the social and economic aspects of dairy farming. These studies mainly focus on the socio- economic conditions of the dairy farmers, production and marketing, costs, constraints, profiles of the dairy farmers, aspects of employment and income generations involved in dairy farming in various parts of the country. However, there are hardly any studies on the socio- economic conditions of dairy farmers of Mizoram, the institutional settings of dairy farming, the feeding system and other economic analysis on dairy farming activity in Mizoram. Therefore, this study will focus on the socio- economic conditions of the dairy farmers, the institutional settings of dairy farming as well as on other important economic aspects of dairy farming in Mizoram.

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# CHAPTER- III

# DAIRY FARMING IN MIZORAM: AN OVERVIEW

## 3.1. INTRODUCTION

Mizoram is one of the north-east states of India, which is located in the southernmost part of the north-east region of the country. Mizoram has a small population of 10.97 Lakhs- that is only 0.09% of India's total population- spread over an area of 20000 kilometres square, making it the third state in India with the lowest density of population, that is, 50 per kilometre square. The capital city of Mizoram is Aizawl, which is also the largest city in the state. Out of the total population, 52.11% live in urban areas and 47.89% live in rural areas. (Census, 2011)

Mizoram is one of the fastest growing states of India. During 2017-18, the annual Gross State Domestic Product (GSDP) growth rate was 12.28% at constant prices (2011-12), which increased by 14.82% as compared to the previous year. The economy comprises of three main sectors- Primary Sector, Industrial Sector and Service Sector.

The Primary sector comprises of agriculture and its allied activities and contributed 29.93% to the Gross State Value Added (GSVA) during 2017-18. In the same period, the Industry sector contributed 25.05% to the GSVA. This sector comprises of (i) Mining & Quarrying, (ii) Manufacturing, (iii) Construction and (iv) Electricity, Water Supply, Gas and Other Utility Services. The Service sector has the highest contribution to the GSVA, which was at 45.03% during 2017-2018. This sector comprises of- (i) Transport, Storage, Communication & services related to Broadcasting, (ii) Trade, Hotels & Restaurants, (iii) Finance Services, (iv) Real Estate, other Professional Services etc. (v) Public Administration and (vi) other Services. (Mizoram Economic Survey, 2018-19)

In Mizoram, around 70% of the total population, that is, around 7,68,044 of the population derive majority of their income from agriculture and its allied activities. For most of these families, livestock farming is an important secondary source of income and this sector plays an important role in the rural and socio-economic development in of the state. The livestock sector in Mizoram contributes to 3.62% to the GSDP while the combination of the remaining agriculture and allied sector contributes 9.84% to the GSDP. (Economic Survey Mizoram 2018-19)

According to the Livestock Census 2012, the livestock population in Mizoram is 384604, Pigs constitute the largest group followed by cattle that is 69.33% and 9.95 % respectively, that is, 38,268.098 of the total livestock population in Mizoram is composed of cattle population. (Livestock Census, 2012)

Over the last few decades, the Indian dairy sector has been witnessing a tremendous growth. Due to the growing significance of this sector in the Indian economy, the government has also taken several initiatives to develop this sector. However, the growth of dairy sector in the North-Eastern states is still not at par with other states of India. Despite the poor performance of the sector, the demand for milk and milk products have been increasing in these states due to increase in per capita income and changes in lifestyle. (Feroze, 2010)

## 3.2. CATTLE AND FEEDS IN MIZORAM

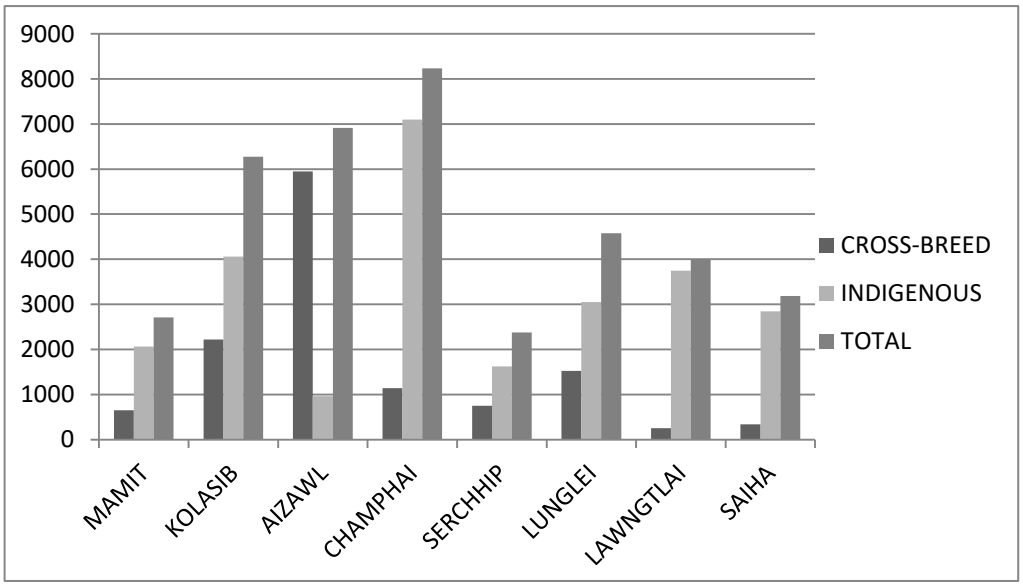
In Mizoram, the main productive cattle in milk production are cross-breed and indigenous cows, while production from buffaloes and goats are negligible and are not accounted in the state's milk production. According to the 19th Quinquennial Livestock Census of India (2012), there were a total 12812 cross-breed cows and 25456 indigenous cows in Mizoram. Thus there is a total of 38268 cattle population in Mizoram. The number of both cross-breed and indigenous cows varies widely among the various districts of Mizoram. This can be shown in Table 3.1 and Figure 3.1 as follows:

Table-3.1. Cattle Population in Mizoram (19th Livestock Census of India)

| Name of District | Cattle | | |
|---|---|---|---|
| | Cross-Breed | Indigenous | Total |
| Mamit | 648 | 2063 | 2711 |
| Kolasib | 2217 | 4061 | 6278 |
| Aizawl | 5948 | 963 | 6911 |
| Champhai | 1140 | 7097 | 8237 |
| Serchhip | 748 | 1626 | 2374 |
| Lunglei | 1523 | 3053 | 4576 |
| Lawngtlai | 253 | 3746 | 3999 |
| Saiha | 335 | 2847 | 3182 |
| **Total** | **12812** | **25456** | **38268** |

*Source: 19th Livestock Census of India, Mizoram State.*

Figure- 3.1- Cattle Population in Mizoram (19th Livestock Census of India)




*Source: 19th Livestock Census of India, Mizoram State.*

Table 3.1 and Figure 3.1 show the result of the 19th Livestock Census of India for Mizoram in terms of cattle population- cross- breed and indigenous across different districts of Mizoram. Among the 8 districts of Mizoram, Champhai district has the highest number of cattle population with the highest share of indigenous cattle, which are 8237 and 7097 respectively, while Aizawl district has the highest cross- breed cattle population, that is, 5948 and the lowest indigenous cattle population of 963. Among the 8 states, Serchhip district has the lowest number of cattle population of 2374 while Lawngtlai district has the lowest cross- breed cattle population, that is, 253 only. In total there are more indigenous cattle, that is, 25456 than cross- breed cattle population of 12812. However, in terms of productive milch animals, there were 6203 productive milch cows and 4511 productive indigenous cows in 2015- 16. (Report on Integrated Sample Survey for the Estimation of Annual

Production of Milk, Eggs and Meat for the year 2015-16, AH & Vety Dept., Mizoram)

Since cross-breed cows are more productive in terms of milk production, increasing the population of cross- breed cattle is important to meet the dairy needs of the state. Even though there is no specific crossbreeding policy in Mizoram, the success of cross breeding is positively visible in Aizawl district, wherein the dairy farmers are maintaining good crossbred cattle, mostly of Holstein Friesian cross and Jersey cross.

Regarding the feeds, dairy farmers in Mizoram mainly provide green fodder, dry fodder (when green fodder feeds are not available), salt, oil-cake, concentrated feeds and wheat bran. Many researchers have found that feeds comprises of the highest costs involved in dairy farming across the country. This also appears to be true in Mizoram. Supplies of feeds, especially concentrated feeds (ready-made) are not available regularly and are depending on the markets in Silchar, Guwahati and Kolkata. (Agarwal, 2013)

## 3.3. MILK PRODUCTION IN MIZORAM

Milk production in Mizoram has been witnessing a positive growth over the years. However, although livestock farming and dairy production plays an important role in the state's economy, the production of milk and milk products is least as compared to other states of India and to other north-east states. The estimated total milk production during 2017-18 was 25019 tonnes. The per capita availability of milk per day in Mizoram is worked out to be around 54 grams which was very low as

against the Indian Council of Medical Research (ICMR) recommendation of 240 grams of milk per day per individual. (Mizoram Economic Survey, 2018-19)

### 3.3.1. Estimated Annual Milk Production

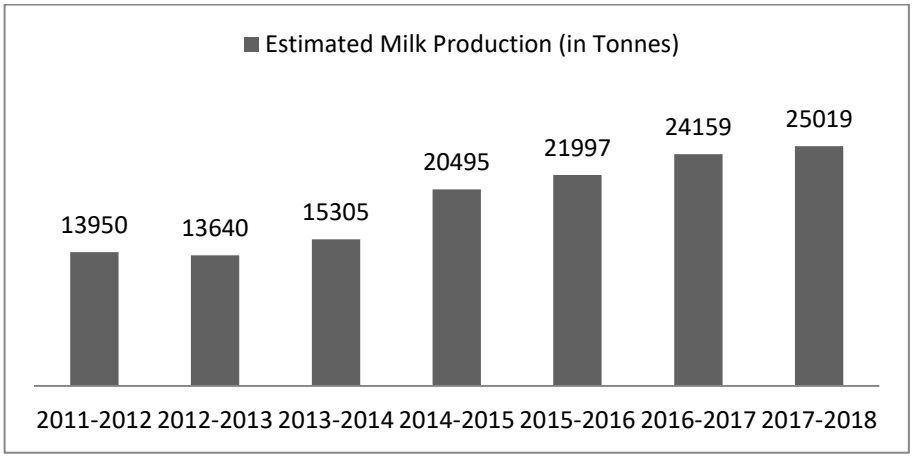
The estimated annual milk production in Mizoram during the year 2011-2018 can be shown in Table 3.2 and Figure 3.2 as follows:

Table- 3.2: Estimated milk production during 2011-2018 in Tonnes

| Year | Estimated Milk Production (in Tonnes) | Percentage Increase/ Decrease In Milk Production |
|---|---|---|
| 2011-2012 | 13950 | 0 |
| 2012-2013 | 13640 | -2.2 |
| 2013-2014 | 15305 | 12.2 |
| 2014-2015 | 20495 | 33.9 |
| 2015-2016 | 21997 | 7.3 |
| 2016-2017 | 24159 | 9.8 |
| 2017-2018 | 25019 | 3.5 |

*Source: Mizoram Economic Survey, 2018-2019*

Figure: 3.2: Estimated Milk Production during 2011-2018




*Source: Mizoram Economic Survey, 2018-2019*

Table 3.2 and Figure 3.2 show that there has been a significant and constant increase in milk production in Mizoram over the recent years. There is an increase of milk production by 11,069 tonnes between 2011-2012 to 2017-2018, that is, 79.3% increase in 7 years. Also, except in the years 2011- 2012 to 2012-2013, there has been a positive increase in the milk production. The highest increase was seen between the years 2013-2014 to 2014-2015, that is, 33.9% increase in milk production. This trend clearly shows that there has been a positive growth in terms of milk production and that there is a great potential for the dairy sector in Mizoram for further development.

### 3.3.2. Species- Wise Milk Production

In Mizoram, among the species of the cows, crossbred cows and indigenous cows are mainly reared for milk production and are taken into account for estimation of annual milk production. The cross-breed cows are mostly of Holstein Friesian cross and Jersey cross. Milking of goat and buffalo are very rare in Mizoram and is negligible. The species- wise milk production in Mizoram during the years 2016-2018 can be shown in Table 3.3 as follows.

Table- 3.3: Species- Wise Milk Production during 2016-2018 in Tonnes

| **COW** | **Production (in Tonnes)** | | | |
|---|---|---|---|---|
| | **2016-2017** | **Percentage** | **2017-2018** | **Percentage** |
| Cross- breed | 21888 | 90.6 | 22815 | 91 |
| Indigenous | 2271 | 9.4 | 2204 | 9 |
| Buffaloes | 0 | 0 | 0 | 0 |
| **Total** | **24159** | **100** | **25019** | **100** |

*Source: Mizoram Economic Survey, 2018-2019*

Table 3.3 shows that milk production from cross- breed cows are higher than indigenous cows for both the years 2016-2017 and 2017-2018. Also, while milk production from cross-breed cows has increased from 21888 tonnes in 2016-2017 to 22815 tonnes in 2017-2018, showing a 4.2% increase, the milk production from indigenous cows has declined by 67 tonnes between the two years, showing 2.9% decline.

The percentage contribution of each species in milk production in both the years also shows that, majority of the milk production, that is, around 91% is produced by the cross-breed species cows and indigenous species produced only 9% of the total milk production.

