

**Original Article**

# Exploration of Challenges and Opportunities of Cattle Milk Production and Marketing: The Case of Aysaita District in Afar Regional State, Ethiopia

Yohannes Birahanu<sup>1</sup>, Mohammed Endris<sup>1\*</sup>  and Woldegebriel Tesfamariam<sup>2</sup>

<sup>1</sup>Afar Pastoral and Agro-Pastoral Research Institute, Semera, Ethiopia

<sup>2</sup>Ethiopian Institute of Agricultural Research, Pastoral, Agro-Pastoral and Special Support Regions Research Directorate, Addis Ababa, Ethiopia

## ABSTRACT

This study was conducted to explore the challenges and opportunities of cattle milk production and marketing in the case of the Aysaita district in the Afar National Regional State. The study was undertaken in the two purposely selected rural kebeles of the Aysaita district namely Berga and Kerbuda kebeles. Agro-pastoralists from each rural kebeles were selected using the Proportional Probability to Size (PPS) approach for each rural kebeles. A total of 120 Agro-pastoralists were selected based on the number of households in each rural kebeles. To capture gender effects in the overall production system, the sampled households in each rural kebele were stratified into female and male-headed households, which guided the determination of the number of Agro-pastoralists, using the PPS (Proportional Probability to Size) approach. For the market study, one major milk market site was purposively selected namely, the Aysaita town market based on the accessibility. The overall mean market values of

**Corresponding Author:** Mohammed Endris <mohaend@gmail.com>

**Cite this Article:** Birahanu, Y., Endris, M. and Tesfamariam, W. (2023). Exploration of Challenges and Opportunities of Cattle Milk Production and Marketing: The Case of Aysaita District in Afar Regional State, Ethiopia. *Global Journal of Animal Scientific Research*, 11(2), 99-117.

Retrieved from <http://www.gjasr.com/index.php/GJASR/article/view/172>

**Article History:** Received: 2023.05.06 Accepted: 2023.06.07

Copyright © 2023 Yohannes Birahanu, Mohammed Endris and Woldegebriel Tesfamariam



This work is licensed under a [Creative Commons Attribution-Noncommercial-No Derivatives 4.0 International License](https://creativecommons.org/licenses/by-nc-nd/4.0/).

cattle milk and milk product sale in dry and wet seasons were fresh cow milk per litter in dry and wet seasons were 30 Birr and 40 birrs respectively. From the study, it was noted that the existing milk production systems were affected by many constraints. There are different challenges or constraints faced in cattle milk production in the study area. These include shortage of feed, inadequate access to veterinary drugs and services, access, inadequate extension service, lack of knowledge and skills, and unavailability of credit. Marketing of milk in the study area was mainly a traditional type and women traditionally do Milk marketing. Key actors involved in the milk market chain are the producer, trader, and consumer, and fresh milk is distributed through informal and formal marketing systems. The informal market involves the direct delivery of fresh milk by producers to consumers. The contribution of milk production and marketing in the study area depends on the certain supply of accompanying inputs such as feed, veterinary services, and improved milk-marketing facilities. Based on the present study, these areas need to be explored if cattle milk production is to develop into a market-oriented business operation.

**Keywords:** Prospects, Challenges, Opportunities, Milk Production, Marketing

## INTRODUCTION

Agriculture is the most important economic sector in Ethiopia contributing 43% to the gross domestic product (GDP), providing 85% of the foreign earnings, and employing 85% of the labor force (Tesema *et al.*, 2010). Hence, the capacity of the nation to address food insecurity, and poverty, and to bring sustainable national economic growth and development is highly dependent on the improvement of agriculture. The livestock sub-sector also plays a vital role as source of food, income, and foreign currency to the Ethiopian economy and contributes about 12 and 33% of the total and agricultural GDP, respectively.

Ethiopia holds the largest livestock population in Africa estimated to be about 52.13 million cattle, 24.2 million sheep, and 22.6 million goats (CSA, 2012). The total annual national milk production in Ethiopia comes from about 10 million milking cows and is estimated at 3.2 billion liters that is, 1.54 L/cow on average (CSA, 2012). The dairy value chain comprises about 500,000 smallholder rural farmers who produce about 1,130 million liters of milk of which 370 million liters of raw milk, 280 million liters of butter and cheese, and 165 million liters are consumed by the calves. The remaining 315 million liters were marketed through both informal and formal retailers through farmers' organizations. The estimate of cattle for the rural sedentary areas at the country level is about 53.4 million (CSA, 2011). About 64% or 34 million of these are aged 3 years or above and play several economic roles in the livelihood of smallholder farmers and Pastoralists. Livestock is primarily kept in smallholdings where it provides draught power for crop production, manure for soil fertility and fuel, and serves as a source of family diet and source of cash income (from the sale of

livestock and livestock products) particularly when markets for crops are not favorable.

Ethiopia holds large potential for dairy development due to its large livestock population and the favorable climate for improved, high-yielding animal breeds. Milk represents an important livestock product and makes a significant contribution to nutrition as well as the income of the livestock owner. A key intervention for dairy value chains in Ethiopia is the use of genetic imp Ethiopia holds large potential for dairy development due to its large livestock population and the favorable climate for improved, high-yielding animal breeds. Milk represents an important livestock product and makes a significant contribution to the nutrition as well as income of the livestock owner. A key intervention for dairy value chains in Ethiopia is the use of genetically improved cows (Tegegne and Hoekstra, 2011; Tegegne *et al.* 2013).

The promotion of dairy product marketing through cooperatives as a means of linking smallholders to the market is a key pillar of Ethiopia's rural development strategy (PASDEP, 2010). Cooperatives can be expected to help the smallholders to increase market access and so help them to increase their wealth. Encouraging intensified dairying is one strategy of the Ethiopian government to address the low productivity problem of indigenous cattle and to enable resource-poor smallholder mixed crop-livestock farmers to raise incomes. Market-oriented smallholder dairy farms are concentrated close to urban consumption centers because the effects of the market override many production factors. Less proximate production occurs only in those regions where there is an efficient market infrastructure. As infrastructure develops, markets become more efficient, and urban consumers develop stronger preferences for pasteurized milk, the advantages of proximity could reduce and production may well move away from intensive peri-urban systems and shift to more extensive systems (Woldemicheal, 2008). To undertake a feasible and extensive investigation, this study delimited to found in Aysaita woreda geographically and the analysis of the different actors, chain function, and support service providers involved in Cattle milk production and raw milk marketing value chain thematically based on a yearly survey of cross-sectional data. Therefore, the main objective of this study was to explore the challenges and opportunities of cattle milk production and marketing in the Aysaita District of Afar National regional state.

