OMO International Journal of Sciences

Available online at: https://survey.amu.edu.et/ojs/index.php/OMOIJS/issue/archive

Vol. 4 Issue. 2, December , 2021, pages: 49~74

ISSN(Print): 2520-4882 :ISSN(Online):2709-4596

Full-length Research Article

Milk Production, Handling, Processing and Marketing Practices in Selected Districts in Southern Ethiopia

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Abstract

This study was conducted in Segen Area Peoples Zone, Southern Ethiopia, to analyze milk production, handling, processing, and marketing techniques. A total of 204 people were chosen for the study using simple random sampling technique, and data were collected utilizing a semi-structured questionnaire. During the research, both primary and secondary data were gathered. SPSS version 20 software was used to analyze the data using descriptive statistics, chi square test, and analysis of variance. 85 percent of the 204 houses surveyed were male headed household while the remaining 15% were female headed. The respondents' average age was 43.8610.064 years. In the current study, the age of the respondents ranged from 23 to 80 years old. In the Derashe district, almost 36.5 percent of respondents washed their udders before and after milking, indicating that the importance of udder cleaning was higher than in other regions. The majority of those polled (83 percent) smoked milk handling equipment to improve the taste and flavor of milk and milk products, as well as to eradicate harmful bacteria and promote milk fermentation. To churn milk, 17 percent of respondents use a gourd while 43 percent use a clay pot. The primary limits discovered in the 69 percent, 3 percent, 7.5 percent, 2.5 percent, 8 percent, and 10 percent were shortage of feeds, scarcity of water, disease, lack of market and market information, poor infrastructure, absence of improved breed, and inadequate artificial insemination. Farmers' attitudes should be modified through training and other means, and powerful dairy cooperatives should be founded, mainly in rural regions, to improve milk and milk product handling procedures and reduce cultural barriers in milk marketing.

Keywords*:* Milk Production, Handling, Processing, Marketing

Received: 10 July, 2021; Accepted: 13 September, 2021; Published: December, 2021

1. INTRODUCTION

Ethiopia has one of the largest livestock populations in Africa with the estimated domestic animal population of 56.71 million cattle, 29.33 million sheep and 29.11 million goats (CSA, 2015). This has been contributing a considerable portion to the economy of the country, and it is still a promising potential for the economic development of the country (CSA, 2014). Livestock productions have diverse use and important contributions to livestock keepers and the nation. It also performs multiple functions in the Ethiopian household economy mainly in providing food andinput for crop production and inincreasing soil fertility, in being used for fuel and in creating job opportunities (Metaferia *et al*., 2011).

Ethiopia's increasing human population, urbanization trends and rising household income are leading to a substantial increase in the demand for livestock products, particularly milk and meat. In order to meet the growing demand for milk in Ethiopia, milk production has to grow at least at a rate of 4 percent per annum (Azage, 2003). Dairy sector is a major contributor to economic development especially among the developing countries. As an engine of growth, it provides increased income, employment, food and foreign exchange earnings as well as better nutrition in Ethiopia (Yilma *et al.*, 2011). According to CSA (2014) 2.9 billion liters of cow milk are estimated to be produced by sedentary populations annually. The average daily milk production is only 1.69 liters with average lactation length of about 180 days and mean annual milk yield per cow of 305 liters and the per capita/ milk consumption in the country is about 19.24 kg/year, which is much lower than African and world per capita average of 27 kg/year and 100 kg/year, respectively (MoA, 2012).

In Ethiopia, there is no standard hygienic condition followed by producers during milk production. Therefore, the hygienic conditions are different according to the production system. The common hygienic measures taken during milk production especially during milking are mostly not properly applied in smallholder cases. This is due to, the quality of the water used for cleaning purpose (washing the udder, milk equipment, hands)(Zelalem, 2011).

Milk is the most easily contaminated and perishable product of animal origin. This is mainly due to its high nutritional value creating an ideal medium for the growth of spoilage as well as pathogenic microorganisms. The handling and safety of milk and milk products is of great concern around the world. This is especially true in developing countries where production of milk and various dairy products takes place under rather unsanitary conditions and poor production practices (Zelalem, 2011). Poor handling of traditional milk and milk products during the processing activities account for a loss of about 40% in terms of quality and quantity (CSA, 2010).

As reported by Muriuki *et al*. (2008) the majority `of milk produced outside urban centers in Ethiopia are processed into milk products at household level using traditional technologies such as '*Ergo'* (Ethiopian naturally fermented milk), butter, ghee and

Ayib (Ethiopian cottage cheese) that are marketed through informal channel. In areas where the climate is hot and humid, the raw milk gets easily fermented and spoiled during storage unless it is refrigerated or preserved. However, such storage facilities are not readily available in rural areas and cooling systems are not feasible due to lack of the required dairy infrastructure and when available they are too costly for poor smallholder producers (O'Mahony *et al*., 2004).

In Ethiopia, milk and milk products are marketed through both informal and formal marketing systems. In the dominant informal marketing system, producers sell to consumers directly or to unlicensed traders or retailers. Price is usually set through negotiation between the producer (seller) and the buyer; this system is predominant in the rural dairy production system. In the formal marketing system there are cooperatives and private milk collecting and processing plants that receive milk from producers and channel to consumers, supermarkets and retailers; this system does exist in urban and per-urban dairy system of milk shed, although the number of cooperatives is few and its performance is low (Woldemichael, 2008).

Milk consumption pattern and marketing of dairy products fluctuate with the amount of milk produced per household, dairy production system, market access, and season of the year, fasting period, and culture of the society (Amistu *et al.,* 2015). Amistu *et al.* (2015), who reported major challenges of milk marketing, stated that price fluctuation during fasting months, distance to selling centers or market, milk quality, cultural beliefs affect the marketing of milk. Diversification of agro-ecological zone, availability of huge areas of communal grazing land, availability of indigenous fodder tree and huge number of local cows, regarded as an opportunity for milk production and marketing (Kedija *et al*., 2008)

South Nations, Nationalities and Peoples Region is the third largest potential region of the country in livestock production having 11.04 million cattle population next to Oromia and Amhara which owns about 22.50 million and 14.22 million cattle population respectively (CSA, 2014). With average productivity of 1.65 liter per day per cow, the total annul milk yield in SNNPRS is 667, 562 tons (CSA, 2010), from which 88.62% is consumed at home, 2.29% is sold, 0.36 is paid in kind for wage and 8.73% is processed into other dairy derivates (CSA, 2010).

According to SNNPRS's BoA (2014), the total number of dairy cows is 4, 943, 854, from which 933,225 tons of milk is produced per annum. However, the productivity of the livestock resources and the benefits obtained from the sector does not commensurate with the high livestock population in the region *(*Abebe *et al., 2014)*. The current study areas; Derashe, Alle and Konso Districts are well known in livestock population, having different agro-ecology for dairy production (SAPZANRD, 2017) whereas; milk production potential, milk and milk products handling, processing and marketing system were not yet well studied and the information of milk production, handling, processing and marketing practices is not documented well. As a result, determining the current state of milk production, as well as the handling, processing, and marketing of milk and milk products, is critical in

order to establish effective dairy development interventions that will boost milk production and usage in the studied region. The project's goals are to evaluate milk production techniques, milk and milk product handling, processing, and marketing practices, as well as to identify important milk production limitations and opportunities in the study districts.