### 3.3.3. District-wise share of milk production

The quantity of milk production varies widely among the various districts of Mizoram. The share of milk production among the 8 districts of Mizoram during the year 2017-2018 can be shown in Table 3.4 as follows:

Table- 3.4: District-wise share of milk production during 2017-2018

| District | Milk production (in tonnes) | % share |
|---|---|---|
| Aizawl | 14010 | 56 |
| Kolasib | 4003 | 16 |
| Mamit | 1000.76 | 4 |
| Champhai | 2251.71 | 9 |
| Serchhip | 1,250.95 | 5 |
| Lunglei | 1,751.33 | 7 |
| Lawngtlai | 500.38 | 2 |
| Siaha | 250.19 | 1 |
| **Total** | **25019** | **100** |

*Source: Mizoram Economic Survey, 2018-2019*

Table 3.4 shows that Aizawl district contributes the highest, 56% of total milk production in Mizoram during the year 2017-2018. This is also more than half of the total production. Kolasib follows as the second largest producer among the districts and Siaha district produces the lowest, that is, only 1% of the total milk production. It can be stated that most of the milk production in Mizoram are produced in Aizawl and Kolasib districts.

## 3.4. THE MIZORAM MULTI-COMMODITY PRODUCERS COOPERATIVE UNION LIMITED (MULCO Ltd.)

The biggest and the main cooperative union in the dairy sector in Mizoram is The Mizoram Multi-Commodity Producers Cooperative Union Ltd (MULCO Ltd.).

The Mizoram Multi-Commodity Producers Cooperative (MULCO) was established in the year 1984 formerly as the Mizoram Milk Producers' Co-operative Union Limited (MMU). However, in 4$^{th}$ December, 1991, the Union was transformed into a new cooperative union and The Multi-Commodity Producers' Cooperative Union (MULCO Ltd) was established in its place as directed by the National Dairy Development Board (NDDB). Its objectives include, besides the development of milk supply, the activities like trading in vegetable/spices and sale of pork by building a modern slaughter-house. MULCO Ltd. was registered under the Cooperative Societies Act 1991. According to the Office of the Registrar of Cooperative Societies Government of Mizoram, currently, there are 34 societies affiliated to MULCO ltd. (Khiangte, 2011)

### 3.4.1. Objectives of MULCO ltd.

The main objectives of MULCO ltd. regarding the milk production and supply in Mizoram can be highlighted as follows:

1) To stimulate and assist the operation of the Cooperative Societies affiliated to MULCO ltd. by introducing and implementing more efficient methods of dairy farming to improve the economic conditions of the farmers, especially women farmers.

2) To provide trainings to dairy farmers including women beneficiaries for better implementation of development programme.

3) To provide necessary facilities and inputs to improve the farming techniques, profitability of dairy farming as well as the living conditions of the farmers.

4) To ensure that the works of the Union is in the common interest of all the members in such a way that they all benefit from it.

5) To ensure an efficient system of milk supply in and around Aizawl.

### 3.4.2. Services offered by MULCO. Ltd to dairy farmers

In order to fulfill its objectives, MULCO ltd provides important services for the milk producers/ dairy farmers in Mizoram. The main services offered can be discussed as follows:

1. **Procurement of Milk**

MULCO ltd. procures raw milk form primary cooperative societies by establishing milk collection centres in various parts of milk producing towns in and around Aizawl. Currently, there are 29 MULCO ltd. milk collection centres around Aizawl. Out of these, 14 are located in Durtlang and Sihphir, the study area of the present study. The procurement of raw milk is the main business of MULCO ltd.

**2. Processing of Milk**

The procured milk are examined and scrutinized by both organoleptic and rapid platform tests. Samples that are acceptable for further processing are sent for chilling and pasteurization. Pasteurization removes and eliminates all pathogenic bacteria including the most heat resistant bacteria present in milk. Pasteurized milk is then packed in a 500ml food grade Linear Low Density Polyethylene (LLDPE), the inner lining of which is sterilised by UV light attached to the packing machine to examine and rule out any contamination by poly-film.

**3. Milk Marketing**

Pasteurized milk packed in 500ml pouches are stored in cold storages and are marketed through over 180 sale agents of MULCO ltd. all around Aizawl. Currently, 500 ml of milk is sold at Rs.30 through these agents.

MULCO ltd. also provides breeding services by providing artificial inseminations. Artificial Insemination (AI) centres are maintained by department of Animal Husbandry & Veterinary, Government of Mizoram.

**4. Animal Health Services**

MULCO ltd. through the organization's veterinarians and specialists in dairy farming also provides health services for animals in different parts of the state. These experts also help farmers in dairy farming practices and also supply them with veterinary first aid trainings. The Union also supplies vaccines and medicines to prevent various kinds of diseases and organizes training camps for dairy farmers/ milk producers on scientific management in dairy farming

**5. Quality Control**

The technical staff of MULCO ltd maintains the quality control of milk in order to ensure that the quality of milk supplied are safe and up to standard.

**6. Production of processed milk products**

Integrated Dairy Development Programme (IDDP) was introduced in the Union, financed by the department of Animal Husbandry, Dairying and Fisheries, Government of India. Under this program machineries were installed for processing of milk. Processed products like rasgulla, gulab jamun, paneer, ghee, etc., have been supplied and sold all over MULCO outlets in and around Aizawl.

Apart from these mentioned services, MULCO ltd. has been performing many other services, including the provision of feeds such as dry fodder, concentrate feeds, wheat bran, etc., at lower prices, provision of Bulk Milk Coolers, deep freezers to primary cooperatives and many other services.

MULCO ltd. plays an important role in the dairy sector of Mizoram and has great impact on the economic conditions of the dairy farmers and on the success of

the dairy sector in Mizoram. Thus, it is impossible to exclude MULCO ltd. and its impact on the dairy sector, in terms of price of milk, prices of inputs, income of dairy farmers, etc., from the study of the economics of dairy farming in Mizoram.

## 3.5. DAIRY DEVELOPMENT PROGRAMMES IN MIZORAM

Several dairy development programmes and schemes have been undertaken by the government in Mizoram. The major dairy development programmes and measures with their achievements can be discussed as follows-

### 3.5.1. Intensive Dairy Development Programme (IDDP)

Intensive Dairy Development Programme (IDDP) is a centrally sponsored scheme which was modified in March, 2005 from the previously implemented scheme named 'Intensive Dairy Development Project (IDDP) in Non-Operation Flood, Hilly and Backward Areas' launched in 1993-94 on 100% grant-in-aid basis.

The government of India has launched this programme in various parts of the country in order to promote the development of dairy sector. The main objectives of the scheme are-

1. To facilitate the development of milch cattle.
2. To provide technical inputs services in order to increase milk production.
3. to carry out the procurement, processing and marketing of milk in an efficient and cost effective manner
4. To ensure remunerative prices are given to the milk producers in order to increase their income.
5. To create additional employment opportunities for the dairy farmers.

6. To improve and develop the social, nutritional and economic conditions of the residents of relatively disadvantaged and underprivileged areas.

In Mizoram, the State Government has implemented 5 (five) Dairy Development Projects under this scheme. They are-

1. IDDP I & IV at Aizawl.
2. IDDP-II at Lunglei,
3. IDDP-III at Kolasib and
4. A new project- IDDP-V at Champhai.

Through this project, the government has been taking necessary measures to establish the required infrastructures for the collection, pasteurization, storage and distribution of standard quality of milk, in order to achieve its food policy of self-sufficiency. The government also encourages maximum participation of the people through Dairy Cooperative Societies. (Mizoram Economic Survey, 2018-19)

The performances of these projects during the year 2016-2017 is presented in Table 3.5 as follows-

Table-3.5: Performances of Five Intensive Dairy Development Programme (IDDP) projects in Mizoram

| Sl. No | Name of Project | Location | Plant capacity (Litre/ Day) | Milk Marketed (Litre/ Day) | Milk Procurement in (2016-17) |
|---|---|---|---|---|---|
| 1 | IDDP - I & IV | Aizawl | 15,000 | 4982 | 2323239 |
| 2 | IDDP – II | Lunglei | 5,000 | 882 | 321930 |
| 3 | IDDP – III | Kolasib | 5,000 | 480 | 179700 |
| 4 | IDDP – V | Champhai | 5,000 | Nil | Nil |

*Source: Mizoram Economic Survey, 2018-2019*

Table 3.5 shows the performances of the five projects under IDDP in four major locations of Mizoram during the period 2016-17. It can be seen that in all the locations, the amount milk marketed in litre per day are all well below the plant capacity. The reasons for these were reported to be the malfunctioning of dairy plants and machineries at certain intervals of time. Also, the reason for the non- existence of milk procured and marketed in Champhai under IDDP-V project was reported to be the breakdown of plant and machineries and other management problems. (Mizoram Economic Survey, 2018-19)

### 3.5.2. New Land Use Policy (NLUP)

New Land Use Policy (NLUP) was established by the government of Mizoram on 14th January, 2011. NLUP has been terminated by the end of 2018 with the change in the government ministry. However, since its implementation till present, several successful outcomes have been seen, including in the dairy sector. NLUP was implemented with the aim to develop and provide all farmers/ workers particularly in the primary and informal sector in Mizoram with suitable, permanent and stable trades so as to ensure self- sufficiency in agricultural and its allied products. Under NLUP, the beneficiaries were provided with necessary inputs, both with the supply of credit as well as in kind.

In the dairy sector, under the department of Animal Husbandry and Veterinary, the government provided necessary aids to the dairy farmers in 4 (four) phases. As of May, 2016, there were 1635 beneficiaries in the dairy sector. (Department of Animal Husbandry and Veterinary, Government of Mizoram)

**1st Phase:** The 1st phase was started in 2011 and there were a total of 9929 beneficiaries under animal husbandry. Out of these, 949 beneficiaries were under the dairy sector. 2 (two) cows were provided for each beneficiary under this phase. From the survey report of all the districts, it was concluded that the success rate of phase- I was 55%, out of which 77.5% of the dairy farmers were helped to stand on their own feet.

**2nd Phase:** The 2nd Phase was started in 2013 and there were a total of 12886 beneficiaries, out of which 380 beneficiaries were in the dairy sector. In this phase, although the total number of beneficiaries increased, beneficiaries in dairy sector had declined as compared to the 1st Phase.

**3rd & 4th Phase:** The 3rd and 4th Phase was started in 2015 and there were a total of 14224 beneficiaries, out of which 306 beneficiaries were under the dairy sector. The beneficiaries were provided with required cattle under these phases.

In the dairy sector, satisfactory achievements were seen from NLUP. Many dairy farmers were provided with cattle which would otherwise cost a large sum of money. For many farmers, this programme was the opportunity for a new road to self-sufficiency. As of 2016, the milk production had increased due to the programme by about 13.8%. (Department of Animal Husbandry and Veterinary, Government of Mizoram)

### 3.5.3. National Animal Disease Reporting System (NADRS)

A nationwide programme called “National Animal Disease Reporting System (NADRS)” was launched by the Department of Animal Husbandry, Dairying and

Fisheries, Ministry of Agriculture. This programme aimed to introduce a computerized system of Animal Disease Reporting connecting each block, district and state headquarters to a Central Disease Reporting and Monitoring Unit at the Department of Animal Husbandry, Dairying & Fisheries in New Delhi. The reporting system envisioned was to enable the Block, District and State Animal Health officials to report the disease information and make reports and returns prescribed in this regard via internet.

This programme was launched in order to avoid the losses of livestock due to diseases. This is not only an economic loss for the livestock owners, but also for the whole economy at large. As such, Mizoram government has also taken necessary measures under this project and 36 nodes were allotted for monitoring and reporting of animal diseases all around Mizoram. (Department of Animal Husbandry & Veterinary, Government of Mizoram)

### 3.5.4. National Programme on Bovine Breeding & Dairy Development

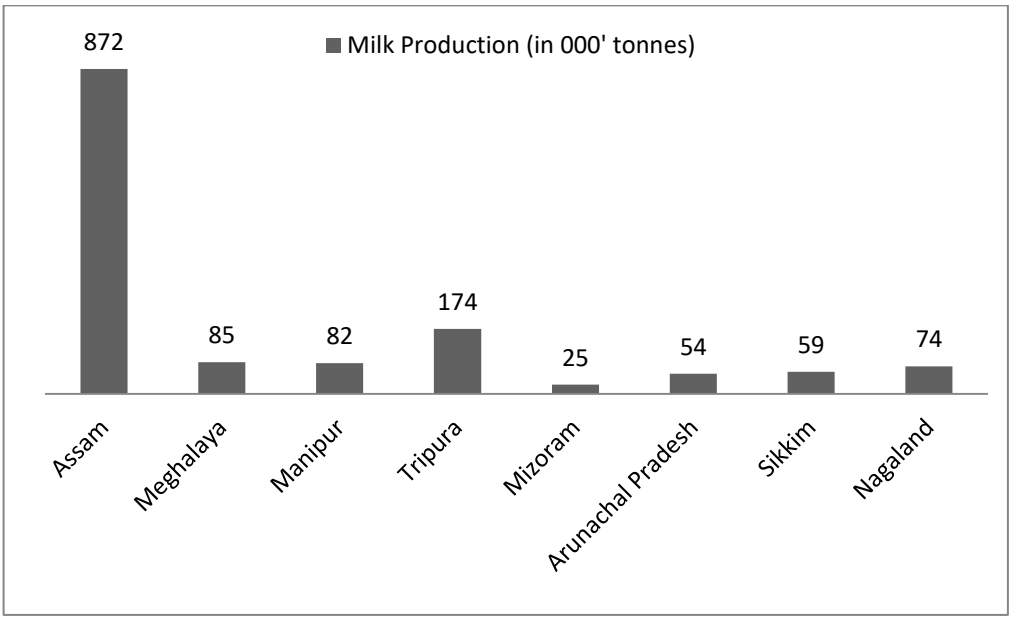
National Programme on Bovine Breeding & Dairy Development was laid down by the Government of India in 2003. The main objective of the programme was to increase the production of good quality milk and better breed of milking cows. Under this programme, improved germplasm of cows like Holstein Friesian breed and Jersey breed cows were distributed through AI as well as natural service. During the period April – December 2016, AI was done to 4065 cows with a high success rate and during 2016 – 2017, Liquid Nitrogen Plant was newly set up at Selesih Veterinary Farm Complex and Calf Rearing Farm was also established at Mampui, Lawngtlai.