## **MATERIALS AND METHODS**

### **Location of the Study Area**

The study was conducted in the Aysaita district of the Afar National Regional State. Aysaita district, which is located is located in the eastern part of the Region in Zone 1 shares an international boundary with the Republic of Djibouti and bordered by Elida'ar in the north, Dubti in the west, Afambo and Dire Dawa Council in the south. It is located 65 km from Semera (the capital city of the Region) and 649 km from

Addis Ababa. It has a total area of 138,800 hectares having 13 *kebeles*; of which two are urban, six are pastoral and five are agro-pastoral *kebeles*. Naturally, it is plain in terms of topography. The soil is mostly alluvial and the temperature ranges between 30°C and 45°C. According to the Central Statistical Agency (CSA, 2012), the total population of Woreda is estimated to be 47,210. Of the total population, 31,162 (66%) live in rural areas, and the rest 16,048 (34%) live in urban areas. In Aysaita, though some oil crops like groundnut and sesame are grown, maize is the staple crop and the pastoral and agro-pastoral system is the dominant agricultural practice. The livestock population in Woreda is estimated at 71383 cattle, 16943 sheep, 23086 goats, 3,277 camels, and 482 donkeys (APADB, 2009). However, cattle milk producers are engaged in milk marketing in the town.

### **Agro-ecological zone**

The temperature of the wereda ranges from 19<sup>0</sup>c to 45<sup>0</sup>c and rainfall is bimodal; the long rain is 560mm, which occurs from June to September (karma), and the short rain is 255.3mm, which happens between January and March (sugum). The soil of the wereda from loamy to clay.

### **Vegetation**

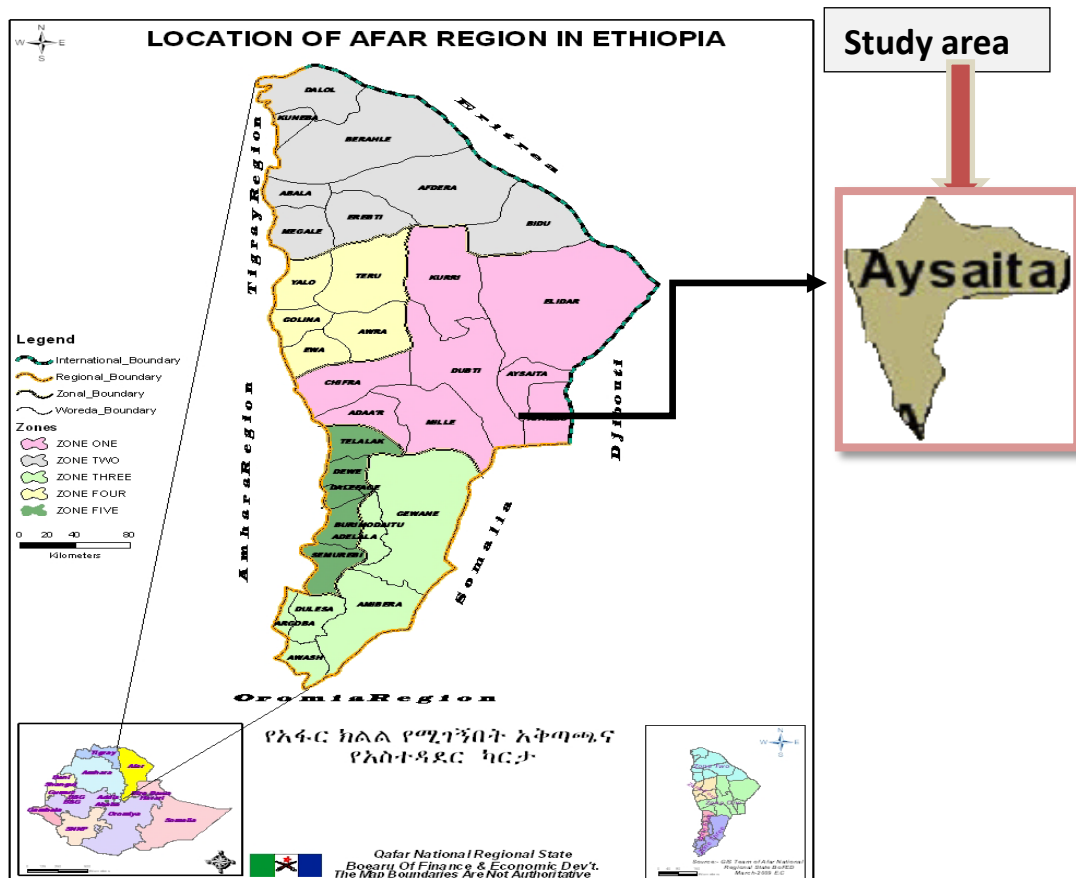
Of the total area coverage of the wereda, 13856ha of land is cropland, 5310ha is forest and bush, 4900ha is grazing land, 24ha is horticulture, 10ha is forage land and 7280ha is bare land.

### **Demographic structure**

According to 2007, national census data by CSA, the total population of the Wereda is about 49,990 and from this 26,633 are male and the rest 23,357 are female and the population density of the wereda is about 29.8/km<sup>2</sup>.

### **Farming activities**

There are two types of farming systems found in the wereda; six kebeles are Agro-pastoralist (both animal production and crop production areas) and the rest five kebeles are pure pastorals (area of animal production only). In pure-pastoral kebeles the community's livelihood mainly depends on livestock and livestock by-products such as milk, meat, and the sale of live animals but in an agro-pastoral area the community's livelihood depend on crop besides livestock and livestock product; they carried out crop production like maize, sesame, horticulture, and cotton, etc along Awash River. Maize, cropland preparation is started from August up to September and harvesting time is February and March (WoPARD, 2011).