2. MATERIALS AND METHODS

2.1 Description of the Study Area

The study was conducted in Derashe, Konso and Alle districts of Southern Nations and Nationalities and People's Region (SNNPR) from December 2019 to November 2021. Derashe District is located at 500 km from Addis Ababa, 318 km from regional capital, Hawassa. Derashe district consists of 16 *kebeles* (ANRO, 2016). The elevation of the district ranges from 1140 to 2614 m.a.s.l. The annual rain fall ranges from 600 to 1600 mm and the annual temperature ranges from 15.1 ^{0}C to 27.5 ^{0}C. The Agro-ecologies of the district is characterized as highland (2301-2622 m.a.s.l), mid altitude (1501-2300 m.a.s.l) and lowland (below1500 m.a.s.l) (DPDAO, 2015).

The common agricultural practice of the district is mixed crop- livestock production system. The major growing crops in the study area are maize, sorghum, teff and wheat. Livestock production systems are characterized by minimal management inputs in terms of production and breeding management, disease control and nutrition are mainly traditional and subsistence oriented. The livestock population in the district is estimated to be 134,056 cattle, 47,404 Sheep, 83,660 Goat, 3 Camel, 13740 Donkey, 297 Horse, 1024 Mule and 161, 544 Poultry are existing in the district (Derashe District Livestock and Fishery Development Office, 2016). The district has 142,758 total human populations, out of this 70,111 are males and 72,647 are females (CSA, 2007).

The second study district, Konso, is located 595 kilometers southwest of Addis Ababa in Ethiopia. The Konso district is divided into 39 kebeles. The elevation of the district ranges from 600 to 2100 meters above sea level (Konso district agricultural office 2008). The annual temperature ranges from 12 and 330 degrees Celsius. The annual rainfall varies between 400 and 1000 millimeters. The rain follows a bimodal pattern, with two rainy seasons: the "Belg" major rains, which begin in mid-February and extend until April, and the "Meher" tiny rains, which begin in October and November. The crop-livestock production system is integrated (Yohannes, 2015). The district's livestock population is expected to be 154,222 cows, 39,458 sheep, and 49,868 goats (Konso district agricultural office 2008). According to the CSA's 2007 Census, the district has a total population of 235,087 people, with 113,412 men and 121,675 women.

The third district of the study, Alle, is located at 640 km from Addis Ababa, 410 km from Hawassa. The district has three agro-ecological zones such as *Kolla*, *Woynadega* and *Dega* and consists of 17 *kebeles*. The annual temperature ranges from 19 ^{0}C to 28^{0}C and the annual rain fall ranges from 480 to 800 mm. The district has a total of 7690 ha of which 4640 ha used for crop-cultivation and the remaining 3050 hectors are covered with natural vegetation's. The production system of the area is mixed – crop livestock production system with crop cultivation as primary and livestock as secondary production (AWAO, 2004). The major crops grown in the area includes, *Dagussa*/Millet, maize, teff, and *mashilla*/sorghum and at high lands *enset* is recognized. The livestock population in the district is estimated to be 104,047 cattle, 39,270 Sheep, and52, 009 Goat. The district has 122,568 total human populations (AWAO, 2004).

2.2 Sampling Technique and Sample Size

The three districts (Derashe, Alle, and Konso) were chosen on the basis of dairy production and potential dairy development appropriateness. Two, three, and four kebeles, respectively, were purposefully chosen based on dairy production from the Alle, Konso, and Derashe districts which accounted a total of nine kebeles. Finally, using simple random sampling, homes with at least one local milking cow and/or cross-bred milking cow were chosen. There were 85, 68, and 51 HHs from the Derashe, Konso, and Alle districts, for a total of 204 HHs from the three districts. With a 3.5 percent standard error, the sample size of respondent homes was calculated using Arsham's (2005) calculation of N=0.25/SE2. The proportion of each kebeles' sample size to the total sample size was used to determine the sample size.

2.3. Methods of Data Collection

A cross-sectional survey was used from December 2019 to November 2021. During the research, both primary and secondary data were gathered. Primary data was gathered using a semi-structured questionnaire administered by skilled enumerators via face-to-face interviews, with an emphasis on herd composition and structure, as well as animal husbandry techniques. Milk and milk products marketing restraints and opportunities, milk yield/single cow, milking procedures, kind of milk products, milking material, traditional ways for raw milk preservation, processing methods, hygienic practice, milk and milk product tools. Secondary data was gathered from the respective agricultural and rural development offices in each town. The questionnaires were pre-tested to ensure that they were appropriate and accurate in generating all of the necessary data to achieve all of the stated goals. The survey was translated into the local dialect.

Focused group discussion

Focused group discussions were held with selected milk producers, model farmers, development agents and *kebele* administrative bodies in three districts with three focus groups (10 individuals were selected from each district) considering their age, sex, education and experience with milk production, milk and milk products processing and marketing. Focus group discussion was carried out by using checklists prepare for this purpose. During focus group discussion, issues such as dairy production system, milk and milk product handling practices, traditional milk processing practice, marketing of milk and milk products and constraints of milk marketing were discussed.

Farm observation

Farm observations was made to collect the data about the type of management systems used by the dairy producers (feeding systems, proper housing) and to describe some of the routine dairy activities (cleaning, milk handling and processing system) practiced by producers.

2.4. Method of Data Analysis

SPSS version 20 was used to code, input, and analyze the obtained data. The results of the survey were summarized using descriptive statistics such as percentage, mean, and frequency, and presented in tables and figures. The significance level for categorical data was set at P0.05, and statistical variations were assessed using chi-square; numerical data was treated to one-way analysis of variance (one-way ANOVA). The numerical values were also tested for significance using P 0.05.

3. RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of Respondents

About 85 % of the 204 houses surveyed were male headed households, while the remaining 15% were female headed. The majority of the household heads who were involved in milk production in the research area were males. The fact that there were fewer female-headed households in the current study could be due to their lower socioeconomic status and the nature of the industry, which requires a lot of energy for proper dairy cattle handling and management practices like feed collection, feeding, and dairy cattle purchasing and selling, which could be difficult for females.

The current study is substantially identical to Wondatir and Mekasha (2014) study in the highlands and central rift valleys of Ethiopiawhich had 86.7 and 13.3 percent male and female-headed households, respectively. The current figure, however, is

higher than that of (Bekele *et al*., 2015), who found 77.78 percent and 22.22 male and female households in Dangila district's urban and peri-urban areas. Moges *et al*. (2021) observed that 86.4 percent of the total interviewed dairy cattle producers in the urban dairy production system (N = 66) were male-headed households, whereas 13.6 percent were female-headed households.