This programme has significantly improve the breeding of cows in Mizoram. Most of the cows have now been bred through AI service provided by the department. (Department of Animal Husbandry & Veterinary, Government of Mizoram)

## 3.6. COMPARISON OF MIZORAM MILK PRODUCTION WITH OTHER NORTH-EASTERN STATES

Although milk production in Mizoram has been increasing over the years, it is still low as compared to other north- east states, let alone with other states in mainland India. The status of various states of north- east India in milk production during the year 2017-18 can be presented in a diagram in Figure- 3.3. as follows:

Figure-3.3. Milk production of North- East States (2017-18)




*Source: Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture and Farmers Welfare, GoI*

Figure-3.3 shows the quantity of milk production in the 8 north-east states of India during the year 2017-18 in 000’ tonnes. It can be clearly seen that Mizoram

stood at the lowest in terms of milk production during the period, which was approximately 25,000 tonnes. This is less than half of the total milk production of Sikkim, which is the least populated state in the north- east states with only around 6 lakhs population. (Census, 2011). This shows that the dairy sector in Mizoram is still not developed as compared to the other north-east states. Meanwhile, Assam was the largest producer of milk among the 8 states during the same period, which was 8,72,000 tonnes and was well above any other north- east states. This could be due to the large population in the state and is not surprising.

### 3.7. CONCLUSION

An overview on the current status of dairy sector in Mizoram clearly shows that Mizoram still has a long way to go to develop the sector which would ultimately lead to a higher level of milk production. There could be several reasons for the low number of cattle population accompanied by low level of milk production in Mizoram. It could be the distribution and marketing channels, the socio- economic conditions of the dairy farmers or lack of knowledge, nature of costs and returns and so on. Thus, this study aims to find out these very questions.

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# CHAPTER- IV

# ANALYSIS OF DATA AND INTERPRETATION

## 4.1. INTRODUCTION

Dairy farming is an important occupation for many households in Mizoram and many families especially in the rural areas of Mizoram have been earning their livelihoods through this activity. It also plays an important role and makes significant contributions to the agriculture sector as well as for the economy of the state as a whole.

This chapter presents the descriptive statistical analysis as well as the inferential statistical analysis of the data collected for the present study. The required information was collected using questionnaire schedule. The sample size of the study is 40 which were allocated proportionally between the two study areas- Durtlang and Sihphir. Simple descriptive statistical tools- such as mean, standard deviation, percentage, etc., tools of cost- benefit analysis are used to analyse the collected data, and inferential statistical tools are used to test the hypotheses of the study.

## 4.2. SOCIO-ECONOMIC CONDITIONS

The socio-economic indicators include sex, age, educational level, occupation, housing type and poverty status. These socio-economic indicators are analysed and interpreted separately for the respondents/ household leaders and for the whole household members. The results of these analyses will illustrate and represent the general social and economic conditions of households engaged in dairy farming in Aizawl district, Mizoram.

### 4.2.1. Sex of Respondents/ Household Leaders

Sex of the 40 respondents/ household leaders is shown in Table- 4.1 as follows:

Table- 4.1: Sex of the respondents/ household leaders

| Sex | No of respondents | Percent |
|---|---|---|
| Male | 37 | 92.5 |
| Female | 3 | 7.5 |
| **Total** | **40** | **100** |

*Source: Field Survey, 2019*

Table- 4.1 shows the sex of the household leaders under the present study. Out of 40 household leaders, 37 are male, which consists of 92.5% of the total respondents while 3 household leaders, that is, 7.5% of the total respondents are female.

### 4.2.2. Sex of All Household Members

Sex of all the household members of the 40 respondents is given Table- 4.2 as follows:

Table- 4.2: Sex of all household members

| Sex | Frequency | Percent |
|---|---|---|
| Male | 114 | 53.27 |
| Female | 100 | 46.73 |
| **Total** | **214** | **100** |

*Source: Field Survey, 2019*

Table 4.2 shows sex of all the household members of the 40 respondents. There are a total of 214 household members including the 40 respondents. Out of these, 114 are male which consists of 53.27% of the total household members and

100 of the household members are female, which consists of 46.73% of the household members.

### 4.2.3. Age of the Respondents/ Household Leaders

Ages of the respondents/ household leaders are given in Table- 4.3.1 and Table- 4.3.2 as follows:

Table- 4.3.1: Descriptive statistics of the age of the respondents

| Total no. of respondents | Minimum age | Maximum age | Mean age of the respondents | Standard deviation |
|---|---|---|---|---|
| 40 | 33 | 67 | 53.775 | 9.47 |

*Source: Field Survey, 2019*

Table- 4.3.2: Sex- wise analysis of age distribution of the respondents

| Age Group | Sex | | | | Total | Percentage |
|---|---|---|---|---|---|---|
| | Male | Percentage of male | Female | Percentage of female | | |
| 30 to 40 years | 6 | 16.2 | 0 | 0 | 6 | 15 |
| 40 to 50 years | 6 | 16.2 | 0 | 0 | 6 | 15 |
| 50 to 60 years | 17 | 45.9 | 0 | 0 | 17 | 42.5 |
| 60 to 70 years | 8 | 21.6 | 3 | 100 | 11 | 27.5 |
| **Total** | **37** | **100.0** | **3** | **100** | **40** | **100** |

*Source: Field Survey, 2019*

Table 4.3.1 shows the descriptive statistics of the ages of the respondents. The minimum age among the 40 respondents/ household leaders is 33 years and the maximum age among the respondents is 67. The mean age of all the respondents is 53.7 years and standard deviation is 9.47. Based on the minimum and maximum ages, different age groups of the respondents have been constructed and all the

respondents are placed under four different age groups which is shown in Table 4.3.2. The table shows that majority of the respondents, that is, 42.5% of the respondents belong to the age group of 50 to 60 years. Another 27.5% of the respondents belong to 60 to 70 years.

### 4.2.4. Age Distribution of All Household Members

The age distribution of all the household members is shown in Table 4.4.1 and Table 4.4.2 as follows:

Table- 4.4.1: Descriptive statistics of ages of all the household members

| Total no. of household members | Minimum age | Maximum age | Mean | Standard deviation |
|---|---|---|---|---|
| 214 | 3 months | 67 | 32.29 | 17.19 |

*Source: Field Survey, 2019*

Table- 4.4.2. Sex- wise analysis of age distribution of all the household members

| Age distribution of all the household members | Sex | | | | Total | Percentage |
|---|---|---|---|---|---|---|
| | Male | Percentage of Male | Female | Percentage of Female | | |
| 0 to 10 years | 18 | 15.8 | 8 | 8 | **26** | **12.15** |
| 10 to 20 years | 7 | 6.1 | 16 | 16 | **23** | **10.75** |
| 20 to 30 years | 36 | 31.6 | 33 | 33 | **69** | **32.24** |
| 30 to 40 years | 22 | 19.3 | 13 | 13 | **35** | **16.36** |
| 40 to 50 years | 6 | 5.3 | 8 | 8 | **14** | **6.54** |
| 50 to 60 years | 17 | 14.9 | 15 | 15 | **32** | **14.95** |
| 60 to 70 years | 8 | 7 | 7 | 7 | **15** | **7.01** |
| **Total** | **114** | **100** | **100** | **100** | **214** | **100** |

*Source: Field Survey, 2019*

Table 4.4.1 shows the descriptive statistics of the age of all household members. The analysis shows that the minimum age is 3 months and maximum age is 67 years. The mean age of all household members is 32.29 and the standard deviation is 17.9. Based on the descriptive statistics, all the household members are distributed into seven age groups as shown in Table 4.4.2. The data analysis in the table shows that majority of the household members that is 32.24% belong to the age group of 20 to 30 years of age, majority of the male and female also belong to this age group, 31.6% and 33% respectively. On the other hand, minority of the members, that is, 6.54% belong to the age group of 40 to 50 years. Minority of the male members that is, 5.3% belong to this group, however, minority of female members, that is, 7% belong to the age group of 60-70 years.

### 4.2.5. Education Levels of Respondents/ Household Leader

The education level of the respondents/ household leaders is analysed with respect to their gender. This can be shown in Table 4.5 as follows:

Table- 4.5: Sex- wise analysis of education levels of the household leaders

| Education | Sex | | | | Total | Percentage |
|---|---|---|---|---|---|---|
| | Male | Percentage of Male | Female | Percentage of female | | |
| Can Read & Write | 2 | 5.41 | 1 | 33.33 | 3 | 7.5 |
| Primary School | 5 | 13.51 | 0 | 0.00 | 5 | 12.5 |
| Middle School | 11 | 29.73 | 2 | 66.67 | 13 | 32.5 |
| High School | 16 | 43.24 | 0 | 0.00 | 16 | 40 |
| Higher Secondary School | 3 | 8.11 | 0 | 0.00 | 3 | 7.5 |
| **Total** | **37** | **100.00** | **3** | **100.00** | **40** | **100** |

*Source: Field Survey, 2019*

Table 4.5 shows the sex- wise analysis of educational levels of the respondents/ household leaders. Data analysis shows that majority of the respondents, that is, 40% of the respondents have high school level of education and the second largest portion of the respondents, that is, 32.5% of the respondents have middle school level of education. Also, majority of the male respondents, that is 16 out of 37 or 43.24% of the male respondents have high school level of education while 2 out of 3 female respondents have middle school level of education and another 1 is barely literate. This data analysis shows that female respondents/ household leaders have lower educational level than male respondents.

### 4.2.6. Educational Levels of All Household Members

The education level of all household members of the respondents is analysed with respect to their gender. This can be shown in Table 4.6 as follows:

Table-4.6: Sex- wise analysis of educational levels of all household members

| Education | Sex | | | | Total | Percentage |
|---|---|---|---|---|---|---|
| | Male | Percentage of Male | Female | Percentage of female | | |
| Illiterate | 4 | 3.51 | 2 | 2 | 6 | 2.80 |
| Can read only | 0 | 0.00 | 1 | 1 | 1 | 0.47 |
| Can read & write | 6 | 5.26 | 3 | 3 | 9 | 4.21 |
| Primary School | 15 | 13.16 | 9 | 9 | 24 | 11.21 |
| Middle School | 16 | 14.04 | 25 | 25 | 41 | 19.16 |
| High School | 42 | 36.84 | 28 | 28 | 70 | 32.71 |
| Higher Secondary | 21 | 18.42 | 20 | 20 | 41 | 19.16 |
| Graduate & Above | 10 | 8.77 | 12 | 12 | 22 | 10.28 |
| **Total** | **114** | **100** | **100** | **100** | **214** | **100** |

*Source: Field Survey, 2019*

Table 4.6 shows sex- wise analysis of the educational levels of all the household members. Data analysis shows that majority of the household members, that is, 70 out of a total of 214 members (32.71%) have high school level of education, which consists of 42 male members and 28 female members. The next largest portion of male, that is, 21 male members have higher secondary level of education, while the next largest portion of female members, that is, 25 female members have middle school level of education. However, while only 8.7% of male members studied up to graduate and above, 12% of female members have the educational level of the same.

### 4.2.7. Occupation of the Respondents/ Household Leaders.

The occupation of the respondents/ household leaders is analysed with respect to their gender. This is illustrated in Table 4.7 as follows:

Table- 4.7: Sex-wise analysis of occupation of the household leaders

| Occupation | Sex | | Total | Percentage |
|---|---|---|---|---|
| | Male | Female | | |
| Dairy Farming | 37 | 0 | 37 | 92.5 |
| Agriculture (crop cultivation) | 0 | 2 | 2 | 5 |
| Housewife | 0 | 1 | 1 | 2.5 |
| **Total** | **37** | **3** | **40** | **100** |

*Source: Field Survey, 2019*

Table 4.7 shows the sex- wise analysis of the occupation of the household leaders. Data analysis shows that although all the male respondents/ household leaders have dairy farming as their main occupation, 3 female respondents/ household members are not directly involved in dairy farming. 2 female household

leaders are engaged in agriculture (cultivation of crops) and 1 female respondent is a house- wife.

### 4.2.8. Occupation of All the Household Members

The occupation of all household members is analysed with respect to their gender. This can be shown in Table 4.8 as follows:

Table- 4.8: Sex-wise analysis of occupation of all household members

| Occupation | Sex | | | | Total | Percentage |
|---|---|---|---|---|---|---|
| | Male | Percentage of male | Female | Percentage of female | | |
| Dairy Farming | 64 | 56.1 | 4 | 4 | 68 | 31.8 |
| Agriculture | 3 | 2.6 | 30 | 30 | 33 | 15.4 |
| Trade/Business | 0 | 0.0 | 4 | 4 | 4 | 1.9 |
| Govt. Services | 3 | 2.6 | 3 | 3 | 6 | 2.8 |
| Private Services | 3 | 2.6 | 3 | 3 | 6 | 2.8 |
| Wage Labourer | 5 | 4.4 | 0 | 0 | 5 | 2.3 |
| Housewife | 0 | 0.0 | 16 | 16 | 16 | 7.5 |
| Student | 27 | 23.7 | 26 | 26 | 53 | 24.8 |
| Infant | 3 | 2.6 | 1 | 1 | 4 | 1.9 |
| Non- worker | 6 | 5.3 | 13 | 13 | 19 | 8.9 |
| **Total** | **114** | **100** | **100** | **100** | **214** | **100.0** |

*Source: Field Survey, 2019*

Table 4.8 shows sex- wise analysis of occupations of all the household members of the respondents. Majority of the members- 68 of a total of 214 members, or 31.8% of the household members are engaged in dairy farming. This consists of 64 male and 4 female members. This shows that many of the family members, especially male members are working together and look after their farms. The next

largest portion that is 24.8% consists of students. Some of the household members are engaged in different occupations such as private services, wage labour, trade and business, etc. However, only 6, that is, 2.8% of the household members are engaged in government services.