## Sampling Techniques

### Cattle Milk Production and Marketing System

To assess the milk production and marketing of the study area, preliminary visits were made before questionnaire development, which is pertinent to the objectives of the study. The questionnaire contained many open-ended questions that allowed the respondents to express their opinions on various issues that are presented in descriptive statistics. Both secondary and primary data sources were used. From the Asayita district, among 11 rural kebeles, two kebeles were selected using purposive sampling which is based on the accessibility, and potentiality of cattle milk production. A preliminary survey was conducted in the rural kebeles to obtain the total number of households that have cattle production. For the selection of sample size of the farmers or dairy farmers using an updated list, farmers from each rural kebeles were selected using the Proportional Probability to Size (PPS) approach for each rural kebeles and a total of 120 farmers were selected based on the number of households. The target sampling population was defined as all households in the study area that owned milk cows and involved in production. The main themes of the study, which are cattle type, number, challenges, milk and milking practices processing, consumption and marketing of milk and milk products, and major constraints and

opportunities for milk production and marketing systems were addressed in the questionnaire.

### **Data Collection Procedures and sources**

Quantitative data were generated through the interview schedule (structured, closed & open-ended) and Qualitative data were derived from the in-depth interview, FGD, personal observation, and transect walk. The primary source of the data was respondents at the field level and some of the data collected were household characteristics such as family size by sex, age, and educational background; the major farming activity of the household, income source, Labour division in the family for milk production and crop production. Cattle herd composition by age and sex; lactation length and milk yield; monitoring of daily milk yield, and milk disposal to the market will be used to generate qualitative and quantitative data for the study. Gender position in milk production and marketing, access to veterinary and extension service, major problems of cattle milk production and marketing, and secondary data were obtained from different documents both published and unpublished

### **Methods of Data Analysis**

Descriptive statistics were used for analyzing the data collected from cattle milk producers in the study areas. Statistical Package for Social Science (SPSS) Version 20 was used to analyze the cattle milk production traits and marketing data and to prioritize the challenges and forecasts of it. This method of data analysis refers to the use of ratios, percentages means, and standard deviations.

## **RESULTS AND DISCUSSION**

### **Household Characteristics**

Out of the sample cattle milk producers, 65.7 % were male-headed and 35.0%female headed households (Table 1). This shows males are more involved in cattle milk production than females this might be a result of males being risk-takers in making a business, getting better opportunities, independent financially, and having the power to decide for females.

The marital status of the sample respondents was married 86.7%, single 7.5%, divorced 2.5%, and widower 3.3%. A small percentage of single respondents indicate that singles may not get their land for cattle milk production to involve in dairying, singles are more dependent on their families financially and in decision-making to involve in some kind of business. Married are involved in dairy production more than the others as they are doing things together and generate different ideas to involve in various businesses.

Concerning the educational levels of the household head, the majority of respondents in cattle milk production were illiterate (unable to read and write) (Table 1). The



overall proportion of illiterate respondents was 91.7%, and about 8.3% are in the category of reading and writing only respectively.

The study results, in general, indicate those cattle-keeping owners are mainly those who can read and write, these indicate that when the household head is educated, they became willing in involving in cattle milk production and are more productive as a result of the adoption of technologies in feed preparation, milk handling, animal health care, and marketing system and dairy management in general. The role of education is obvious in affecting household income, adopting technologies, demography, health, and as a whole the socio-economic status of the family as well (Kerealem, 2005 and cited in Solomon, 2014).

**Table 1: Socio-economic characteristics of the respondents**

| Parameters                            | Frequency<br>(N) | Percent<br>(%) |
|---------------------------------------|------------------|----------------|
| Gender of the respondents             |                  |                |
| Female                                | 42               | 35.0           |
| Male                                  | 78               | 65.0           |
| Total                                 | 120              | 100.0          |
| Marital status of respondents         |                  |                |
| Married                               | 104              | 86.7           |
| Single                                | 9                | 7.5            |
| Divorced                              | 3                | 2.5            |
| widower                               | 4                | 3.3            |
| Total                                 | 120              | 100            |
| Educational level                     |                  |                |
| Illiterate (Unable to read and write) | 110              | 91.7           |
| Read and write                        | 10               | 8.3            |
| Total                                 | 120              | 100            |

Source: survey result, 2020

### Family Size and Age of Households

The average family size and age of the respondents are presented in (Table 2). The overall mean and standard error (Mean (SE) of family size and age of respondents was 6.84 (0.125) and 42.61(0.99) years respectively. Most of the ages of the respondents were between the age of 27- 41 years (45%) and 42-70 (55%). This shows the majority of cattle milk producers are the age of 42-70 years (55%), even though they are not young this age could also be productive in dairying. The value of this study was in line with the value reported by (Nardo, 2010; Hanfare Mohammed, 2011; Solomon, 2014).

The overall average family sizes of the respondents were 6.84 with a standard error of 0.125. The overall average family size of the respondents was lower than the value of 7.37 with a standard error of 0.21, which was the value, reported by Mohammed *et al.* (2016).

Family size may, in turn, influence the availability of labor in the households for herding and cropping. The result agrees with an earlier report that indicated that large households sizes usually have large herds.

### Major Sources of Income Generation

The result indicated in (Fig. 2), household income generation, crop sale (75.8%), animal sale (62.5%), milk & milk product sale (85.8%), and off-farm activities (25%) respectively. Out of the total respondents, 85.8% of milk and milk product sales are the majority of income sources, whereas 75.8% of the respondent's major sources of income were crop sales and 62.5 % animal sales followed by milk and milk product sales.

### Cattle Herd Composition

The overall mean values and standard error of the mean of cattle herd compositions in the study district is presented in (Table 3). The result of this study indicated that the overall mean values and standard error of cattle herd composition concerning their age classes for Cattle, female calves, male calves, heifers, adult males, adult females, and milking cows were estimated to be 11.42, 1.49, 1.13, 3.34, 4.58, 1.06 and 3.20 with a standard error of 0.33, 0.08, 0.07, 0.13, 0.14, 0.10 and 0.10 respectively (Table 3).