Table 1 shows the respondents' household characteristics. The respondents' average age was 43.86 years. The respondents' age ranged from 23 to 80 years. About 43.3 percent of the 204 household heads interviewed were illiterate, 5.95 percent had a basic education, 20.6 percent had an elementary education, 12.7 percent had a secondary and preparatory education, 7.8% had a college education, and 9.8 percent had a higher education. The family head's educational level has a good impact on the introduction of new cattle fattening technology and the adaptation of modern fattening methods.

Table 1: Socio-economic Household Characteristics

Sex	**Derashe**		**Konso**		**Alle**		**Overall**	
	N = 85	**%**	**N = 68**	**%**	**N = 51**	**%**	**N = 204**	**%**
Male	73	85.88	51	75	50	98.03	174	85
Female	12	14.12	17	25	1	1.97	30	15
Total	85	100	68	100	51	100	204	100
Education level								
Illiterate	27	31.76	36	52.94	25	49.01	88	43.3
Basic Education	3	3.52	6	8.82	3	5.88	12	5.95
Elementary school	26	30.58	6	8.82	10	19.6	42	20.6
High school	11	12.94	7	10.29	8	15.68	26	12.7
College	5	5.88	8	11.76	3	9.8	16	7.8
Age of respondent	41.71	-	48.62	-	41.1	-	43.86	-
Higher Education	13	15.29	5	7.35	2	3.92	20	9.8
Total	85	100	68	100	51	100	204	100

3.2 Feed Resources of Dairy Cattle

According to dairy farmers, different feed sources are used to raise dairy cows in the study district (Table 2). These feed sources include: hay (5.3%), crop by-products (51%), natural pastures (35%), improved forages (6.2%) and by-products agriculture and industry (2.5%). Most of the household heads do not use supplementary feed such as Furshika for dairy cows but use locally available feed, which is consistent (Takele and Habtamu, 2009). This may be due to the lack of availability of agricultural by-products and the lack of awareness among producers. The majority of interviewees in the study area did not use improved forage; this is due to lack of awareness, poor extension services and lack of feed/seed inputs. Extension services are needed to increase the adoption of forage technology.

The lack of seed and sowing material in terms of quantity and quality has significantly limited the development of improved pasture and forage growth, especially around the study area. Feed scarcity can be viewed in terms of quality and quantity and seasonal feed supply to meet the nutritional needs of dairy animals. Animal feed and concentrates are either too expensive or inaccessible in sufficient quantity and quality to improve milk yield (Azage *et al*., 2013). Fayo, (2006) reports that food shortage is a major problem that has contributed to low livestock production and productivity in the southern Gamo region, Ethiopia. Likewise, Derese (2008) reports that food shortages are the most important constraint on milk production in the western Shoa area of the Oromia region. In the lowlands, scarcity of food and water during the dry season forces animals and herders to travel long distances in search of food (Azage *et al.,* 2013). Daniel (2000) points out that the conversion from natural grassland to cropland and the degradation and fragmentation of grasslands is a serious problem for livestock production in Bahir Dar, Ethiopia.

Table 2: Major feed resources

	Derashe		**Konso**		**Alle**		**Total**	
Feed resource	**N = 85**	**%**	**N = 68**	**%**	**N = 51**	**%**	**N = 204**	**%**
Hay	2	2	8	12	1	2	11	5.3
Crop residue	55	64.7	24	35	25	49	104	51
Grazing land	15	17.6	34	50	22	43	71	35
Improved forage	9	11	1	1.5	3	6	13	6.2
Agro-industry	4	4.7	1	1.5	0	0	5	2.5
Total	85	100	68	100	51	100	204	100

3.3 Water Source and Frequency of Watering

Table 3 shows the water sources and watering frequency in the research locations. Dairy farmers in the research locations have four distinct water sources for their dairy cows, according to the findings. Ponds, rivers, springs, and piped water are examples of these. River is used by 44 percent of the dairy farms in this survey, followed by piped water (30%), pond (20%), and spring (20%). (6). Water quality must be examined since poor water quality generally contributes to low dairy cattle output and health. It is clear from the data in Table 3 that the Derashe area is improving water availability and quality by ensuring that growers have access to more piped water.

Table 3: Water source for dairy cattle and watering frequency

	Derashe		Konso		Alle		Total	
Water source	**N = 85**	**%**	**N = 68**	**%**	**N = 51**	**%**	**N = 204**	**%**
Pond	5	6	17	25	19	37	41	20
River	33	39	28	41	29	57	90	44
Spring	9	11	3	4	0	0	12	6
Piped water	38	44	20	30	3	6	61	30
Total	85	100	68	100	51	100	204	100
Water frequency								
Once a day	18	21.2	41	60	7	14	66	32
Twice a day	58	68.2	6	9	25	49	89	44
Three times	7	8.2	2	3	1	2	10	5
Ad libitum	2	2.4	19	28	18	35	39	19
Total	85	100	68	100	51	100	204	100

3.4 Housing System

According to the current study (Table 4), the three types of dwellings used to keep fattening cattle were a separate room in the family house (14%), a separate house built just for the cattle (47%), and an enclosed barn with a simple shed (39 percent). According to Shitahun (2009), producers employed three types of buildings to store fattening cattle in Bure Woreda, Amhara National Regional State: a separate room in the family house, a separate house constructed for the cattle, and an enclosed barn with a modest shed, in that sequence. The aforementioned findings support Yisehak *et al*. (2013) conclusions that animal homes are too rudimentary and animals are maintained in poor conditions.

Table 4: Housing system

Housing system	**Derashe**		**Konso**		**Alle**		**Total**	
	N = 85	**%**	**N = 68**	**%**	**N = 51**	**%**	**N = 204**	**%**
Separate room	10	12	15	22	5	10	30	14
Separate house	44	52	24	35	27	53	95	47
Enclosed barn	31	36	29	43	19	37	79	39
Total	85	100	68	100	51	100	204	100

3.5 Milking hygienic practice

The results of the poll revealed that 24.5 percent of respondents washed the udder before and after milking, and 11.5 percent washed the udder before milking (Table 5). No washing of the cow's udder and hand washing before and after milking were

reported by 41% and 23% of the respondents, respectively. Cows' udders must be cleaned before milking since they may come into contact with the ground, urine, feces, and feed refusals while resting. In the Derashe district, almost 36.5 percent of respondents washed their udders before and after milking, indicating that the importance of udder cleaning was higher than in other regions. Failure to cleanse the udder before milking can result in pollutants entering the milk. Milk hygiene was statistically significant ($P<0.05$) in all study districts. Gezu and Haftu (2015) disagreed with the current finding, reporting that all respondents (100%) cleanse their udders before milking in Hadya Zone, Southern Ethiopia. The current finding contradicts with Abebe *et al*. (2013), who claimed that 100% of respondents in the Ezha district Gurage Zone do not wash the udder before milking. About 82 percent, 93 percent, and 84 percent of respondents cleaned milk storage equipment before and after milking in Derashe, Konso, and Alle, respectively,. The majority of respondents in the research area cleaned the milk storage equipment before and after milking, however a soiled milking area and the failure to use a separate towel for each cow can result in significant pathogenic microorganism contamination of the milk. According to the Food Hygiene Regulations (2006), the milking area must be free of contamination from any source, such as dust, flies, birds, or other animals. However, in the current study, milking was frequently done in an unsanitary manner, and most households did not have a distinct milking area. This could make milk more bacterially contaminated from the milking environment. According to Almaz *et al*. (2001)the use of correct milking processes and the cleanliness of milking instruments most significantly influences the quality of dairy products.