### 4.2.9. Occupation of All Household Members With Respect to Their Age.

The analysis of occupation of all the household members with respect to their age- groups is illustrated in Table 4.9 as follows:

Table- 4.9: Age- wise analysis of occupation of all household members

| Occupation | Age distribution of all the household members | | | | | | | Total | Percent |
|---|---|---|---|---|---|---|---|---|---|
| | 0 to 10 years | 10 to 20 years | 20 to 30 years | 30 to 40 years | 40 to 50 years | 50 to 60 years | 60 to 70 years | | |
| Dairy Farming | 0 | 0 | 17 | 18 | 8 | 17 | 8 | **68** | **31.78** |
| Agriculture | 2 | 0 | 6 | 2 | 5 | 14 | 4 | **33** | **15.42** |
| Trade/Business | 0 | 0 | 2 | 2 | 0 | 0 | 0 | **4** | **1.87** |
| Govt. Services | 0 | 0 | 4 | 2 | 0 | 0 | 0 | **6** | **2.80** |
| Private Services | 0 | 0 | 4 | 2 | 0 | 0 | 0 | **6** | **2.80** |
| Wage Labourer | 0 | 0 | 3 | 2 | 0 | 0 | 0 | **5** | **2.34** |
| Housewife | 0 | 1 | 5 | 5 | 1 | 1 | 3 | **16** | **7.48** |
| Student | 20 | 22 | 11 | 0 | 0 | 0 | 0 | **53** | **24.77** |
| Infant | 4 | 0 | 0 | 0 | 0 | 0 | 0 | **4** | **1.87** |
| Non- worker | 0 | 0 | 17 | 2 | 0 | 0 | 0 | **19** | **8.88** |
| **Total** | **26** | **23** | **69** | **35** | **14** | **32** | **15** | **214** | **100** |

*Source: Field Survey, 2019*

Table 4.9 shows age- wise analysis of occupation of all the household members. Data analysis shows that all the members engaged in dairy farming (dairy farmers) are between the ages of 20 to 70 years of age, while all 53 students come

under the age group of 0 to 30 years. Since large numbers of members are students, this shows that education holds an important place in the households of the respondents. However, 17 out of 19 non- working members come under the age group of 20 to 30, which implies that they are mostly youths and are employed. This shows the prevalence of unemployment among the youths .

### 4.2.10. Housing types/ status of the households of the respondents

The housing types/ status of the households of the respondents is illustrated shown in Table 4.10 as follows:

Table- 4.10: Housing type of the households of the respondents

| Housing-type | No of households | Percentage |
|---|---|---|
| Semi- Pucca | 27 | 67.5 |
| Pucca | 13 | 32.5 |
| **Total** | **40** | **100** |

*Source: Field Survey, 2019*

Table 4.10 shows the housing types and status of the household of the respondents. Data analysis shows that majority of the respondents, 27 out of 40 or 67.5% live in semi- pucca houses while 32.5% live in pucca houses. There are no respondents living in kutccha house.

### 4.2.11. Poverty status of the households of the respondents

Poverty status of the households of the respondents is shown in Table 4.11 as follows:

Table- 4.11: Poverty status of the household of the respondents

| Poverty Status | No of households | Percentage |
|---|---|---|
| APL | 40 | 100 |
| BPL | 0 | 0 |
| AAY | 0 | 0 |

*Source: Field Survey, 2019*

Table 4.11 shows the data on the poverty status of the households of the respondents. Data analysis shows that all the households are living above poverty line.

### 4.2.12. Number of Years engaged in dairy farming

Information regarding the number years the respondents have been engaged in dairy farming was acquired and presented in Table 4.12.1 and Table 4.12.2 as follows:

Table- 4.12.1: Descriptive statistics on number of years engaged in dairy farming

| No of respondents | Minimum no of years | Maximum no years | Mean years engaged in dairy farming | Standard Deviation |
|---|---|---|---|---|
| 40 | 6 | 36 | 16.78 | 7.34 |

*Source: Field Survey, 2019*

Table- 4.12.2: No of years engaged in dairy farming

| No of years engaged in dairy farming | No of farmers | Percentage |
|---|---|---|
| Less than 10 years | 10 | 25 |
| 10 to 20 years | 17 | 42.5 |
| 21 to 30 years | 12 | 30 |
| More than 30 years | 1 | 2.5 |
| **Total** | **40** | **100** |

*Source: Field Survey, 2019*

Table 4.12.1 shows the descriptive statistics on the number of years the respondents are engaged in dairy farming. The minimum or the lowest number of years is 6 years and the maximum or the highest number of years engaged in dairy farming by a respondent is 36 years. The mean number of years the respondents have been engaged in dairy farming is 16.78 years and standard deviation is 7.34.

Table 4.12.2 shows the distribution of the respondents across 4 groups of years for which they have been engaged in dairy farming. The distribution of years has been made based on the descriptive statistics calculated. Data analysis shows that majority, that is 17 out of 40 or 42.5% of the respondents have been engaged in dairy farming for 10 to 20 years and only 1 respondent has been engaged in dairy farming for more than 30 years. Other respondents come under the groups of less than 10 years and 10 to 20 years.

## 4.3. CATTLE DETAILS AND DISTRIBUTION OF CATTLE SIZES

The details of the cattle owned by the respondents have been collected which includes the number of cattle, the types- milch, heifer, calves, etc., and the distribution of cattle among these types. Also, a farm size distribution has been made and the respondents are divided across these farm sized based on the number of cattle they own. These are shown in Table 4.12 and table 4.13 as follows:

### 4.3.1. Cattle Population

Descriptive statistics of the cattle population under the present study is shown in Table 4.13.1 as follows:

Table- 4.13.1: Descriptive statistics of cattle population

| No of farmers | Minimum cattle size of the respondent | Maximum cattle size of the respondent | Total size of cattle | Mean | Standard deviation |
|---|---|---|---|---|---|
| 40 | 4 | 13 | 301 | 7.525 | 2.961 |

*Source: Field Survey, 2019*

Table- 4.13.2: Types of cattle population

| Type of Cattle | Milch Cows | Heifer | Calves | Bull | Bull Calves | Total |
|---|---|---|---|---|---|---|
| **No of Cattle** | 203 | 50 | 46 | 0 | 2 | **301** |
| **Percentage** | 67.4 | 16.6 | 15.3 | 0.0 | 0.7 | **100** |

*Source: Field Survey, 2019*

Table 4.13.1 shows the descriptive statistics of cattle population own by all the respondents. Data analysis shows that the smallest size of farm or size of cattle owned by a single respondent is 4 and the largest cattle size owned by a single respondent under the present study is 13. The total number of cattle population or the summation of all the cattle owned by 40 respondents is 301, the mean size of farm by each respondent is 7.525 and standard deviation is 2.961.

Table 4.13.2 shows the distribution of cattle population according to their types. Data analysis shows that out of a total of 301 cattle, 203 or 67.4% are milch cows or cows producing milk. 50 are heifers or young female cows that have not born a calf and 46 are calves or young cows in their first year. 2 are bull calves or young male cows while none of the respondents rear a bull.

### 4.3.2. Farm Size Distribution According to Cattle Population

Farms of the respondents are divided and distributed into four groups on the basis of numbers of cattle owned by the respondents. This is shown in Table 4.14 as follows:

Table- 4.14: Farm size distribution according to cattle population

| Farm Size Distribution | No. of Cattle | Percentage of cattle | No. of farmers | Percentage of farmers | Average size of cattle per farmer |
|---|---|---|---|---|---|
| Less than 5 | 32 | 10.63 | 8 | 20 | 4 |
| 5 to 8 | 115 | 38.21 | 18 | 45 | 6.4 |
| 9 to 12 | 102 | 33.89 | 10 | 25 | 10.2 |
| More than 12 | 52 | 17.28 | 4 | 10 | 13 |
| **Total** | **301** | **100** | **40** | **100** | **7.5** |

*Source: Field Survey, 2019*

Table 4.14 shows the distribution of farms according to cattle sizes, numbers of farmers present in each farm size and the average size of cattle owned by a farmer in each of the farm size. Based on the minimum and maximum farm sizes of the respondents, farms are divided into four groups- a group of less than 5 cows, 5 to 8 cows, 9 to 12 cows and a group of more than 12 cows. Data analysis shows that majority of the respondents/ farmers, that is, 18 respondents have a farm size of 5 to 8 cows while minority, that is, only 4 of the respondents have a farm size of more than 12 cows. Consequently, the largest size of cattle, that is 115 of 301 belong to the farm size of 5 to 8 cows. For the respondents belonging to the group of less than 5 cows, average size of cattle owned by one farmer is 4, 6.4 cows for the respondents

belonging to the group of 5 to 8 cows, 10.2 cows for the group of 9 to 12 cows and 13 cows for the respondents/ farmers belonging to the group of more than 12 cows.

### 4.3.3. Farm Size Distribution According to Milch Animal Population

Farms of the respondents are also divided and distributed based on the number of milch cows owned by the respondents. The descriptive statistics of milch animal population and farm size distribution according to milch animal population are shown in Table 4.15.1 and Table 4.15.2 as follows:

Table- 4.15.1: Descriptive statistics of milch animal population

| Total no of farmers | Minimum size of milch cows per farmer | Maximum size of milch cows per farmer | Total size of milch cows | Mean | Standard deviation |
|---|---|---|---|---|---|
| 40 | 2 | 11 | 203 | 5.07 | 2.28 |

*Source: Field Survey, 2019*

Table- 4.15.2: Farm size distribution according to milch animal population

| Farm size | No of milch cows | Percentage of milch cows | No of farmers | Percentage of farmers | Average no of milch cow per farmer |
|---|---|---|---|---|---|
| Less than 4 | 29 | 14.29 | 11 | 27.5 | 2.6 |
| 4 to 6 | 84 | 41.38 | 18 | 45 | 4.7 |
| 7 to 9 | 79 | 38.92 | 10 | 25 | 7.9 |
| 10 to 12 | 11 | 5.42 | 1 | 2.5 | 11 |
| **Total** | **203** | **100** | **40** | **100** | **5.075** |

*Source: Field Survey, 2019*

Table 4.15.1 shows the descriptive statistics of milch animal population owned by the respondents. The smallest number of milch cows owned by a single respondent is 2 and the highest number of milch cows owned by a respondent is 11. The total number of all milch cows under the present study is 203, the mean/ average

number of milch cows owned by 40 respondents is 5.07 and standard deviation is 2.28.

Table 4.15.2 shows the distribution of farm sizes based on the number of milch cows owned by the respondents. Based on the minimum and maximum number of milch cows owned by a respondent, farm sizes are divided into 4 groups- a group owning less than 4 milch cows, 4 to 6 milch cows, 7 to 9 milch cows and a group owning 10 to 12 milch cows. Among the 40 respondents, the maximum number of respondents, that is 18 or 45% own 4 to 6 cows and only 1 respondent comes under the group of farmers owning 10 to 12 milch cows. The average number of milch cows owned by respondents in the group of less than 4 milch cows is 2.6, 4.7 milch cows for farmers in the group of 4 to 6 milch cows, 7.9 milch cows for the group of 7 to 9 milch cows and 11 for the group of 10 to 12 milch cows.

### 4.3.4. Person/s Operating the Farm

For better understanding of the institutional settings of dairy farming, information regarding the person/s in charge of looking after the cattle and operating the farm was gathered through questionnaire schedule. This can be shown in Table 4.16 as follows:

Table- 4.16: Person/s operating the farm

| Person/s in charge of cattle | No. of respondents | Percentage |
|---|---|---|
| My family alone | 27 | 67.5 |
| Only employed labourers/ workers | 1 | 2.5 |
| My family with employed workers | 12 | 30 |
| **Total** | **40** | **100** |

*Source: Field Survey, 2019*

Table 4.16 shows data on person/s operating the farms of the respondents. Majority of the respondents, that is, 27 of the respondents claimed that their cattle are looked after and farms are operated by their own families alone while another large portion, that is 12 of the respondents claimed that their cattle are looked after by their families with employed workers. Only 1 of the respondent has their farm operated by employed labourers/ workers alone.

## 4.4. FIXED COSTS

Data on the fixed costs incurred in dairy farming were acquired from the respondents. This information was mostly gathered from the recollection of the respondents as most of the respondents did not keep records and are given in approximate amounts. The main fixed factors of production include- land, livestock, cow shed, water tanks, storages, machines, vehicles and other tools used in dairy farming. Costs incurred for these factors of production by the respondents from the beginning are aggregated and analysed for the different farm sizes. This is shown in Table 4.17 as follows:

Table- 4.17: Fixed costs incurred in dairy farming

| Farm Size | No of farmers | Total Fix Costs (from the beginning) | Average Fix cost per farmer |
|---|---|---|---|
| Less than 5 | 8 | 1848000 | 231000 |
| 5 to 8 | 18 | 7403467 | 411304 |
| 9 to 12 | 10 | 3040200 | 304020 |
| More than 12 | 4 | 1884500 | 471125 |
| **Total** | **40** | **14176167** | **354404** |

*Source: Field Survey, 2019*

Table 4.17 shows the total fixed costs incurred in each of the farm sizes as well as the average fix cost incurred per farmer in each farm size. Data analysis shows that an average fixed cost incurred per farmer is the highest for the farm size of more than 12 cows, which is Rs. 471125 and lowest for the farm size of less than 5 cows. However, the average fixed cost per farmer is higher in the farm size of 5 to 8 cows than of 9 to 12 cows. Nevertheless, data analysis clearly shows that average fixed cost increases with the increase in farm size. The average fixed costs incurred per farm is estimated at Rs.3,54,4404.