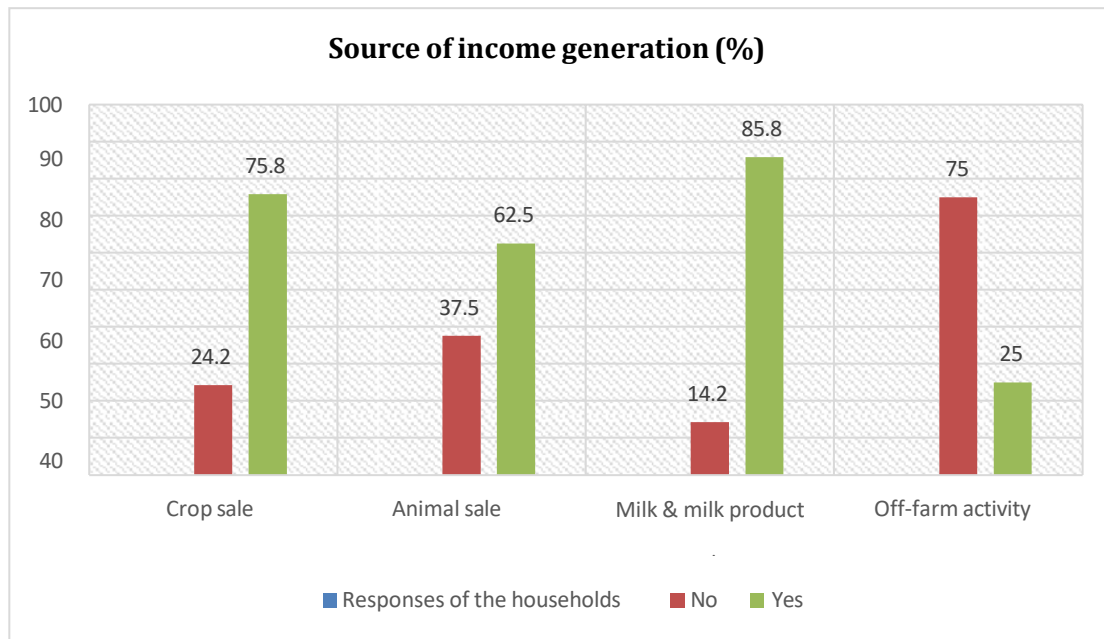
**Table 2: Mean and standard error of family size and age of respondents by rural kebeles**

| Rural Kebele | Statistics | Family size  | Age of respondents (years) |
|--------------|------------|--------------|----------------------------|
| Berega       | Mean       | 7.07 (0.155) | 42.00 (1.28)               |
|              | N          | 70           | 70                         |
| Kerbuda      | Mean       | 6.52 (0.19)  | 43.46 (1.56)               |
|              | N          | 50           | 50                         |
| Overall      | Mean       | 6.84 (0.125) | 42.61(0.99)                |
|              | N          | 120          | 120                        |

N = Number of households, Parenthesis in the brackets = Standard Error of the mean

Source: survey result, 2020





**Fig. 2: Overall reported percentages of household income generation**  
Source: survey result, 2020

**Table 3: Cattle Herd composition in Aysaita Woreda**

|                    |     | Descriptive |      |     |     |
|--------------------|-----|-------------|------|-----|-----|
| Cattle composition | N   | Mean        | SE   | Min | Max |
| Cattle             | 120 | 11.42       | 0.33 | 5   | 21  |
| Female calves      | 120 | 1.49        | 0.08 | 0   | 5   |
| Male calves        | 120 | 1.13        | 0.07 | 0   | 3   |
| Heifers            | 120 | 3.34        | 0.13 | 0   | 8   |
| Adult female       | 120 | 4.58        | 0.14 | 3   | 10  |
| Adult male         | 120 | 1.06        | 0.10 | 0   | 5   |
| Milking cows       | 120 | 3.20        | 0.10 | 2   | 8   |

N= Number of cattle holding households, SE = standard error of the mean, Min= minimum, Max = Maximum

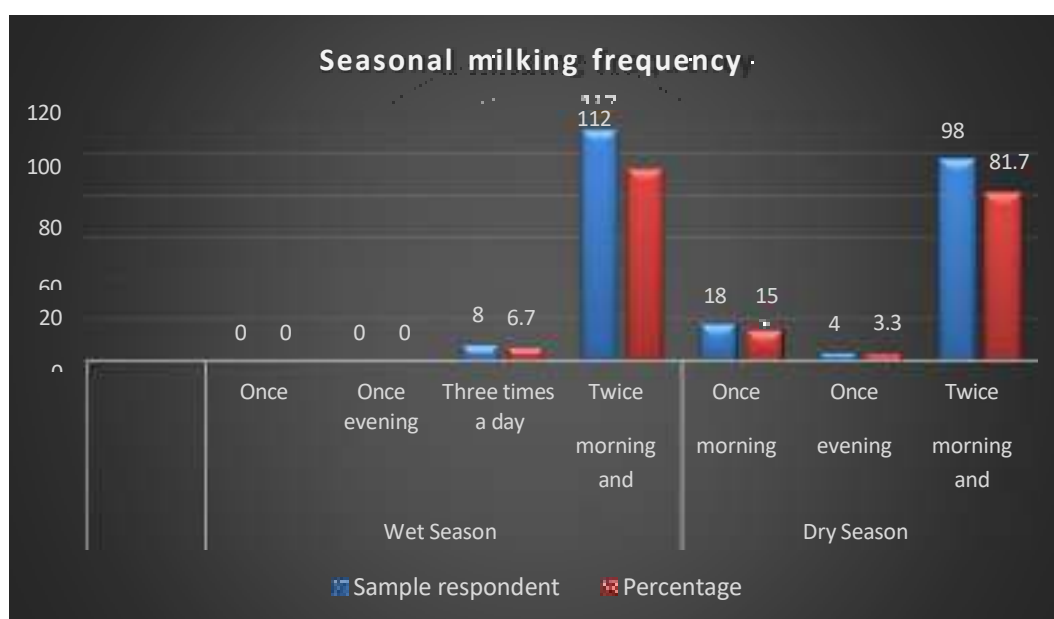
The result of this study indicated that the difference in livestock holding among rural kebeles may be due to the livelihood of the community's dependence on more of rearing livestock rather than crop production. The result of this particular study was in agreement with the findings of (Mohammed *et al*, 2016).