Table 5: Milking hygienic practice

Parameters	**Derashe**		**Konso**		**Alle**		**Overall**		**P-value**
	N=85	**%**	**N=68**	**%**	**N=51**	**%**	**N**	**%**	
Washing udder before and after milking	31	36.5	8	12	11	21	50	24.5	
Washing udder before milking	14	16.5	7	10	2	4	23	11.5	
No washing at all	16	19	35	51.5	33	65	84	41	0.000
Hand washing before and after milking	24	28	18	26.5	5	10	47	23	
Total	85	100	68	100	51	100	204	100	
Clean the milk storage equipment	70	82	63	93	43	84	176	86	

3.6 Smoking practice of milking and handling equipment

Smoking practices and smoking purposes in the study areas are presented in Table 6. Most of the respondents (83%) milk handling equipment was smoked. The purpose of smoking is to improve the taste and aroma of milk and dairy products, kill bad microorganisms and improve the fermentation of milk. 17% of respondents did not smoke milk handling equipment in the study area. Derashe and Konso use Tobacco to kill bad microorganisms more than the Alles due to their better awareness of proper handling of dairy products. Consistent with this, Abebe *et al*. (2013) reported that the purpose of smoking was to improve the taste and aroma of dairy products, reduce bad microorganisms and increase shelf life of products in the Ezha district of Gurage. Fikireneh e*t al*. (2012) also reported that 93.3% of respondents used smoking herbs for better taste and aroma of milk and dairy products in Ethiopia's Rift Valley. The smoking plants like Woira (*Olea africana*), woybeta, Cheba (*Acacia nilotica*), Kega (*Rosa abissinica*) are the most commonly used smoking plants in the study area. In agreement with this finding, respondents in Kenya, Bahir Dar Zuria and Mecha districts, Wolaita area and West Gojjam area used the same crop as reported by Wayua *et al*. (2012), Eyasu and Asaminew (2014), Tsegaye and Gebreegziabhar (2015) and Melku (2016), respectively. As shown in Table 6, the majority of respondents (14%, 3% and 16% of respondents in Derashe, Konso and Alle) washed the milk cartons with water without using fumigation techniques. However, 71%, 93% and 76% of interviewees in Derashe, Konso and Alle used both rinsing and suction techniques to clean milk containers. Tobacco smoking has antibacterial activity, thereby inhibiting microbial growth in milk (Teshome *et al*., 2014).

Table 6: Smoking practice of milking handling equipment's

	Derashe		**Konso**		**Alle**		**Overall**	
Parameters	**N=85**	**%**	**N=68**	**%**	**N=51**	**%**	**N=204**	**%**
Smoking equipment								
Yes	62	73	62	91	45	88	169	83
No	23	27	6	9	6	12	35	17
Total	85	100	68	100	51	100	204	100
Method of cleaning								
Washing	12	14	2	3	8	16	22	11
Smoking	13	15	3	4	4	8	20	10
Both	60	71	63	93	39	76	162	79
Total	**85**	**100**	**68**	**100**	**51**	**100**	**204**	**100**

3.7 Milk storage and processing materials

Table 7 shows the various containers used for milk storage and processing. Traditional milk storage and processing materials were used. Natural fermented/sour milk is used for storage and processing. Traditional materials such as plastic containers (20%),

gourds (70%), clay pots (4%), and stainless steel (6%) are used to turn the sour milk into butter. Sintayehu and Birhanu (1991) and Alganesh (2002), who found that 96.5 percent and 91 percent of dairy producers in Southern and Western Ethiopia, respectively, employed clay pot and gourd for churning, disagreed with the current finding. Traditional milk processing materials and procedures employed in the study, according to respondents, are time consuming, difficult, and poor at extracting fat. As a result, reducing the stress on women in the conventional process of processing milk into butter requires the adoption of enhanced and low-cost technology that saves time and adds to optimal fat recovery.

It's possible that the disparity in equipment utilization in the study area is related to a lack of materials. The majority of responders (70%) said they utilized gourd for milk storage and processing. Gourd was generally used in low-altitude settings because the plant is primarily grown in this area. According to Sale *et al*. (2018), the majority of respondents (96.3 percent), (84.2 percent), and (95.7 percent) in the mid altitude, high altitude, and Motta town, respectively, utilized clay pot. Melku (2016) found that in rural portions of West Gojjam Zone, 73 percent and 27 percent of respondents utilized gourd and clay pots, respectively. The gap could be attributed to people's cultural patterns and equipment availability.

Table 7: Traditionl milk storage and processing materials

	Derashe		**Konso**		**Alle**		**Overall**		**P-value**
Material	**N = 85**	**%**	**N = 68**	**%**	**N = 51**	**%**	**N = 204**	**%**	
Clay pot	8	9	1	1	0	0	9	4	
Gourd	37	44	59	87	46	90	142	70	0.000
Plastic container	30	35	6	9	5	10	41	20	
Stainless steel	10	12	2	3	0	0	12	6	
Total	**85**	**100**	**68**	**10**	**51**	**10**	**204**	**100**	

3.8 Traditional butter (*Kibe*) making equipment

In the study area, 43 percent, 17 percent, and 40 percent of respondents utilized clay pots, bottle gourds, and plastic containers to manufacture traditional butter, respectively (Table 8). The equipment used for milking, processing, and storage determines the quality of milk and milk products because they allow germs to proliferate on milk contact surfaces during the time and between milkings. Traditional containers may be a source of bacterial contamination in milk. As a result, dairy farmers must pay particular attention to the quality and cleanliness of their milking equipment. They should use aluminum and stainless steel because they are easy to clean and theyare the most widely used materials for milking equipment.

None of the respondents used modern appetizers to make butter in the study area. According to respondents, ergo is often semi-solid and is made from whole milk on small dairy farms. Milk is usually stored in clay pots or pumpkins for 1 to 4 days to generate acid. Fermented milk, along with other fermented dairy products, was the main ingredient in the production of traditional butter, ghee, cottage cheese, buttermilk, and whey. The majority of respondents use clay pots to make traditional butter, but some farmers use gourd containers instead. 17% and 43% of the surveyed people use pumpkins or clay pots to stir the milk. According to respondents, the amount of fermented milk that is milked at any given time depends on the number of cows, the amount of milk produced, and the amount consumed by the family. No additives are used to preserve the raw milk produced in the study area. Instead, milk can ferment naturally.