## 4.5. VARIABLE COST

Variable factors of production in dairy farming mainly include- feeds of cattle, water, labour costs, costs of transportation involved in dairy farming, veterinary and other day to day factors of production. The costs for all these factors of production are called variable cost of production. Data of variable cost per month was collected and analysed as follows.

### 4.5.1. Costs of Feeds

Since feeds account for the majority and highest portion of variable cost, data on costs of feeds are analysed separately from other variable cost. Based on the information acquired from the questionnaire schedule, feeds of cattle mainly include- wheat bran, oil cake, flour, salt, green fodder, dry fodder for dry periods when green fodder feeds are not available and readymade concentrates/ mixed feeds, that are given to the cattle three times a day. Although the combinations of different kinds of

feeds given to the cattle are not similar for all farms, all farms provide wheat bran, salt and green fodder.

The average cost of feeds per cow per day is estimated for each farm size and is shown in Table 4.18.1 as follows:

Table- 4.18.1: Cost of feeds in dairy farming (average cost/cow/day in Rs)

| **Particulars** | **Farm Size** | | | | |
|---|---|---|---|---|---|
| | Less than 5 | 5 to 8 | 9 to 12 | More than 12 | **Total** |
| Wheat Bran | 112.16 | 104.59 | 116.65 | 89.18 | 105.64 |
| Oil Cake | 5.00 | 6.32 | 6.50 | 13.30 | 7.79 |
| Flour | 3.39 | 1.24 | 6.31 | 5.93 | 4.22 |
| Salt | 3.80 | 2.71 | 2.12 | 1.60 | 2.67 |
| Rice | 2.60 | 1.35 | 0.00 | 0.00 | 1.13 |
| Green Fodder | 20.44 | 37.81 | 18.22 | 32.76 | 28.93 |
| Dry Fodder | 2.17 | 1.48 | 0.00 | 0.00 | 1.10 |
| Other Feeds | 23.45 | 24.72 | 10.33 | 5.29 | 18.34 |
| **Total** | **173.02** | **180.22** | **160.13** | **148.05** | **169.82** |

*Source: Field Survey, 2019*

Table 4.18.1 shows the different types of feeds provided to the cattle and the costs on these per cow per day with the total average cost of feeds per cow per day. The total average cost of feeds per cow per day for the cattle size of less than 5 is Rs.173.02, for the cattle size of 5 to 8- Rs.180.22, for the cattle size of 9 to 12- Rs.160.13 and for the cattle size of more than 12- Rs.148.05. This shows that the cost of feeds per cow per day declines as the size of the farm increases.

The average cost of feeds per month for each farm size is also estimated which is shown in Table 4.18.2 as follows.

Table 4.18.2: Costs of feeds in dairy farming (per farm per month in Rs)

| Farm Size | No of Farmers | Total Costs of feeds per | Average Costs of feeds | Additional average feed costs per farm |
|---|---|---|---|---|
| Less than 5 | 8 | 163279 | 20410 | 0 |
| 5 to 8 | 18 | 623281 | 34627 | 14217 |
| 9 to 12 | 10 | 487835 | 48784 | 14157 |
| More than 12 | 4 | 236134 | 59034 | 10250 |
| **Total** | **40** | **1510529** | **37763** | |

*Source: Field Survey, 2019*

Table 4.18.2 shows data analysis on the costs of feeds incurred per month in dairy farming by the respondents distributed across 4 farm sizes. The average costs of feeds incurred by incurred by a single farm per month was also calculated. Data analysis shows that the cost of feeds per farm indeed increases as the size of farm/ cattle increases, however, the additional average cost of feeds declines as the size of farm increases. This shows that economies of scale exists.

### 4.5.2. Variable Cost Other Than Cost of Feeds

Other variable cost besides the costs of feeds include- cost of water, veterinary expenses, labour costs in terms of wage, costs of transportation involved in dairy farming which may include transportation costs in distribution of milk and/ or for carrying fodder feeds, and other miscellaneous expenses.

The average variable cost (excluding the cost of feeds per cow per day) is estimated in Table 4.19.1 as follows:

Table: 4.19.1: Variable costs excluding feed costs (average cost/cow/day in Rs)

| Particulars | Farm Size | | | | |
|---|---|---|---|---|---|
| | Less than 5 | 5 to 8 | 9 to 12 | More than 12 | **Total** |
| Labour | 0.00 | 9.10 | 19.98 | 37.18 | 12.81 |
| Water | 0.00 | 3.25 | 1.21 | 1.60 | 1.92 |
| Electricity | 0.73 | 0.77 | 0.62 | 0.74 | 0.72 |
| Veterinary Expenses | 3.13 | 2.45 | 1.93 | 2.15 | 2.42 |
| Transportation | 2.60 | 4.15 | 1.96 | 7.69 | 3.65 |
| Miscellaneous | 1.14 | 0.97 | 0.84 | 0.51 | 0.92 |
| **Total** | **7.59** | **20.69** | **26.53** | **49.87** | **22.45** |

*Source: Field Survey, 2019*

Table 4.19.1 shows the different variable factors of production other than feeds and their respective average cost per cow per day for all the farm sizes. The average variable cost (other than feed costs) for the farm size of less than 5 cattle is Rs.7.59, for the cattle size of 5 to 8, Rs.20.69, for the cattle size of 9 to 12- Rs.26.53 and for the cattle size of more than 12- Rs.49.87. The overall average variable cost excluding feed costs per cow per day is Rs.22.45.

Variable cost incurred other than costs of feeds per month per farm is also estimated and is shown in Table 4.19.2 as follows:

Table- 4.19.2: Variable cost other than feed costs (per farm per month in Rs)

| Farm Size | No of Farmers | Total Variable cost (excluding feed cost) | Average Costs of other Variable factors |
|---|---|---|---|
| Less than 5 | 8 | 7440 | 930 |
| 5 to 8 | 18 | 72670 | 4037 |
| 9 to 12 | 10 | 106305 | 10631 |
| More than 12 | 4 | 88000 | 22000 |
| **Total** | **40** | **274415** | **6860** |

*Source: Field Survey, 2019*

Table 4.19.2 shows data analysis on the monthly variable cost (excluding feed costs) incurred per farm excluding the costs of feeds by each farm size. Data analysis shows that the monthly average variable cost (excluding feed cost) per farm for the cattle size of less than 5 is Rs.930, for the cattle size of 5 to 8- Rs.4037, for the cattle size of 9 to 12- Rs.10631 and for the farm size of more 12 cattle- Rs.22000. Data analysis of Table 4.19.1 as well as Table 4.19.2 show that the average variable cost other than feed cost per cow as well as per farm greatly increases with the increase in farm size. This accounts for the requirement to incur high costs for the purchase of water and to employ additional workers to operate the farms as farm size or cattle size increases.

### 4.5.3. Total Variable cost

The total variable cost of production includes costs on- feeds, water, electricity, veterinary expenses, transportation and other day to day expenses. The total average variable cost per cow per day is shown in Table 4.20.1 and the total variable cost incurred per month by the farms is shown in Table 4.20.2 as follows.

Table 4.20.1: Total variable cost (average cost/cow/day in Rs)

| **Particulars** | **Farm Size** | | | | |
|---|---|---|---|---|---|
| | Less than 5 | 5 to 8 | 9 to 12 | More than 12 | **Total** |
| **No of Farmers** | 8 | 18 | 10 | 4 | **40** |
| **Total Variable costs** | 213.83 | 247.81 | 223.52 | 253.09 | 234.16 |

*Source: Field Survey, 2019*

Table 4.20.1 shows the total average variable cost incurred per cow per day by each of the farm sizes. The average variable cost per cow per day is lowest for the

smallest farm size and is highest for the largest farm size. The overall average variable cost per cow per day is estimated at Rs.234.16.

The total variable cost per farm per month is also estimated and is shown in Table 4.20.2 as follows:

Table- 4.20.2: Total variable cost (per farm per month in Rs)

| Farm Size | No of Farmers | Total Variable Cost | Total Average Variable Cost |
|---|---|---|---|
| Less than 5 | 8 | 170719 | 21340 |
| 5 to 8 | 18 | 695951 | 38664 |
| 9 to 12 | 10 | 594140 | 59414 |
| More than 12 | 4 | 324134 | 81034 |
| **Total** | **40** | **1784944** | **44624** |

*Source: Field Survey, 2019*

Table 4.20.2 shows the total variable cost incurred by the respondents belonging to the four different farm sizes as well as the average variable cost incurred per farm per month. Data analysis shows that average variable cost incurred increase substantially as farm size increases. The average variable cost incurred per farm in cattle size less than 5 cows is Rs. 21340, Rs.38664 for cattle size of 5 to 8 cows, Rs.59414 for cattle size of 9 to 12 cows and Rs. 81034 for cattle size of more than 12 cows. Thus the average variable cost per farm is lowest for the smallest farm size and is largest for the largest farm size.

## 4.6. MILK PRODUCTION

Information regarding the amount of milk production was obtained through the questionnaire schedule. Since the amount of milk produced by a milch cow

changes throughout the year, depending on the time of pregnancy, time of giving birth and growth of the calves, milk production of the farms also fluctuates throughout the year. Therefore, to get accurate information, data on the maximum and minimum amount of milk produced per day are acquired through the schedule and the researcher calculated the average of these two extremes to get the average litres of milk produced by the respondents per day throughout the year.

The amount of milk produced per cow per day is estimated for all the farm sizes and is shown in Table 4.21.1 as follows:

Table- 4.21.1: Milk production (per day in Ltrs.)

| **Particulars** | **Farm Size** | | | | |
|---|---|---|---|---|---|
| | **Less than 4** | **4 to 8** | **9 to 12** | **More than 12** | **Total** |
| No of milch cows | 20 | 75 | 72 | 36 | 203 |
| Total milk produced | 171 | 464 | 572 | 339 | 1546 |
| Milk produced per cow (in Ltrs.) | 8.6 | 6 | 8 | 9.4 | 7.62 |

*Source: Field Survey, 2019*

Table 4.21.1 shows the number of milch cows, total milk produced per day and the amount of milk produced per cow per day. There are total 20 milch cows under the farm size of less than 4 cows, 75 milch cows under 4 to 8 cattle size, 72 milch cows under 9 to 12 cattle size and a total of 36 milch cows under the farm size of more than 12 cows. The amount of milk produced per cow per day is lowest in the farm size of 9 to 12 cattle which is 6 litres and is highest in the farm size of more than 12 cattle which is 9.4 litres. The average milk produced per cow per day is 7.62 litres.

Information regarding the milk production by the farms both daily as well as monthly is illustrated in Table 4.21.2 as follows.

Table- 4.21.2: Milk production by the farms (in Litres)

| Particulars | Farm Size | | | | Total |
|---|---|---|---|---|---|
| | Less than 5 | 5 to 8 | 9 to 12 | More than 12 | |
| No of farmers | 8 | 18 | 10 | 4 | 40 |
| Total milk Production per day | 201 | 718 | 572 | 339 | **1830** |
| Average milk production per day | 25.13 | 39.89 | 57.2 | 84.75 | **45.75** |
| Total milk production per month | 6030 | 21540 | 17160 | 10170 | 54900 |
| Average Milk production per month | 753.8 | 1196.7 | 1716 | 2542.5 | 1372.5 |
| Additional average milk production with increase in farm size per month | 0 | 442.9 | 519.3 | 826.5 | |

*Source: Field Survey, 2019*

Table 4.21.2 shows the total amount of milk produced by farms in each of the four farm sizes per day and per month with the average amount of milk produced by a single farm per day and per month for each of the farm size as well. Also, the additional or increase in average milk production per farm with the increase in farm sizes has also been calculated. The average litres of milk produced by a farmer in the farm size of less than 5 cows is 25.13 litres per day and 753.8 litres per month, for the farm size of 5 to 8 cows, it is 39.89 litres per day and 1196.7 litres per month, 57.2 litres per day and 1716 litres per month for the farm size of 9 to 12 cows and the average amount of milk produced by the farm size of more than 12 cows is 84.75 litres per day and 2542.5 litres per month. The additional average milk production per month has been calculated to see how much milk production increases as the

farm size increases. Starting from the smallest farm size, data analysis shows that milk production increases at a positive rate with the increase in farm size.

## 4.7. DISTRIBUTION

Information regarding the distribution of milk production was also obtained. This mainly includes the specification of the various existing channels of distribution, the prices of milk at these various channels and the mode of transportation accompanying some of these distribution channels.

### 4.7.1. Channels of Distribution

The various types of milk distribution channels existing in the study areas are presented in Table 4.22 as follows.