## Milk Production and Marketing

### Milking Frequency, Milk Yield, and Lactation Period

The overall reported percentages of seasonal milking frequency of the respondents are presented in (Figure 3). Of the total respondents of the households, about 93.3% and 6.7% were cows milked twice a day (Morning and evening) and three times a day in the wet season respectively. Whereas cows milked in the dry season were 81.7%, 15%, and 3.3% respectively. Almost all of the households revealed that in the case of cow milking, twice milking is a common practice in the wet and dry seasons.

Mohammed *et al.*, 2016; Nardos, 2010; Solomon, 2014 reported that milking frequency in the area depends on Seasonal feed availability. Once milking is practiced in the dry season in the evenings. Evening milking in the dry season is practiced because cows are kept far from the homestead for grazing during the daytime. Milk produced in the evening is marketed the next morning through proper processing such as washing and smoking of utensils with different herbs properly.



**Fig. 3: Overall reported percentages of Seasonal milking frequency of cattle in the study area**  
**Source: survey result, 2020**

The overall mean values and standard error of the mean milk yield per day per cow and lactation period of lactating cows in the study area are presented in (Table 6). The result of this study indicated that the overall mean values and standard error of milk yield and lactation period of cows that responded by households were 2.30 liter/cow/day and 8.30 months lactation period with a standard error of 0.42 and 0.17. The indigenous breed of cows is generally considered low milk producers. However, they were the major source of milk in the study area. The result of this study was

higher than the average lactation length of local cows (7.29 months) in the Meiso district (Kedija, 2008; Cited by Nardos, 2010). The lactation length of cows in the study area depends mostly on the management objective of the herder; the herder may prolong the lactation length for the sake of continuous milk production or dry off the dam at an early stage to breed the cows.

**Table 4: Overall average milk production and lactation period of cows reported by the households**

| Parameters                        | Descriptive Statistics |         |         |      |            |
|-----------------------------------|------------------------|---------|---------|------|------------|
|                                   | N                      | Minimum | Maximum | Mean | Std. Error |
| Lactation length (months)         | 120                    | 5.0     | 11.0    | 8.30 | 0.17       |
| Average milk yield/liter/cow/day/ | 120                    | 1.5     | 3.0     | 2.30 | 0.42       |

(N)= Total number of respondents

### Traditional Processing and Handling

Female members of the family (Wives and Daughters) usually perform milk processing activities. Milking vessels used by the local community known as Ayni it was generally washed with water and herbs of different species (used as disinfectants) and smoked for aromatic purposes. Most of the women fumigate the milk utensils simply by inserting the firewood into the utensil and shaking it well or simply keeping the fired stick on the top of the utensil and fumigating well until the utensil is sufficiently smoked. Similarly, smoking milk handling utensils is done to improve the aroma and flavor of the milk. As similarly reported by (Hanfere Mohammed, 2011), different plants were used by pastoral and Agro Pastoral households for smoking; however, the major plants used for smoking were *Adengali* (*Olea africana*), *Alayto* (*Balanites aegyptiaca*) and *Maderito* (*Acacia mellifera*).

### Milk Marketing System

Market refers to a set of buyers and sellers who interact and influence the price. However, the existence of the market by itself does not ensure an exchange to take place. There should be a channel. In pastoral areas, milk production is seasonal while consumption is throughout the season (IPS, 2002; Cited by Nardos, 2010). Moreover, there are no preservation and processing techniques, and physical infrastructure, like roads and market facilities, is limited (Nardos, 2010; Tegene *et al.*, 2013; Solomon, 2014). However, where there is market access, dairying is preferred to meat production since it makes more efficient use of feed resources and provides regular income to the producer. Marketing of milk in the Aysaita woreda was mainly a traditional type and

women traditionally do Milk marketing. Key actors involved in the milk market chain are producers, traders, and consumers. In the study district, fresh milk is distributed through informal and formal marketing systems. The informal market involves the direct delivery of fresh milk by producers to consumers in Aysaita town. There are also several informal milk traders, agents, and retailers from the pastoralists that are involved in the milk delivery channel. The differences in distance to different milk marketplaces in the Aysaita Woreda milk shed affect the price of milk. Milk is transported to towns on foot and commands a higher price than when sold in nearby producers' homes.

### Gender Responsibilities in Milk Production and Marketing in the Study Area

The responsible family members for Cattle milk production and marketing of the households are presented in (Table 5). The result indicated that activities of herding and watering, mating assistance, delivery assistance of pregnant cows, selling of live cattle, and handling of health care cattle were (89.17%, 88.4, 100%, 91.66%, and 81.7) responsible by Males. Whereas activities of milking cows and selling of milk and milk products were done by Female members of the households.

**Table 5: A responsibility of family members for cattle production and marketing activity in Aysaita district**

| Activities                    | Total<br>N | A responsible member of the family |       |      |       |
|-------------------------------|------------|------------------------------------|-------|------|-------|
|                               |            | Female                             |       | Male |       |
|                               |            | N                                  | %     | N    | %     |
| Herding and watering cattle   | 120        | 13                                 | 10.84 | 107  | 89.17 |
| Milking (cows)                | 120        | 119                                | 99.17 | 11   | 9.16  |
| Mating assistance             | 120        | 0                                  | 0.00  | 120  | 100   |
| Delivery assistance           | 120        | 14                                 | 11.7  | 106  | 88.4  |
| Selling milk and milk product | 120        | 111                                | 92.5  | 9    | 7.5   |
| Selling of live cattle        | 120        | 8                                  | 5.83  | 112  | 91.66 |
| Handling of healthcare cattle | 120        | 22                                 | 18.4  | 98   | 81.7  |

N = number of sampled households

Source: survey result, 2020

The primary objective of keeping cattle in the study area was for milk production. Fresh milk, fermented milk, and butter were among the common milk products produced and consumed in the area. Culturally fermented milk is not sold; rather cows' fresh whole milk, and butter are in the market. The mean values of the market price of cattle milk and milk product sale are presented in Table 6. The result indicated that the overall mean market values of cattle milk and milk product sale in dry and wet

seasons were fresh cow milk per liter in dry and wet seasons were 30 Birr and 40 birrs respectively. The price of Yoghurt per cup in Birr in the cafeteria was 7 and 10 birrs in dry and wet seasons whereas the Price of Butter per beer bottle in ETB and the Price of Cosmetic butter per tea glass in ETB was 166.33 and 50 birrs. The current values of this study on the price of milk and milk product sales were in agreement with the report of Mohammed *et al.* (2016).