Table 8: Traditional butter making equipment

Butter making equipment	**Derashe**		**Konso**		**Alle**		**Overall**		**P-value**
	N = 85	**%**	**N = 68**	**%**	**N = 51**	**%**	**N = 204**	**%**	
Clay pot	42	49	25	37	21	41	88	43	
Bottle gourd	4	5	21	31	10	20	35	17	0.004
Plastic container	39	46	22	32	20	39	81	40	
Total	**85**	**100**	**68**	**100**	**51**	**100**	**204**	**100**	

3.9. The major traditionally fermented milk products

The main products of traditional milk processing were fermented milk (Ergo), 42% ghee (Neterkebe), 12% sour skimmed milk (Arerra) and 3% cheese (Ayib) (Table 9). Therefore, naturally fermented milk is the main ingredient used in the production of a wide variety of traditional Ethiopian dairy products. Fermented dairy products are traditionally made in Ethiopia by naturally fermenting fresh milk in traditional unsmoked milk containers for at least two days. The majority (57%) of respondents in the Derashe area produce fermented milk (ergo) compared to other study areas, which is statistically ($P<0.05$) very important. Ergo is Ethiopia's most popular dairy product and is usually made by naturally fermenting milk at room temperature for at least 2 days without the addition of starter culture. However, depending on general environmental conditions, temperature and incubation time will vary from location to location. Ethiopian milk is of poor quality and does not meet international standards. These are due to the very perishable properties of milk, in addition to poor pre-milking and post-harvest handling techniques (Tsadkan and Gurja, 2018).

Ethiopian traditional butter (*Kibe*) is made from yoghurt (traditional Ergo) (Abebe *et al*., 2014). The most frequent milk products produced and consumed by different parts of the country were fresh milk, Ergo, whey, Ethiopian cottage cheese (Ayib), and traditional butter (Abebe *et al*., 2014).

Table 9: The major traditionally fermented milk products

Fermented milk products	**Derashe**		**Konso**		**Alle**		**Overall**		**P-value**
	N = 85	**%**	**N = 68**	**%**	**N = 51**	**%**	**N = 204**	**%**	
Fermented milk (Ergo)	48	57	8	12	6	12	62	30	
Butter (Kibe)	14	16	39	57.4	32	63	85	42	
Ghee (Neterkibe)	8	9	13	19.1	5	10	26	13	<0.001
Sour defatted milk (Arrera)	9	11	7	10	8	15	24	12	
Cheese (Ayib)	6	7	1	1.5	0	0	7	3	
Total	**85**	**100**	**68**	**100**	**51**	**100**	**204**	**100**	

3.10 Length of milk fermentation time

As shown in Table 10, 50.5%, 25% and 24.5% of respondents said that milk was left to sour for 3 days, 45 days and for one week respectively in the study area (Table 10). Belay and Janssens (2014) reported that the majority of respondents (86%) reported that milk left to sour for 3 days and 62% of household processes consumed an average of five liters of milk at a time, with variable frequency. Weekly (64%). The majority of respondents (69%) let milk ferment for 3 days in Alle district, which is better than other districts. The efficiency of the stirring process is determined by the amount of milkfat recovered as butter and the granulation time of the butter. Temperature, milk fat, milk acidity, and volume of milk in the clay pot all affect the effect. Differences in fermentation times may be due to regional differences in temperature, as well as their preferred mode of consumption. According to Belete et al. (2010), the traditional Ethiopian method is to preserve milk for two to three days until yogurt is made. According to Table 11, 7%, 18%, 53%, 16%, 13% of the respondents gave milk more often in the fasting period, the rainy season, the dry season and no specific time respectively. During the fast, when Orthodox Christians abstain from any animal products, a minority of respondents (7%) processed milk on the fasting day, extending the shelf life of milk by converting it into dairy products. The majority of respondents (53%) process milk more often during the rainy season, because during the rainy season (March to August), excess milk is often available and manufacturers process it into dairy products. such as fermented milk (Ergo), ghee (Neterkebe), reduced-fat yogurt (Arerra) and cheese (Ayib). The majority of respondents (53%) process milk

more often during the summer (rainy season). This is because there is a lot of grass available for animals to eat during this time of year.

Table 10: Length of milk fermentation time

Length of milk fermentation time	**Derashe**		**Konso**		**Alle**		**Overall**	
	N = 85	**%**	**N = 68**	**%**	**N = 51**	**%**	**N = 204**	**%**
For 3 days	35	41	33	49	35	69	103	50.5
For 4-5 days	15	18	24	35	12	24	51	25
For a week	35	41	11	16	4	7	50	24.5
Total	85	100	68	100	51	100	204	100
When do you process milk more frequently								
Fasting period	14	16	7	10	15	29	36	18
Wet season	46	54	33	49	30	59	109	53
Dry season	9	11	17	25	6	12	32	16
No specific time	16	19	11	16	0	0	27	13
Total	85	100	68	100	51	100	204	100

3.11 Purpose of butter making

The quantity of milk needed to stir was 35 liters, 67 liters, 710 liters and more than 10 liters respectively for 61%, 13%, 17% and 9% in the study area (Table 10). The amount of milk required for milk stirring in the whole district of Alle was 810 liters, which was higher than in other study areas, which may be due to the relatively high amount of milk produced per day and per household. The present conclusion is almost similar to Eyasu and Asaminew (2014), who reported that 7.5 ± 1.8 liters was required for stirring in both Bahirdar Zuria and Mecha districts. However, Bekele *et al.* (2015) in Dangila district reported that 25.14 liters of milk were required to stir at a time in Dangla district. The normal stirring process takes a long time, sometimes more than two hours. The goal of making butter from yogurt is to extract as much fat as possible from the milk. Buttermilk, the liquid left over after making butter, is used to make a cheese. Accordingly, the stirring time and, more importantly, the amount of fat remaining in the buttermilk or the amount of fat extracted from the milk can be used to determine the efficiency of the butter making process. About 47%, 19% and 11% of the respondents made butter for consumption, for the market and for making ointment, respectively. 52% of respondents made avocados for consumption in Derashe county, which is higher than in other study areas. About 23% of respondents do not want to make butter, only eat raw milk. Bacteria such as Salmonella and E. coli can be found in raw milk. E. coli and other bacteria that cause foodborne illness, also known as “food poisoning,” can harm the health of anyone who consumes raw milk or raw milk products.