Table- 4.22: Channels of distribution

| Channels of Distribution | No of respondents using the channel in Durtlang | No of respondents using the channel in Sihphir | Total no of respondents using the channel |
|---|---|---|---|
| Door to Door | 14 | 5 | 19 |
| MULCO | 15 | 15 | 30 |
| Middlemen | 1 | 7 | 8 |
| Sale at home (Regular customers) | 0 | 3 | 3 |
| Sale at home (Irregular customers) | 0 | 3 | 3 |

*Source: Field Survey, 2019*

Table 4.22 shows the different types of milk distribution channels existing in the study areas. They are- door to door distribution by the farmers or other family members or employed workers, sale to MULCO ltd., middlemen, sale at home for

regular customers and also for irregular customers. Based on the information obtained, respondents from Durtlang area mainly use the door-to- door channel and MULCO channel of distribution while only one respondent uses middlemen as a channel of distribution. Respondents from Sihphir area on the other hand are using all the five channels of distribution. However, only 5 respondents are using door- to door channel of distribution. In both areas, MULCO ltd. is the most commonly used channel of distribution. It is used by 30 out of 40 respondents in the study area.

### 4.7.2. Price of Milk in Different Channels of Distribution

The price milk varies significantly depending on the channels of distribution. Therefore, a cross- tabulation analysis of different channels and their prices with the number of farmers engaged in the channels have been calculated. This is presented in Table 4.23 as follows.

Table-4.23: Prices of milk in different channels of distribution

| **Channels of distribution** | **Prices of milk (in Rs)** | | | | | |
|---|---|---|---|---|---|---|
| | **Rs.43** | **Rs.45** | **Rs.48** | **Rs.50** | **Rs.60** | **Rs.70** |
| Door to door | | | | | 5 farmers (Sihphir) | 14 farmers (Durtlang) |
| MULCO | 4 famers | 25 farmers | 1 farmer | | | |
| Middlemen | | | | 7 famers (Sihphir) | 1 farmer (Durtlang) | |
| Sale at home (Regular customers) | | | | | 3 farmers (Sihphir) | |
| Sale at home (Irregular customers) | | | | | 3 farmers (Sihphir) | |

*Source: Field Survey, 2019*

Table 4.23 shows the different channels of distribution with their respective prices and the number of respondents using the different channels. The table shows that the price of milk differs between Durtlang and Sihphir for door- to- door channel of distribution that is Rs.60 for Sihphir where 7 farmers / respondents are using the channel and Rs.70 for Durtlang with 13 farmers / respondents using the channel. Also, the price of milk in MULCO channel differs between Rs. 43, Rs.45 and Rs.48 both in Sihphir and Durtlang. This is because farmers are paid according to the quality of their milk after inspection done by technicians in MULCO. Following the price of milk in door- to- channel of distribution, the price of milk paid by middlemen also differs between Durtlang and Sihphir, that is, Rs.50 for Sihphir and Rs.60 for Durtlang. The price of milk sold at home in Sihphir is the same as door- to – door channels, which is Rs.60. Thus, out of all the channels of distribution, MULCO can be stated as the most inefficient channel and door-to- door distribution, including sale of milk at home can be stated as the most efficient channel of distribution for the farmers.

## 4.8. INCOME

The main source of income in dairy farming is naturally from milk production. However, there are also some smaller sources of income, such as- sale of cow dung to be used as organic fertilizer, sale of meat when milch cows do not longer produce milk or of bulls reared solely for this purpose. The income earned from various sources in dairy farming by the respondents have been analysed and presented as follows.

### 4.8.1. Income from Milk Production

The income earned by the respondents from milk production alone is firstly analysed. The descriptive statistics including the minimum, maximum and mean income earned by the respondents from milk production per month is shown in Table 4.24.1 and the income distribution of the respondents is shown in Table 14.24.2 as follows:

Table- 4.24.1: Descriptive statistics on income earned from milk production (per month in Rs)

| No of Respondents | Minimum income | Maximum Income | Mean Income | Standard deviation |
|---|---|---|---|---|
| 40 | 26158 | 219000 | 74411.58 | 46252.369 |

*Source: Field Survey, 2019*

Table- 4.24.2: Income earned from milk production (per month in Rs)

| Income from milk production | No of respondents/ Farmers | Percentage of respondents |
|---|---|---|
| Less than 30000 | 2 | 5 |
| 30000 to 60000 | 16 | 40 |
| 60000 to 90000 | 11 | 27.5 |
| 90000 to 120000 | 5 | 12.5 |
| 120000 to 150000 | 2 | 5 |
| 150000 to 180000 | 2 | 5 |
| 180000 to 210000 | 1 | 2.5 |
| More than 210000 | 1 | 2.5 |
| **Total** | **40** | **100** |

*Source: Field Survey, 2019*

Table 4.24.1 shows the descriptive/ summary statistics on income earned by the respondents from milk production. Data analysis shows that the minimum income earned from milk production by a respondent per month is Rs.26158 and maximum income earned from milk production per month is Rs.219000. The mean income of

all the respondents from milk production per month is Rs.74411.58 and standard deviation is 46252.369.

Table 4.24.2 shows the distribution of the respondents across eight income groups based on the minimum and maximum income earned from milk production per month by the respondents. Data analysis shows that majority of the respondents, that is, 16 out of 40 or 40% of the respondents earn monthly income of Rs.30000 to Rs.60000 from the sale of milk while there is only one respondent each earning between Rs.180000 to Rs.210000 and more than Rs.210000. The second largest portion, that is 11 out of 40 or 27.5% of the respondents earn monthly income of Rs.60000 to 90000 form milk production.

### 4.8.2. Other sources of income from dairy farming

The other sources of income present in dairy farming apart from milk production are presented in Table 4.25 as follows.

Table- 4.25: Other Sources of Income in Dairy Farming

| Other Sources of Income Other than Milk Production | No. of Respondents/ Farmers | Percentage |
|---|---|---|
| Earnings from sale of meat (2019) | 1 | 2.5 |
| Earnings from sale of cow dung | 16 | 40 |
| No of farmers with other sources of income in dairy farming | 17 | 42.5 |
| No of Farmers without other sources of income in Dairy Farming | 23 | 57.5 |
| Total No of Respondents/ Farmers | 40 | 100 |

*Source: Field Survey, 2019*

Table 4.25 shows the other sources of income in dairy farming other than milk production, the number of respondents earning from each of these sources and

the total number of families with and without other sources of income from dairy farming. There is one respondent who has earned income from the sale of meat during 2019 and 16 respondents who have been earning income from the sale of cow dung every year. Thus, a total of 17 respondents earn income from other sources in dairy farming besides milk production while a larger number, that is 23 out of 40 or 57.5% of the respondents depend on the sale of milk alone as a source of income from dairy farming.

### 4.8.3. Total Income from All Sources in Dairy Farming

Relevant information regarding the total income from all sources in dairy farming are presented in Table 4.26.1 and Table 4.26.2 as follows.

Table- 4.26.1: Descriptive statistics on income from all sources in dairy farming (per month in Rs)

| No of Respondents | Minimum income | Maximum income | Mean income | Standard deviation |
|---|---|---|---|---|
| 40 | 26574.67 | 219000 | 74655.33 | 46281.18 |

*Source: Field Survey, 2019*

Table-4.26.2: Income earned from all sources in dairy farming

| Income Distribution (per month in Rs) | No of Respondents/ Farmers | Percentage |
|---|---|---|
| Less than 30000 | 2 | 5 |
| 30000 to 60000 | 16 | 40 |
| 60000 to 90000 | 11 | 27.5 |
| 90000 to 120000 | 5 | 12.5 |
| 120000 to 150000 | 2 | 5 |
| 150000 to 180000 | 2 | 5 |
| 180000 to 210000 | 1 | 2.5 |
| More than 210000 | 1 | 2.5 |
| **Total** | **40** | **100** |

*Source: Field Survey, 2019*

Table 4.26.1 shows the descriptive statistics on income from all sources in dairy farming, including the minimum income of a respondent per month, which is Rs.26574.67 and the maximum income earned by a respondent per month which is Rs.2190000. The mean income of all the respondents is Rs.74655.33 and standard deviation is 46281.18.

Table 4.26.2 shows the distribution of the respondents across eight different groups based on the minimum and maximum monthly income earned from dairy farming. Data analysis shows that majority, that is 40% of the respondents earn monthly income of Rs.30000 to 60000 and only one respondent each earns monthly income between Rs.180000 to Rs.210000 and more than Rs.210000 respectively. This data shows that income from other sources besides milk production does not have much impact on the total income earned from dairy farming.

## 4.9. COST- BENEFIT SITUATION OF DAIRY FARMING

The cost- benefit situation of dairy farming has been analysed. This is calculated by summing up all the variable costs of production and the income earned from dairy farming. Then income earned is divided by the variable cost. The cost-benefit situation in terms of per cow per day and of per farm per month has be estimated. These are shown in Table 4.27.1 and 4.27.2 as follows.

The cost benefit situation per cow per day is firstly analysed. This includes the average fixed cost incurred per cow since the beginning of the farm, the average variable cost incurred per cow per day and the average income earned per cow per day. This is shown in Table 4.27.1 as follows:

Table- 4.27.1: Cost benefit situation in dairy farming (Per cow per day in Rs)

| Particulars | Farm Size | | | | |
|---|---|---|---|---|---|
| | Less than 5 | 5 to 8 | 9 to 12 | More than 12 | Total |
| Wheat Bran | 112.16 | 104.59 | 116.65 | 89.18 | 105.64 |
| Oil Cake | 5 | 6.32 | 6.5 | 13.3 | 7.79 |
| Flour | 3.39 | 1.24 | 6.31 | 5.93 | 4.22 |
| Salt | 3.8 | 2.71 | 2.12 | 1.6 | 2.67 |
| Rice | 2.6 | 1.35 | 0 | 0 | 1.13 |
| Green Fodder | 20.44 | 37.81 | 18.22 | 32.76 | 28.93 |
| Dry Fodder | 2.17 | 1.48 | 0 | 0 | 1.1 |
| Other Feeds | 23.45 | 24.72 | 10.33 | 5.29 | 18.34 |
| Labour Cost | 0 | 9.1 | 19.98 | 37.18 | 12.81 |
| Water | 0 | 3.25 | 1.21 | 1.6 | 1.92 |
| Electricity | 0.73 | 0.77 | 0.62 | 0.74 | 0.72 |
| Veterinary Expenses | 3.13 | 2.45 | 1.93 | 2.15 | 2.42 |
| Transportation | 2.6 | 4.15 | 1.96 | 7.69 | 3.65 |
| Miscellaneous | 1.14 | 0.97 | 0.84 | 0.51 | 0.92 |
| Total variable cost (A) | 180.61 | 200.92 | 186.66 | 197.92 | 191.52 |
| Total Fixed Costs (B) | 57750 | 64952.27 | 29797.8 | 36240.38 | 47185.1 |
| Income from milk (C) | 484.13 | 480.01 | 425.91 | 587.75 | 494.45 |
| Net income from milk (D) | 303.52 | 279.09 | 239.25 | 389.83 | 302.93 |
| Benefit- Cost ratio (milk) | 1.68 | 1.39 | 1.28 | 1.97 | 1.58 |
| Income from sale of cow dung, etc. (E) | 32.3 | 48.7 | 5.9 | 6.4 | 23.3 |
| Total income from dairy farming (F) | 516.43 | 528.71 | 431.81 | 594.15 | 517.75 |
| Net Income from dairy farming (F-A) | 335.82 | 327.79 | 245.15 | 396.23 | 326.23 |
| Benefit- Cost ratio of dairy farming ((F-A) ÷ A) | 1.9 | 1.6 | 1.3 | 2.0 | 1.7 |

*Source: Field Survey, 2019*

Table- 4.27.1 shows the analysis of cost- benefit situation per cow per day.

The table shows the average costs incurred per cow per day in terms of the different kinds of feeds, other variable cost as well as the average fixed cost of production incurred per cow since the beginning of the farms. The fixed costs of production incurred from the beginning of the farm per cow are- Rs.57750, Rs.64952.27, Rs.29797.8 and Rs.36240.38 respectively from the smallest to the largest farm size. Thus, the total average fixed cost incurred per cow from the beginning is 47185.1. The total variable cost per cow per day are estimated at Rs.180.6, Rs.200.92, Rs.186.66 and Rs.197.92 respectively from the smallest to largest farm size and the total average variable cost incurred per cow per day is Rs. 191.52.

Net income from milk per cow per day is estimated by subtracting the total income per cow day which are- Rs.303.52 for the smallest farm size, Rs.279.09 for 5 to 8 cattle size, Rs.239.25 for 9 to 12 cattle size and Rs.302.18. The overall average net income per cow per day is Rs.302.93. Here, it is to be noted that the income from milk is largely determined by the price of milk in different channels of distribution and size of milch animals per farm besides the amount of milk produced per day. After including the income per cow per day from other sources like sale of cow dung, sale of meat, etc., the net income and Benefit-Cost ratio for each farm size are- Rs.335.82 and 1.9, Rs. 327.79 and 1.6, Rs. 245.15 and 1.3, and Rs. 396.23 and 2 respectively from smallest to largest farm size. The Benefit- Cost ratio is highest for the largest farm size and is lowest for the farm size of 9 to 12 cattle. The overall Benefit- Cost ratio per cow per day is estimated at 1.7.