**Table 6: Mean values of the market price of cattle milk and milk product sale in the study town**

| Descriptive Statistics                                       |     |        |            |
|--------------------------------------------------------------|-----|--------|------------|
| Milk and milk product                                        | N   | Mean   | Std. Error |
| Price of Fresh cow milk per liter in Birr in Wet season      | 120 | 30.00  | 0.000      |
| Price of Fresh cow milk per liter in Birr in Dry season      | 120 | 40.00  | 0.00       |
| Price of Yoghurt per cup in Birr in the cafeteria            | 120 | 10.00  | 0.000      |
| Price of Butter per beer bottle in ETB                       | 120 | 166.33 | 1.705      |
| Price of Cosmetic butter per tea glass in Birr in Wet season | 120 | 50.00  | 0.000      |
| Price of Yoghurt per cup in Birr in Wet season               | 120 | 7.00   | 0.000      |

N= Number of sampled respondents

Source: Survey result (2020)

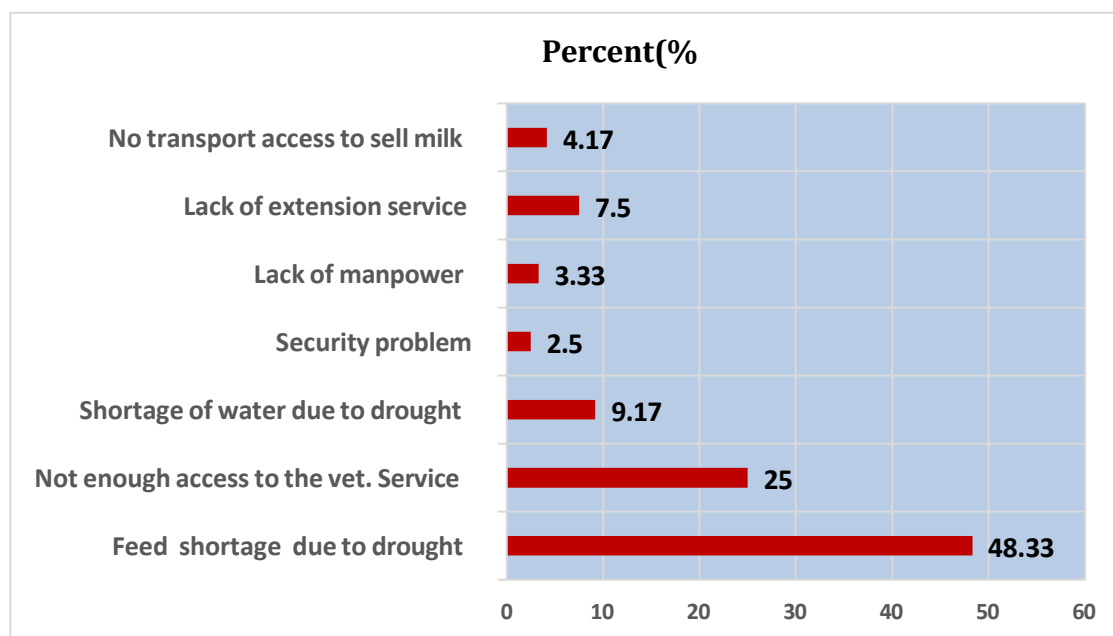
The same study by Mohammed *et al.* (2016) revealed that two different milk outlets were identified in the Aysaita milk shed, namely traditional milk collectors (traders) and the producer themselves. However, in the area, there are no traditionally self-organized group or cooperatives, which involves women who have milking cows, or camels that tend to sell the whole milk contributed by each member at her turn or shift and uses the income generated for her own.

### Challenges of Milk Production and Marketing

The major challenges of cattle milk production and marketing in the study area raised by the respondents are presented in (Fig 4). There are different challenges or constraints faced in cattle milk production in the study area. These include shortage of feed, inadequate access to veterinary drugs and services, access, inadequate extension service and lack of knowledge and skills, and unavailability of credit. Among those problems, feed scarcity, limited access to veterinary services, security problems, lack of extension service, and lack of manpower were the major problems identified by 48.33%, 25 %, 9.17 %, 2.5%, 3.33%, 7.5%, and 4.17 % of the household, respectively. The

respondents reported feed shortage in the study area as the cultivation of rangeland for crop production is increasing at a disturbing rate. Every hectare of grazing land converted to cropland is at the expense of livestock production except for a very small subsidy that the livestock sector could receive from crop residue as feed and encroachment of unwanted weedy species like *prospis julifulera* and *perineum*. About 25 % of the respondents indicated that veterinary service was a serious problem in all the woredas. This is due to the distance to veterinary service in towns, an irregular visits by the veterinarian, shortage of experts, and lack of transport.

In the study conducted by Solomon (2014) in Mekele City, the major constraints of dairy development were the shortage of feed, high costs of feeds, seasonality of milk demand occurring due to fasting season, lack of formal marketing systems, inadequate land for dairy expansion and preparation of feeds, AI problem, lack of income, shortage of water, lack of handling tools, knowledge gap in identifying quality crossbreed, even though there is access for extension service there is a problem of extension service in some local administration, lack of processing factory and access for credit for expansion. Accordingly, major constraints or challenges on milk marketing in aysaita district are reported elsewhere (Mohammed *et al.*, 2016). He reported that the major challenges in milk marketing were less milk quantity, Distance to market, cultural taboos, high cost of transport, and spoilage of milk.