Table 11: Purpose of butter making

Amount of milk required for churning	**Derashe**		**Konso**		**Alle**		**Overall**	
	N=85	**%**	**N=68**	**%**	**N=51**	**%**	**N**	**%**
3-5 liters	51	60	43	63	31	61	125	61
6-7 liters	15	18	7	10	5	10	27	13
8-10 liters	8	9	12	18	15	29	35	17
More than 10 liters	11	13	6	9	0	0	17	9
Total	85	100	68	100	51	100	204	100
Purpose of butter making								
Consumption	44	52	27	40	25	49	96	47
For market	16	19	11	16	11	22	38	19
Ointment	10	12	9	13	3	6	22	11
Used raw milk only	15	17	21	31	12	23	48	23
Total	85	100	47	100	39	100	156	100

3.12 Reasons for processing milk

Reasons for milk processing in the study area are presented in Table 12. The majority of respondents processed milk to preserve products (27%), generate income (29%), diversify products (35) %), customer satisfaction (2%) and product hygiene (7%). The results are almost similar to Ayantu (2006) who reported that milk is processed to increase family income, diversify consumer products and increase shelf life of products in the primary sector. Delbo's source from the Wolayta area. Befekadu *et al*. (2019) wrote that the majority of respondents (72.73%) process milk to diversify products, preserve products and generate income. In Ethiopia, milk and dairy products are mainly used for home consumption because of their high nutritional value. In addition, it is a source of cash income to purchase agricultural inputs such as animal feed, fertilizers and improved crop varieties as well as food and non-food items such as educational materials for children. their own (Melese and Tesfaye, 2015).

Table 12: Reasons for processing milk

Reason for processing milk	**Derashe**		**Konso**		**Alle**		**Overall**	
	N=85	**%**	**N=68**	**%**	**N=51**	**%**	**N**	**%**
For preservation of products	23	27	21	31	12	24	56	27
For income generation	28	33	17	25	15	29	60	29
For diversify products	27	31	20	29.5	24	47	71	35
Customer satisfy	3	4	1	1.5	0	0	4	2
To keep the product hygienic	4	5	9	13	0	0	13	7
Total	**85**	**100**	**68**	**100**	**51**	**100**	**204**	**100**

3.13 Dairy products marketing

As shown in Table 12, whole milk (35%), fermented milk (Ergo), 57% butter (Kibe), 5% dairy (Arerra) are milk and dairy products marketed. In the study area, milk and dairy products are sold almost exclusively through an informal marketing system. The marketing of milk is very loosely structured and only a few merchants use a formal marketing strategy for butter and milk. The present results are in contrast to those of Abebe *et al*. (2013) and Amistu *et al*. (2016), who stated that in the Ezha and Alle districts of the Guragie region and the Segen region, 100% of respondents do not sell milk. However, dairy marketing practices were more important in this study than Menal and Yilkal (2015), with 30.83% in Chencha district and 12.78% in Kutcha district. In addition, the results are lower than those reported by Zewdie (2010), Hanfer *et al*. (2016) and Melku (2016), who found that 90%, 50%, and 48.3% of respondents in Sebeta town, Asayita district and western Gojjam area, respectively, were assigned to follow up fresh milk market. Very few respondents (13%) have commercially available sour skimmed milk (Arrera) in Derashe district but none of the respondents have commercially available avocado milk (Arrera) in Konso and Alle districts. Compared with Konso and Alle counties, the majority of respondents (57%) in Derashe use fermented milk (Ergo). This could be the presence of a dairy marketing location nearby. Around Holetta, about 83% of farmers are selling butter for processing milk into butter, and Ayib has a financial advantage of about 40% over selling whole milk at the time of reporting. However, processing may not have a financial advantage over selling whole milk, given the very high cost of feed and other inputs for dairy production, as well as rising milk prices. According to Zelalem (1999), between 57% and 40% of smallholder farmers in Holetta and Selale do not sell raw milk but process it into butter. According to Rahel (2008), the sale of liquid milk is virtually non-existent due to consumer preferences for processed dairy products such as butter and cheese, as well as cultural factors and lack of fruit demand. against the current results. The present finding disagrees with Lemma (2004) reporting that 96.7 percent of respondents in Adami Tulu and Arsi Negelle counties, and 93.3 percent in Lume counties, do not sell raw milk. Next to whole milk, butter was the most important item on the market to research, with around 57% of respondents saying they sell this type of butter. This can be attributed to the increase in milk production as well as the approval of most of the customers about the taste of the butter. Disagree with Zewudie (2010) and Abebe *et al*. (2013), the marketing of raw milk is not widespread in and around Zeway town, Oromia region and Ezha district due to cultural constraints, milk scarcity and lack of market.

Table 12: Milk and milk products marketing

Dairy product marketing	**Derashe**		**Konso**		**Alle**		**Overall**	
	N = 85	**%**	**N=68**	**%**	**N=51**	**%**	**N**	**%**
Whole Milk	39	46	23	34	9	18	71	35
Fermented Milk (*Ergo*)	5	6	1	1	42	82	6	3
Butter (*Kibe*)	30	35	44	65	0	0	116	57
Butter Milk (*Arrera*)	11	13	0	0	0	0	11	5
Total	85	100	68	100	51	100	204	100

3.14 Mode of Milk Delivery and Means of Transportation

Because there is no centralized milk collection, milk produced on farms is either sold at the farm gate or delivered to individual milk contractors (Table 12). The majority of the milk (54%) is provided by family members or hired workers, while 34% is collected at the farm gate, and the other 12% is brought by either consumer collect at the farm gate or by family (12 %). The distance between milk producers and marketing outlets, such as small stores and hotels/cafeterias, determines the mode of milk transportation. Producers who are close to marketing places take public transportation, whereas those who are further away walk with their milk.

Table 3: The mode of milk delivery in the study areas

Mode of milk delivery	**Derashe**		**Konso**		**Alle**		**Overall**	
	N = 85	**%**	**N = 68**	**%**	**N = 51**	**%**	**N**	**%**
Family or hired labor	32	38	45	66	34	67	111	54
Collected by consumer	43	51	16	24	10	20	69	34
Both	10	11	7	10	7	13	24	12
Total	85	100	68	100	51	100	204	100
Means of transportation								
On foot	84	99	67	99	49	96	200	98
Public transport	1	1	1	1	2	4	4	2
Total	85	100	68	100	51	100	204	100
Milk marketing place								
Local market	42	49.4	46	68	35	69	123	60
Neighbor/ consumers/home	40	47	20	29	15	29	75	37
Cafeteria/hotel	2	2.4	0	0	0	0	2	1
Shop	1	1.2	2	3	1	2	4	2
Total	85	100	68	100	51	100	204	100

3.15 The Major Constraints of Milk Production

Lack of food, lack of water, disease, lack of information on markets, inadequate infrastructure, lack of improved varieties and inadequate artificial insemination were the main constraints for 69%, 3%, 7.5%, 2.5%, 8% and 10% (Figure 1). The present conclusion is in agreement with the results of Tsegaye et al. (2015) who reported feed, animal health, water and labor shortage problems as major challenges affecting dairy cow production and productivity in several districts of the Sidama region, southern Ethiopia.