The cost- benefit situation per farm per month is also analysed. This includes the average fixed cost incurred per farm from the beginning, the average variable

cost incurred per farm per month, total income, net income and cost- benefit ratio per farm per month. This is shown in Table 4.27.2 as follows:

Table- 4.27.2: Cost- benefit situation in dairy farming (per month in Rs)

| Accounting Variables | Mean |
|---|---|
| Total Fixed Cost (from the beginning) | 354404 |
| Total Variable Cost (A) | 44344 |
| Income from Milk | 74412 |
| Income from other sources of dairy farming (cow dung, etc.) | 13353 |
| Total mean income from Dairy Farming (B) | 74655 |
| Average net income or Profit (B- A) | 30312 |
| Net Income as % of Variable Cost - % | 68.36 |
| Benefit-Cost Ratio (B ÷ A) | 1.7 |

*Source: Field Survey, 2019*

Table 4.27.2 shows the analysis of the cost- benefit situation of dairy farming. The mean value of the total fixed cost incurred from the beginning of the farm is Rs.354404 and the mean value of total variable cost per month is Rs.44344. The mean value of income earned from dairy farming per month is Rs.74655 and the mean variable cost is subtracted from this in order to get the mean value of net income/ profit, which is Rs. 30312 per month. The average net income/ profit is equal to 68.36% of the average variable cost per month. The Benefit- Cost ratio is-

$$\frac{\text{Mean value of total monthly income from dairy farming}}{\text{Mean value of total variable cost per month}} = 1.7$$

The value of the Benefit- Cost ratio being greater than 1 shows that dairy farming is profitable and farmers are earning reasonable profits from dairy farming.

## 4.10. REGRESSION ANALYSIS OF MILK PRODUCTION AND AMOUNT OF FEEDS

To test the hypothesis that milk production is an increasing function of feeds, Log- linear production function is estimated. Where,

$$\log Y = \alpha + \beta \log X$$

Where, Y = Milk production (in Litres)

X = Amount of feeds or value of feeds (in Rs)

$\alpha$ = Intercept

$\beta$ = The constant elasticity of production with respect to feeds. If $\beta > 1$, we can say that there is an increasing function.

The regression analysis of milk production and amount of feeds is shown in Table 4.28 as follows:

Table-4.28: Regression analysis of milk production and amount of feeds

| Parameters | Estimate | Standard Error | t- statistic | Significance |
|---|---|---|---|---|
| Constant | -3.998 | 0.857 | -4.654 | 0.00 |
| Log of Feed | 1.056 | 0.082 | 12.903 | 0.00 |
| R- squared | 0.814 | F statistic | 166.498 | p = 0.000 |

*Source: Calculation from Field Data, 2019*

Regression analysis shows that the estimated constant and slope co-efficient are highly significant. At the same time $R^2 = 0.814$ and F statistic = 166.498 are highly significant. Thus, we can say that feed is the significant determinant of milk production. Since the slope co-efficient (or constant elasticity) is more than one (1),

one unit increase in feed will be accompanied by more than one unit increase in milk production. Also, $R^2$ = 0.814 shows that 81.4% of variation in milk production is explained by amount of feeds. Thus we can conclude that milk production is an increasing function of feeds. This is in clear justification to Hypothesis no. 1 of the present study.

## 4.11. REGRESSION ANALYSIS OF TOTAL MONTHLY INCOME AND VARIABLE COST

To find out if income from dairy farming is a function of the increase in variable cost, log- linear regression is estimated. Where,

$$\log Y = \alpha + \beta \log X$$

Where, Y = Income from dairy farming (in Rs)

X = Variable cost (in Rs)

α = Intercept

β = Constant elasticity.

The result of the regression analysis is shown in Table 4.29 as follows:

Table-4.29: Result of regression analysis of income and variable cost

| Parameters | Estimate | Std. Error | t- statistic | Significance |
|---|---|---|---|---|
| Constant | 1.007 | 1.003 | 1.004 | 0.322 |
| Log of variable cost | 0.95 | 0.095 | 10.031 | 0.00 |
| R- squared | 0.725 | F statistic | 100.61 | p = 0.000 |

*Source: Calculation from Field Data, 2019*

Regression analysis shows that the estimated constant and slope co-efficient are highly significant. At the same time $R^2 = 0.725$ and F statistic = 100.61 are highly significant. The slope co-efficient (or constant elasticity) is almost equal to 1, i.e. 0.95, thus the result suggests that there is constant returns to scale. Increase in variable cost by Rs.1 will result in increase in income by Rs.1. Also, $R^2 = 0.725$ shows that 72.5% of variation in income is explained by the variable cost. Thus it can be concluded that variable cost of production is a significant determinant of income from dairy farming.

## 4.12. PROFITABILITY OF DAIRY FARMING

To test the hypothesis that substantial amount of income could be earned from the sale of milk, a paired t- test is conducted as follows:

$$t = \frac{\bar{d}}{s/\sqrt{n-1}} \sim t_{n-1} \qquad \text{Eq. (1)}$$

Where, $\bar{d} = \sum d_i / n$, and $s^2 = \frac{1}{n} \sum (x - y)^2$

$d_i$ = Total monthly income including farm income (x) – Monthly income excluding farm income (y).

Hypotheses are made as follows:

Null Hypothesis, $H_0$ : There is no significant difference between the means of family income including farm income and of family income excluding farm income. i.e. $\mu_1 = \mu_2$

Alternate Hypothesis, $H_1$: There is significant difference between the means of family income including farm income and of family income excluding farm income. i.e. $\mu_1 \neq \mu_2$

For this test, the significance level used is 0.05. Results of paired t-test of the difference between the means of monthly family income can be shown in Table 4.30.1 and Table- 4.30.2 as follows:

Table- 4.30.1: Paired samples statistics

| **Paired samples** | **Mean Income(in Rs)** | **Std. deviation** |
|---|---|---|
| Total Family income including farm income per month (x) | **87505.32** | **49459.867** |
| Family income excluding farm income per month (y) | **12850** | **16256.44** |

*Source: Calculation from Field Data, 2019*

Table- 4.30.2: Result of paired t- test for difference in monthly income

| **Paired Differences** | | **t- statistic** | **Degrees of freedom** | **Significance** |
|---|---|---|---|---|
| **Mean** | **Std. Deviation** | | | |
| 74655.33 | 46281.19 | 10.20202 | 39 | 0.000 |

*Source: Calculation from Field Data, 2019*

Table 4.30.1 shows the paired samples statistics including the mean value of family income including farm income per month, which is Rs.87505.32 and the mean value of family income excluding farm income per month, which is Rs. 12850.

Table 4.30.2 shows that the calculated t value is 10.202 and $p < 0.001$ at 39 degrees of freedom. The tabulated t value = 2.023 when $p = 0.05$ at 39 degrees of freedom. Since the calculated t value is higher than the tabulated t value and since p

value is lower than the significance level, i.e. 0.05, we reject the null- hypothesis and accept the alternate hypothesis at 5% level of significance. Thus, there is a significant difference between the means of family income excluding farm income and of family income including farm income, and the mean family income is Rs.74655.33 less without farm income. Therefore, we can conclude that substantial amount of income could be earned from the sale of milk which justifies the profitability of dairy farming.

## 4.13. CONSTRAINTS

The different kinds of constraints involved in dairy based on the responses of given by the respondents are presented in Table 4.31 as follows:

Table- 4.31: Constraints faced in dairy farming

| Constraints | Responses | | Percentage of Cases |
|---|---|---|---|
| | No. of responses | Percentage | |
| High costs of feeds | 40 | 44.4 | 100 |
| Supply of feeds | 3 | 3.3 | 7.5 |
| Water | 3 | 3.3 | 7.5 |
| Health of cattle | 8 | 8.9 | 20 |
| Low price of milk | 21 | 23.3 | 52.5 |
| Nature of occupation | 4 | 4.4 | 10 |
| Unavailability of workers | 9 | 10.0 | 22.5 |
| Transportation and distribution | 2 | 2.2 | 5 |
| **Total** | **90** | **100** | **225** |

*Source: Field Survey, 2019*

Table 4.31 shows the different kinds of constraints faced by the respondents, the number of respondents facing these constraints, percentage of each response from

the total number of responses as well from the total number of respondents/ cases. There are 90 responses in total, which indicates that the respondents face more than one kind of constraints. All the respondents claimed that the high cost of feeds is a constraint. The second biggest constraint faced by more than half, that is, 52.5% of the respondents is the low price of milk. Other constraints include constraints related to the supply of feeds, water, health of cattle, nature of the unavailability of workers and transportation and distribution of milk production.

## 4.14. CONCLUSION

Dairy farming plays an important role as a source of livelihood for many households in Mizoram. Families engaged in the activity mostly live in decent housing types and no households under the present study live below poverty line. Also, many families have more than one family member operating the farm. Even those who employ workers are also actively engaged in the activity. Many families are able to grow cash crops alongside dairy farming as it provides the required manure for cropping.

Data analysis in the present study shows that dairy farming requires a large amount of capital for starting up and monthly average variable cost are also high. However, returns from sale of milk and other smaller sources accrue to a sizable amount of income. Thus, the study has found that dairy farming is a profitable activity and Benefit- Cost ratio is also satisfactory enough to justify its profitability. Regression analyses also show that milk production increases with increase in the amount of feeds and that income from dairy farming is proportional to total variable cost incurred. This shows the importance of the price of milk across the various

channels as income earned from the sale of milk varies widely among the respondents depending on the channels of distribution they are engaged in.

Among the various types of channels, farmers are able to sell their milk at the highest price in door- to – door channel and thus it can be considered as the most efficient channel of distribution for the farmers. On the other hand, the price of milk is lowest when sold to MULCO ltd. However, most of the farmers are still selling their produced whole or partially to MULCO ltd. This is because most farmers cannot afford to spare the manpower or hire a worker for distribution and many farmers need a channel to sell their surplus milk.

Dairy farmers in Aizawl district, Mizoram are confronted with various kinds of challenges out of which the biggest ones are the high cost of feeds, particularly of wheat bran and the low price of milk in some of the channels of distribution. Other constraints include the unavailability of labour to hire, the health of cattle, scarce water and irregular supply of concentrate feeds by MULCO, etc. Appropriate measures are needed to address these constraints in order to enhance the profitability and viability of dairy farming and to develop the sector as a whole.

# CHAPTER- V

# FINDINGS, SUGGESTIONS AND CONCLUSION

## 5.1. INTRODUCTION

This chapter presents the findings from the analysis of data collected from 40 respondents in Durtlang and Sihphir areas through questionnaire schedule. The main areas of the findings are- the socio- economic conditions of the farmers/ respondents, the costs and income involved in dairy farming, the production of milk and its distribution and the constraints faced by the dairy farmers. Suitable suggestions from these findings are also presented.

## 5.2. FINDINGS

1. There are 37 males and 3 females among the respondents/ household leaders and all of them are the leaders of their households. All the male respondents are directly engaged in dairy farming as their main occupation while 2 of the female respondents are engaged in agriculture as their main occupation and 1 female respondent is a house- wife.

2. 40% of the respondents have high school level of education and are all male, while 2 out of 3 female respondents have middle school level of education and another 1 is barely literate.

3. There are a total of 214 household members including the respondents, out of which 114 are male and 100 are female. Out of these, 70 members (32.71%) have high school level of education, which consists of 42 male members and 28 female members. 8.7% of male members and 12% of female members have the educational level of graduate and above.

4. 68 (31.8%) of the household members of the household members are engaged in dairy farming. This consists of 64 male and 4 female members. The next largest portion that is 24.8% of the members are students. Some of the household members are engaged in different occupations such as private services, wage labour, trade and business, etc. Only 6, that is, 2.8% of the household members are engaged in government services.

5. Majority of the respondents, 27 out of 40 or 67.5% live in semi- pucca houses while 32.5% live in pucca houses. There are no respondents living in kutccha house and all the households are living above poverty line.

6. Majority of the respondents, that is 17 out of 40 or 42.5% have been engaged in dairy farming for 10 to 20 years and only 1 respondent has been engaged in dairy farming for more than 30 years and 38 or 95% of the respondents raise their cattle in their own land while only 2 or 5% raise on rented land.

7. Majority of the respondents, that is, 27 of the respondents claimed that their farms are operated by their own families alone while 12 of the respondents claimed that their farms are operated by their families with employed workers. Only 1 of the respondent has their farm operated by employed labourers/ workers alone.

8. The main work of the labourers employed is to obtain green fodder for the cattle. They also perform other works like feeding and milking of cows as well as distribution of milk depending upon the channels of distribution.

9. Based on the size of cattle, the respondents are distributed across 4 groups of farm sizes- less than 5 cows, 5 to 8 cows, 9 to 12 cows and more than 12 cows. Majority of the respondents, i.e. 18 respondents own 5 to 8 cows and minority of the respondents, i.e. 4 respondents own more than 12 cows.

10. The total average fixed cost incurred per cow from the beginning is Rs.47185.1 and Rs.3,54,404 per farm. Fixed cost of production includes costs on- land, cow shed, livestock, storages, water tanks, machines, vehicles and other tools used in dairy farming.

11. The average cost of feeds per farm per month is estimated to be Rs. 37763 which comprises of the highest portion of variable cost and average additional feed costs declines as farm size increases. The monthly average cost for other variable factors per farm is Rs. 6860 and thus the total variable cost is Rs. 44624 per farm per month. The total average variable cost incurred per cow per day is Rs.191.52. Variable cost of production mainly includes costs on- feeds of cattle, water, labour, transportation, veterinary and other day to day costs.

12. The main source of income in dairy farming is naturally from milk production and the average income from milk is Rs.494.45 per cow per day and Rs. 74412 per farm per month. Income from other sources in dairy farming such as- sale of cow dung, meat, etc also contributes income for some respondents and the average income from these sources is estimated at Rs. 23.3 per cow per day and Rs. 13353 per farm per month. Therefore, the mean value of total income from dairy farming is Rs. 74655.

13. The overall net income per cow per day is Rs.302.93 and Rs. 30312 per farm per month. Here, it is to be noted that the income from milk is largely determined by the price of milk in different channels of distribution and size of milch animals per farm besides the amount of milk produced per day.