**Fig. 4: Challenges faced in cattle milk production and marketing in Aysaita Woreda**

Source: survey result, 2020

Multiple factors constrain dairy production and even the nature, and magnitude of the problems differ between production systems and agroecologies. Some factors are cross-cutting regardless of the dairy production system and agroecologies that can



influence dairy production; others are system-specific (Azege, *et al.*, 2013). The most important constraints associated with milk production as ranked according to their importance by the farmers were feed shortage, shortage of water, access to land, disease prevalence, the poor genetic potential of local cows for milk production, inadequate artificial insemination services, and shortage of farm labor. The total productions of milk in the areas are effects by the interaction of these constraints (Assaminew and Eyassu, 2009 and cited in Solomon, 2014). The dairy production system is highly constrained by a shortage of feed in terms of quality and quantity. Insufficient supply of quality feed is the main thing restraining dairy efficiency in the region.

## CONCLUSION

Out of the total cattle milk producers, about 65.7 % were male-headed and 35.0% female headed households (Table 1). This shows males are more involved in cattle milk production than females this might be a result of males being risk-takers in making a business, getting a better opportunity, independent financially, and having the power to decide for females. The marital status of the sample respondents was married 86.7%, single 7.5%, divorced 2.5%, and widower 3.3%.

The overall mean and standard error (Mean (SE) of family size and age of respondents was 6.84 (0.125) and 42.61(0.99) years respectively. Most of the ages of the respondents were between the age of 27-41 years (45%) and 42-70 (55%). Out of the total respondents of the households, about 93.3% and 6.7% were cows milked twice a day (Morning and evening) and three times a day in the wet season respectively. Whereas cows milked in the dry season were 81.7%, 15%, and 3.3% respectively. Almost all of the households revealed that in the case of cow milking, twice milking is a common practice in wet and dry seasons. The overall mean values and standard error of cattle herd composition with respect to their age classes for Cattle, female calves, male calves, heifers, adult male, adult female, and milking cows were estimated to be 11.42, 1.49, 1.13, 3.34, 4.58, 1.06 and 3.20 with a standard error of 0.33, 0.08, 0.07, 0.13, 0.14, 0.10 and 0.10 respectively. Of the total respondents of the households, about 93.3% and 6.7% were cows milked twice a day (Morning and evening) and three times a day in the wet season respectively. Whereas cows milked in the dry season were 81.7%, 15%, and 3.3% respectively. Almost all of the households revealed that in the case of cow milking, twice milking is a common practice in wet and dry seasons. Traditional hand milking is the major type of milking practice used in the study area. Currently, about 100 % of the households had milking cows. About 99.17 % of them stated that milking cows are the responsibility of female members. About 9.16% of respondents indicated that milking cows are the responsibility of male members of the household. Almost all of the households indicated that in the case of cow milking, twice milking is a common practice in wet and dry seasons. However, as indicated by

the cattle owners milking frequency decreases to once in the dry season. The activities of herding and watering, mating assistance, delivery assistance of pregnant cows, selling of live cattle, and handling of healthcare cattle were (89.17%, 88.4, 100%, 91.66%, and 81.7) responsible by Males, whereas activities of milking cows and selling of milk and milk products were done by Female members of the households. The overall mean values and standard error of milk yield and lactation period of cows that responded by households were 2.30 liter/cow/day and 8.30 months lactation period with a standard error of 0.42 and 0.17. The indigenous breed of cows is generally considered low milk producers. The overall mean market values of cattle milk and milk product sale in dry and wet seasons were fresh cow milk per litter in the dry and wet seasons were 30 Birr and 40 birrs respectively. From this study, it was noted that the existing milk production systems were affected by many constraints. There are different challenges or constraints faced in cattle milk production in the study area. These include shortage of feed, inadequate access to veterinary drugs and services, access, inadequate extension service, lack of knowledge and skills, and unavailability of credit. Among those problems, feed scarcity, limited access to veterinary services, security problems, lack of extension service, and lack of manpower were the major problems identified by 48.33%, 25 %, 9.17 %, 2.5%, 3.33%, 7.5%, and 4.17 % of the household, respectively. Dairy development in the studied areas could be improved by encouraging private investors and cooperatives to establish a dairy processing plant, and thereby commercial milk producers could be encouraged to enter into milk collection systems.

## RECOMMENDATIONS

The following challenges of cattle milk production in the study district were feed scarcity, water shortage, poor veterinary service, and limited access to markets. The contribution of milk production and marketing depends largely on the assured supply of accompanying inputs such as feed, veterinary services, and improved milk-marketing facilities.

Based on the present study, the following recommended areas need attention if cattle milk production is to develop into a market-oriented business operation in the district.

- Improve the available natural pasture and introduce haymaking; develop and implement rangeland management systems.
- To alleviate feed and water problems proper rangeland management and utilization should practice.
- To ease conflict, the responsible bodies from both sides should have to establish a common committee of herders working for their common interests.
- Introduce and develop improved animal forages as sole crops or integrated with cereal crop production (sorghum or maize system).
- There should be a mobile clinic with the necessary facilities, drugs, and

veterinarians to identify, control, and monitor camel diseases.

- Breed improvement should consider the multipurpose utility of local breeds; efforts should be made to characterize the breed.
- Improve animal health services including para vet training and drug supply system with close monitoring and supervision.
- Establish a milk collecting and processing unit by encouraging the already existing self-organized group, which is the milk Cooperative.
- Introduce a technology for the processing of milk to fulfill their demand for the processed product in the household to strengthen the market participation position of the household in case of cow milk sale.
- Develop marketing linkage between the producer and consumer of milk products.
- Examine the possibility of credit provision for improved milk production, processing, and marketing.
- Training of district staff, development agents, and Agro-pastoralists (mainly women) on dairy production, processing, and marketing
- Establish dairy cooperatives in both areas by introducing locally feasible milk-preserving technology and linking them with the market, especially in the wet season when surplus milk is produced.
- Further research should be done on traditional treatments to investigate the efficiency of traditional medicine used by pastorals and agro pastorals.

## ACKNOWLEDGEMENT

The Authors mainly acknowledge Afar Pastoral and Agro-Pastoral Research Institute for funding this research study. I would like to express my gratitude to all the pastoralists and Agro-pastoralists, as well as all the experts of the district development agents (DAs), who volunteered and collected the survey data throughout the study.