The first important factor causing low performance and low milk production in dairy cows was identified as nutritional deficiency in the study area. This is consistent with the findings of Bekele et al. (2015) and Gezu and Haftu (2015) who identified feed scarcity as the most important constraint contributing to low production and performance of dairy cows in different parts of the

Ethiopia. This may involve the conversion of cropland to arable areas, with less use of crop by-products and treatment practices. The present conclusions indicate that the second and third major constraints to milk production in the study area are poor infrastructure, lack of improved varieties, and inadequate artificial insemination. The present finding is consistent with Teshome and Tesfaye (2017), who found that the most important dairy production constraints identified by the sampled farmers were food shortages, land scarcity and Disease. According to the same author, the other most important limitations of the marketing system are the accessibility of marketing sites, limited market knowledge, lack of improved varieties, insufficient artificial insemination. (AI) and lack of infrastructure. These constraints interact to affect the genetic potential of the animal, resulting in milk production at subsistence levels.

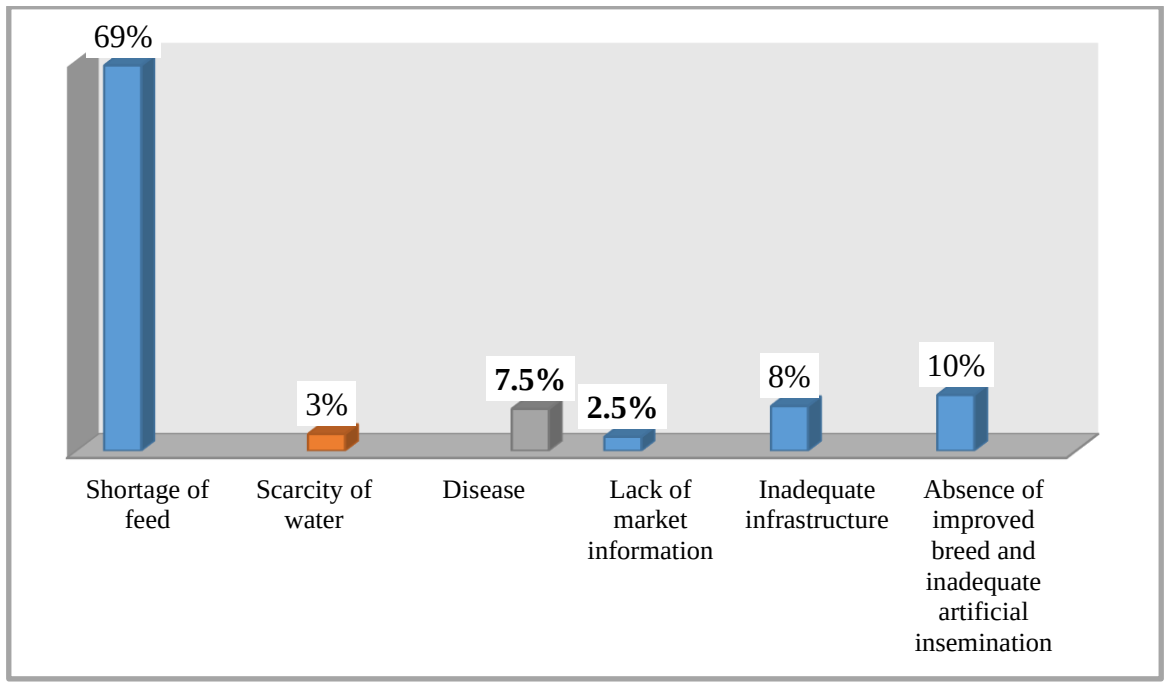

Figure 1: The major constraints of milk production in the study area

A dairy marketing difficulty (Figure 2) was shown to be milk shortage (47 percent), lack of markets or purchasing centers (27 percent), milk quality (3 percent), low prices (2 percent), a lack of demand (1 percent), and restricted culture (20 percent). In the research area, milk scarcity is the biggest impediment to marketing challenges. Fasting is the most common cause of insufficient milk consumption. People who practice Orthodox Christianity avoid dairy products, particularly during the Easter fast (55 days). Orthodox Christians abstain from dairy products for about 200 days a year (Ahmed Mohamed et al., 2004). Only 20% of the people polled thought that a taboo culture was a barrier to milk marketing. This study contrasts a survey conducted by Tegegne in the Showa region of eastern Oromia, which revealed that low milk production and cultural constraints are the most common impediments identified by farmers (Tegegne *et al*., 2013).

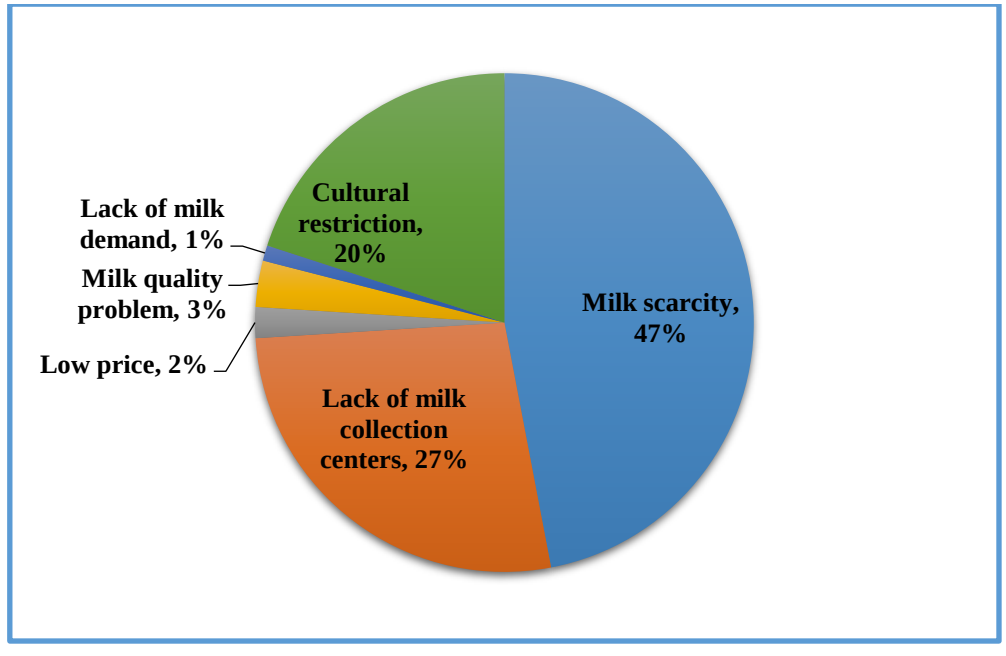

Figure 2: Milk marketing constraints

3.16 The Major Opportunities of Milk Production

Availability of large communal pasture areas (20%), large numbers of local cows (25%), increased demand for milk (33%), population growth (12%), urban proportions high marketing (4%) and income (6%) turned out to be the main dairy production opportunities in the study area (Figure 3). According to Solomon (2014), dairy production provides dairy farmers with income generation opportunities due to rapid urbanization, significant population growth and changing living standards of the inhabitants of Mekelle, because as this is a product in great demand, it is appropriate for the research being conducted. Asrat *et al*. (2016) notes what is consistent with current findings. Per the authors, allowing smallholder farmers to use their land, labor and food resources while generating constant income. Azage *et al*. (2006) conclude that urban and peri-urban dairy systems can contribute to overall development by providing income and employment opportunities. Azege *et al*. (2013) also mentioned the diverse and large genetic resources of dairy animals adapted to many types of agriculture, the establishment of different structures and service centers such as veterinary and fertilization centers. artificial intelligence (AI), high demand for dairy products. products and a large population.