14. The overall Benefit- Cost ratio calculated is 1.7. The value being greater than 1 shows that dairy farmers are earning reasonable profits from the activity.

15. The main channels of distribution of milk in the study areas are- Door to door, MULCO ltd., Middlemen, sale at home to regular customers as well as irregular customers. The price of milk varies widely across these channels. The price of milk in door- to- door distribution channel is Rs.60 for Sihphir and Rs.70 for Durtlang and for MULCO ltd. it ranges from Rs.43 to Rs.48. To middlemen, milk is sold at Rs.60 in Durtlang and Rs.50 in Sihphir. Milk is sold at home only by the respondents in Sihphir and is sold at Rs.60. Thus**,** based on the prices of milk across the different channels, door- to- door distribution can be said to be the most efficient channel and MULCO ltd**.** the most inefficient channel of distribution for the dairy farmers.

16. To find if milk production is an increasing function of amount of feeds, log-linear regression is estimated. The regression analysis shows that the estimated constant and slope co-efficient are highly significant. $R^2$ = 0.814 and the slope co-efficient is 1.056 which shows that one unit increase in feed will be accompanied by more than one unit increase in milk production. Thus one can conclude that feed is the significant determinant of milk production and milk production is an increasing function of feeds.

17. To find the strength of relation between the income from dairy farming and variable cost incurred monthly for dairy farming, log- linear regression is estimated. Regression analysis shows that the slope co-efficient (or constant elasticity) is almost equal to 1, i.e. 0.95, which suggests that there is constant returns to scale. Increase in variable cost by Rs.1 will result in increase in income by approximately Rs.1. Also, $R^2$ = 0.725 shows that 72.5% of variation in income is explained by the variable cost of production. Thus one can conclude that variable cost of production is a significant determinant of income from dairy farming.

18. A paired t- test is conducted to find if substantial amount of income could be earned from sale of milk. The average monthly income of the respondents with and without the sale of milk is calculated and the test result shows that there is a significant difference between the means of family income excluding farm income and of family income including farm income, which shows that substantial income can be earned from the sale of milk and justifies the profitability of dairy farming.

19. There are a number of constraints faced by the respondents. The biggest constraint is the high cost of feeds which is faced by all the respondents. The second biggest constraint faced by more than half, that is, 52.5% of the respondents is the low price of milk. Other constraints include constraints related to the supply of feeds, water, health of cattle, nature of the unavailability of workers and transportation and distribution of milk production.

## 5.3. SUGGESTIONS

Based on the findings of the present study, some suggestions are made for further development of dairy farming in the study areas. They are presented as follows:

1. The present study found that the cost of feeds comprises of the major portion of the total variable cost in dairy farming and the average cost of feeds per farm declines as the size of cattle increases. Thus, in order to reduce the costs of feeds and increase the profits earned, necessary steps should be taken to increase the size of the cattle.

2. At the same time, the study also found that milk production is an increasing function of the amount of feeds. Therefore, the farmers should provide sufficient amount of feeds required by the cattle to increase the milk production and income from milk, and not reduce the amount of feeds provided merely to reduce the costs.

3. The biggest constraint faced by all the respondents is the high price of feeds, particularly the price of wheat bran. Measures should be taken by the government to regulate the prices of feed or to provide these feeds at subsidised prices.

4. Also, the irregular supply of feeds, particularly readymade concentrates by MULCO ltd. poses a great challenge for the farmers. Steps should be taken by MULCO ltd. to provide these feeds on a more regular basis for the farmers.

5. Another large constraint faced by the respondents is the low price of milk. Although the price of milk is lowest when sold to MULCO ltd., majority of the respondents still sell their milk to MULCO ltd. either due to the cost of transportation involved in other channels or unavailability of workers/ family members to sell milk through other channels. This results in significant differences in the income earned from milk among the respondents. Thus, necessary actions should be taken to pay the farmers with fair price and increase their income.

6. To increase the profitability of dairy farming, farmers can explore the opportunity of value addition to milk. They can add value to raw milk by producing various kinds of processed products such as ghee, paneer, cheese, rasgulla, etc., and increase income above the price of raw milk. Since none of the respondents in the study areas produce processed products, there is a need to encourage the farmers in this area.

7. Some of the respondents also face problems regarding the health of their cattle. To maintain good health of the cattle, a more effective and holistic measure is required to provide the farmers with necessary vaccinations and medicines to control diseases. Awareness programmes on the health of cattle can also be organised for the farmers.

## 5.4. CONCLUSION

Dairy farming is an important occupation and a means of earning livelihood for many households in Mizoram. The present study has also proved that it is an economically profitable activity and that substantial amount of income can be earned from milk production. However, the number of households engaged in the activity is still very low and the milk production of Mizoram is also the lowest as compared to other north- east states. A large reason for this seems to be the various constraints faced by the dairy farmers, out of which the high cost of feeds and the low price of raw milk being the largest constraints. Therefore, there is an urgent need to overcome these problems and the solutions to these are largely in the hands of the state government and the cooperative societies concerned to this sector. Encouragement and awareness of the farmers to explore the vast opportunities of value addition to milk is also necessary in order to develop the sector, to promote rural industrialization in Mizoram as well as to increase the profitability of this activity. Further development and support of the sector is crucial in order to meet the ever rising demand of milk products and to amplify its valuable contribution to the state's economy.

## APPENDCES

## APPENDIX- I

## QUESTIONNAIRE FOR DAIRY FARMERS IN DURTLANG AND SIHPHIR, AIZAWL, MIZORAM

### I. General Information:

Name of the household head: ……

Housing type: [ ] 1. Kutchha [ ] 2. Semi-Pucca [ ] 3. Pucca

Poverty status of the family: [ ] 1. APL [ ] 2. BPL [ ]3. AAY

Village/ Town: ……..

### II. Family Details:

1. Household Member Profile-

| Sl. No | (A) | (B) | (C) | (D) | (E) | (F) |
|---|---|---|---|---|---|---|
| | Name | Sex 1= M 2=F | Age (Years) | Education | Occupation | Approx income p.m (other than D.F in Rs) |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |

| | |
|---|---|
| Codes for D | 01 = Illiterate; 02 = Can read only; 03 = Can read and write; 04 = Primary School; 05 = Middle School; 06 = High School; 07 = Higher Secondary school; 08= Graduate and above |
| Codes for E | 01 = Dairy Farming; 02: Agriculture; 03= Livestock (other than D.F); 04= Fisheries; 05 = Manufacturing;06 = Trade/Business; 07 = Govt. Services; 08= Private Services;09= Wage Labourer; 10= Housewife; 11= Student; 12=Infant; 13= Non-worker;14 = Others (specify) |

**III. Details on cattle:**

1. How long have you been engaged in dairy farming?

   ……..

2. Size of cattle in terms of breed, gender and maturity.

| Breed of cattle | Gender & Maturity of Cattle | | | | | Total no. of cattle |
|---|---|---|---|---|---|---|
| | Milch cow | Heifer | Calf | Bull | Bull calf | |
| Cross- breed | | | | | | |
| Indigenous | | | | | | |
| Total no. of cattle | | | | | | |

3. Purpose for owning cattle other than milch cows.

| Gender & Maturity | Purpose |
|---|---|
| Heifer | |
| Calf | |
| Bull | |
| Bull Calf | |

| CODES | 01= To be raised for a milch cow; 02= For sale to other dairy farmers; 03= For sale to slaughter-man upon maturity; 04= To work on the farm; 05= Other reasons (*please specify*) |
|---|---|

4. Who is/ are mainly in charge to look after your cattle?

   [ ] 1= My family alone [ ] 2= Only labourers/ workers

   [ ] 3= My family with employed workers

   [ ] 4 = Others, please specify……

5. How long is the lactation period of your cattle? (i.e number of months the cattle give milk continuously)

   ……..

6. How many years do the cattle give milk/ how long before they completely stop giving milk?

   ……..

7. What do you do to the cattle after they completely stop producing milk?

   ……..

**IV. Costs/ expenses, milk production, distribution and income in dairy farming:**

1. Fixed costs in dairy farming.

| Fixed Factors | Specification (If required) | Quantity- in Size (Sq.ft) and/or numbers | Costs at the time of purchase (in ₹) | Costs if rented per month (in ₹) |
|---|---|---|---|---|
| Land | | | | |
| Milch cow (if purchased) | | | | |
| Heifer (if purchased) | | | | |
| Calf (if purchased) | | | | |
| Bull (if purchased) | | | | |
| Cow Shed | | | | |
| Water Tanks | | | | |
| Storages | | | | |
| Vehicles | | | | |
| Machines | | | | |
| Others | | | | |

Total Fixed Costs: ……..

2. Details on feeds.

| Types of feeds | Specification (nature of feeding, frequency, etc) | Quantity (in kgs, bundles, etc) per month | Costs of feeds per month (in ₹) |
|---|---|---|---|
| Wheat Bran | | | |
| Oil- Cake | | | |
| Flour | | | |
| Salt | | | |
| Rice | | | |
| Green Fodder | | | |
| Dry Fodder | | | |
| Others | | | |

**Total cost of feed per month**: ……

3. Employment of workers (if employed).

| **Nature of employment** | **No. of workers** | **Cost per month (in ₹)** |
|---|---|---|
| Full- time contract to perform all required work | | |
| Part- time contract for maintenance of cattle | | |
| Part- time contract for the purpose of milking only | | |
| Part- time contract for the purpose of distributing milk only | | |
| Other reasons | | |

Total no. of workers: …….

Total Cost of Labour (₹): ……..

4. What is the source of water that you provide to your cattle? ……

| | |
|---|---|
| CODES | 01= Harvested rain water 02= Water connection; 03= Purchased water; 04= local spring well/streams; 05=Any other sources, please specify*: ……..* |

5. What is the cost of water consumed for dairy farming per month (if purchased)?

   ……..

6. What is the cost of electricity consumed per month?

   …….....

7. In what situations do you need veterinary help and what is the cost per month?

   …….

8. Miscellaneous expenses per month.

   …….

9. How much litres of milk do you produce per day in average?

   …….

10. If both Cross- breed and indigenous cows are owned, which kind produces more milk per day (in terms of litre)?

    ……...

11. Are you a member of cooperative society? (MULCO or any others) If yes, please state the name of the society.

    …….

12. What benefits do you receive from cooperative society?

…….

13. What is/ are your channel of distribution for your milk production?

…….

| | |
|---|---|
| CODES | 01= Door- to- door distribution; 02= By selling to MULCO Ltd. 03= Middlemen; 04= Sale at home (Reg); 05= Sale at home (Irreg); 06= Other shops/ outlets; 07= Others, please specify; |

14. Who is mainly in charge of distributing your milk production?

……

15. Transportation for milk distribution.

| **Mode of transportation** | **Cost per month (in ₹)** |
|---|---|
| Private vehicle | |
| Bus | |
| Taxi | |
| By foot | |

16. Price of milk per litre.

| **Channel of Distribution** | **Price per litre** |
|---|---|
| Door-to-door distribution | |
| MULCO Ltd | |
| Middlemen | |
| Sale at home (Reg) | |
| Sale at home (Reg) | |
| Other outlets | |

17. If sold both to MULCO Ltd. (or other outlets), as well as door- to- door, how do you divide between them in terms of litres in average?

    ……..

18. Do you process your milk production?

    [ ] 1= Yes [ ] 2= No

19. If yes, what are the products that you make?

    …….

20. What is your purpose for processing milk?

    [ ] 1= For self- consumption [ ] 2= For commercial purposes

    [ ] 3= Others, Please specify……

21. If processed for commercial purposes, what is your approximate income from processed products per month?

    ……..

22. **Total income from milk production (including processed products, if any) per month:** ……..

23. Other sources of income from dairy farming other than milk production. (If any)

| **Other sources** | **Income per year (in ₹)** |
|---|---|
| Earnings from the sale of meat | |
| Earnings from sale of cow dung | |
| Earnings from sale of Calves | |
| Other sources | |

**Total income from dairy farming other than milk production (per year): …….**

24. Do you receive any kind of aids for dairy farming from the government? If yes, what kind of aid

[ ] 1= No [ ] 2=Yes, please specify ……

25. Constraints in dairy farming: ……..

| | |
|---|---|
| CODES | 1= High costs of Feeds; 2= Supply of feeds; 3= Water; 4= Health of cattle; 5= absence of veterinary help; 6= Low price of milk; 7= Nature of the occupation; 8= Unavailability of workers; 9= Transportation & distribution; 10= Others, please specify; |

26. What in your opinion is the most important factor for a more profitable dairy farming? What are your suggestions?

……

……..……

……...……

……

## APPENDIX- II

## SELECTED PICTURES FROM FIELD SURVEY

The Researcher and Mr. Chhetri,
a dairy farmer in Durtlang Ramthar

Mr. Bishnu Jaishi in his cowshed,
Durtlang Ramthar

Dry fodder stack

Green fodder feeds

Water tank used to store water for cattle


A questionnaire scheduled with
Mr. Hrangchhuana,
a dairy farmer in Durtlang Mualveng

A questionnaire scheduled with
Mr. Bhuananda,
a dairy farmer in Durtlang Ramthar

A questionaire scheduled with
Mr. Chuailova's wife, a dairy farmer in
Sihphir Venglai

A questionnaire scheduled with
Mr. H. Lalrinawma's wife,
a dairy farmer in Sihphir Vengthar

Mr. K. Lalduhawma's Cattle,
in Durtlang North

Mr. Shailendra's Cattle,
in Durtlang Ramthar

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