## AUTHOR'S CONTRIBUTION

All authors are equally contributed to the data collection, analysis, interpretation of the result, and write up of this research manuscript. The authors read and approved the final manuscript.

## CONFLICT OF INTEREST

The authors declare that no conflict of interest concerning the research, authorship, or publications of this research article.

## REFERENCES

Ahmed M., Ehui S. and Yemesrach Assefa, (2003). Milk development in Ethiopia. Socioeconomics and policy research. Working paper 58. ILRI (International Livestock

- Research Institute), Nairobi, Kenya. 47p. Available from: <https://cgspace.cgiar.org/bitstream/handle/10568/2921/wp58.pdf?sequence=1>.
- Ahmed MAM, Ehui S and Yemesrach Assefa (2003). Dairy development in Ethiopia. Paper presented at the 'Successes in African agriculture' conference In: WEnt, IFPRI, NEPAD, CTA conference paper no. 6. 1–3 December 2003, Pretoria, South Africa.
- Asaminew T, Eyassu S. Smallholder dairy production system and emergence of dairy cooperatives in Bahir Dar Zuria and Mecha Woredas, Northwestern Ethiopia. *World Journal of Dairy and Food Sciences*. 2009; 4: 185-192.
- Asaminew Tassew and Eyassu Seifu, (2009). Smallholder Dairy Production System and Emergence Of Dairy Cooperatives In Bahir Dar Zuria And Mecha Woredas, Northwestern Ethiopia. *World Journal Of Dairy & Food Sciences* 4 (2): 185-192, 2009. Andassa Livestock Research Center, Bahir Dar, Ethiopia. Available from: <https://www.semanticscholar.org/paper/Smallholder-Dairy-Production-System-and-Emergence-Tassew-Seifu/51bcc91081b97c401a14eb209da9ac6568499ab0>.
- Azage Tegegne, (2003). Financing market oriented dairy development: the case of Ada'a-Liben district Dairy Association, Ethiopia. *Urban Agricultural Magazine*. No. 9. Koninklijke, Netherlands. Available from: <https://cgspace.cgiar.org/handle/10568/29818>.
- Azage Tegegne, Berhanu Gebremedhin, Dirk Hoekstra, Berhanu Belay And Yoseph Mekasha, (2013). Smallholder Dairy Production and Marketing Systems in Ethiopia: IPMS Experiences and Opportunities for Market-Oriented Development. International Livestock Research Institute (ILRI), Addis Ababa, Ethiopia. Working Paper No. 31. Available from: <https://cgspace.cgiar.org/handle/10568/27914>.
- Azage Tegegne. (2003). Financing market-oriented dairy development. The case of Ada'a-Liben Woreda Dairy Association. *Urban Agriculture Magazine (the Netherlands)* 9:25–27.
- CSA (Central Statistical Agency) (2012). Ethiopia Sample survey Enumeration. Addis Ababa Ethiopia.
- CSA 2011. Agricultural Sample Survey 2010/11: Report on Livestock and Livestock Characteristics. Vol11. (Private peasant holdings). Addis Ababa, Ethiopia: Central Statistical Agency.
- IPS (Industrial Project Service) (2002) Resource Potential Assessments and Project Identification Study of Somali Region. Agricultural Resources. Industrial Projects Service. Addis Ababa, 401 p. Available from: [https://www.scirp.org/\(S\(czeh2tfqw2orz553k1w0r45\)\)/reference/referencespapers.aspx?referenceid=2596599](https://www.scirp.org/(S(czeh2tfqw2orz553k1w0r45))/reference/referencespapers.aspx?referenceid=2596599).
- Kedija HH. (2008). Characterization of milk production system and opportunity for market orientation: A case study of Mieso district, Oromia region, Ethiopia. Msc thesis, Haramaya University, Ethiopia.
- Keralem Ejigu, (2005). Honeybee production systems, opportunities and challenges in enebse Esarmidir wereda (Amhara region) and Amaro Special Wereda (Southern Nations, Nationalities and Peoples Region), Ethiopia. M.Sc. Thesis, Alemaya University, Ethiopia.
- Mohammed, H., Nigusie, A., Patrick, E. (2016). Cattle and Camel Milk Production and Marketing: The Case Study in Aysaita Woreda, Awsi Rasu of Afar Regional State, Ethiopia. *Journal of Marketing and Consumer*, ISSN 2422-8451 An International Peer-reviewed Journal Vol.22. pp:7-24. Available from: <https://iiste.org/Journals/index.php/JMCR/article/view/30154/30970>.
- Nardos Eshetu, (2010). Determinants, challenges and prospects of dairy production and marketing in mekele city, MA Thesis Mekele University, Ethiopia.

- PASDEP (Plan for Accelerated and Sustained Development to End Poverty) 2010. Ethiopia's Agricultural Sectoral Policy and Investment Framework. Federal Democratic Republic of Ethiopia, Ministry of Agriculture and Rural Development, Draft Final Report. Addis Ababa, Ethiopia.
- Solomon, M. (2014). Exploration of Challenges and Prospects of Dairy Production: A survey study of Mekelle City, Ethiopia. MSc Thesis Mekelle University, Ethiopia. <https://opendocs.ids.ac.uk/opendocs/handle/20.500.12413/4536>.
- Tegegne, A. and D. Hoekstra 2011. Mass artificial insemination interventions to enhance dairy and beef production in Ethiopia. Paper presented at a 'Livestock Exchange,' 9 -10 November 2011, ILRI, Addis Ababa, Ethiopia.
- Tegegne, A., Gebremedhin, B., Hoekstra, D., Belay, B. and Mekasha, Y. (2013). Smallholder dairy production and marketing systems in Ethiopia: IPMS experiences and opportunities for market-oriented development. IPMS (Improving Productivity and Market Success) of Ethiopian Farmers Project Working Paper 31. Nairobi: ILRI.
- Woldemichael Somano, (2008). Milk Marketing Chains Analysis: The Case of Shashemane, Hawassa and Dale District's Milk Shed, Southern Ethiopia. M.Sc. Thesis, Hawassa University, Ethiopia. Available from: <https://cgspace.cgiar.org/handle/10568/713>.