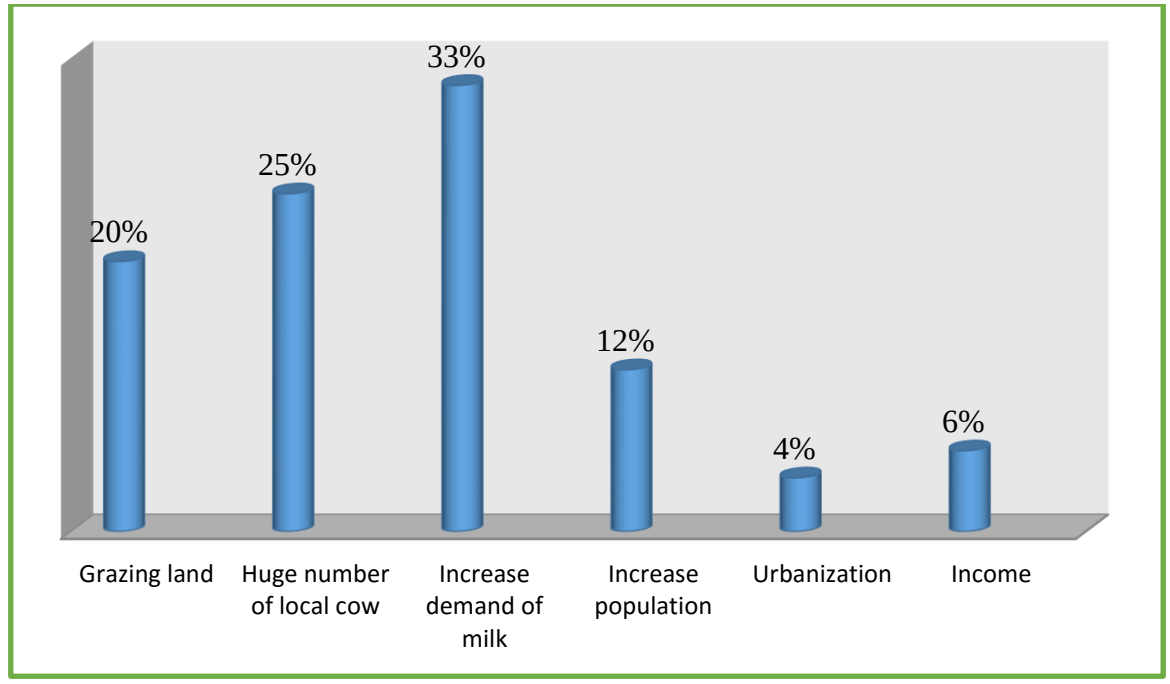

Figure 3: Major opportunities of milk production

4. CONCLUSIONS

The majority of household heads engaged in dairy production in the study area are men compared to women. The lower number of female-headed households in the present study may be due to the nature of the industry, which requires more energy to handle and practice proper dairy management. The average level of education of dairy farming households is mainly illiterate. Households with low educational attainment may be slow in adopting technology. In this study, milking was often done in poor sanitary conditions and most households did not have their own milking place. This can increase bacteria in milk contaminated from the milking environment. The use of tobacco smoke to kill bad microorganisms was higher in Derashe and Konso than in Alle county due to the respondent's raising awareness about the proper handling of dairy products. The majority of respondents use clay potting for traditional butter making, although some farmers use potting soil instead. 17% and 43% of respondents used gourds and clay pots to stir milk, respectively.

The quality of milk and dairy products is determined by the equipment used for milking, processing and storage. Traditional containers can be a source of microbial contamination for milk because they allow germs to multiply on milk contact surfaces between milking sessions. Lack of food, lack of water, disease, lack of information on markets and markets, inadequate infrastructure, lack of improved varieties and inadequate artificial insemination were the main constraints for 69%, 3%, 7.5%, 2.5%, 8% and 10%. . The first important factor causing low performance and low milk production in dairy cows was identified as nutritional deficiency in the study area. Milk scarcity (47%), lack of markets or purchasing centers (27%), milk quality (3%), cheap prices (2%), lack of demand (1%) and limited culture (20 %) turned out to be a dairy marketing problem.

5. RECOMMENDATION

To boost milk processing and marketing for sustainable dairy production, improved and appropriate milk processing technology, as well as a structured marketing framework, are required. Farmers' attitudes should be changed through education and other means, and strong dairy cooperatives should be established, primarily in rural areas, to improve milk and milk product handling procedures and reduce cultural barriers in milk marketing. Farmers must be aware of the importance of proper udder preparation, a sanitary milking environment, and the use of appropriate milking equipment in order to produce and sell wholesome milk to the market. Because milk handling methods and hygienic conditions were lacking, particularly in rural areas, training in hygienic milk quality will be provided, and stainless-steel milking and milk storage tools will be made available at a reasonable cost to all milk producers. Because feed is in short supply, both in terms of quality and quantity, extensive extension work on concentrate feed use, grazing area management, and improved forage production is required.

REFERENCES

Abebe B, Mitiku E, Zelalem Y (2014). Microbial properties of Ethiopian dairy products: A review. *African Journal of Microbiology Research*, 8(23): 2264-2271.

Abebe B Zelalem Y, Ajebu N (2013). Handling, processing and utilization of milk and milk products in Ezha district of Guragie Zone, Southern Ethiopia. *Journal of Agricultural Biotechnology and Sustainable Development*, 5(6):91-98

Abebe B, Zelalem Y, Ajebu N (2014). Dairy Production System and Constraints in Ezha Districts of the Gurage Zone, Southern Ethiopia. *Global Veterinaria*,12 (2): 181-186.

Ahmed Muhamed M, Ehui S K, Yemisrach Assefa (2004). Dairy development in Ethiopia. Socio-economic and Policy Research Working Paper-58. ILRINairobi, Kenya. pp 47.

Alganesh T (2002). Traditional milk and milk products handling practices and raw milk quality in eastern Wollega. MSc thesis, Alemaya University, Ethiopia.

Almaz G, Howard AF, Wilhelm HH (2001). Field survey and literature review on traditional fermented milk products of Ethiopia. *International Journal of Food Microbiology*, 68:173-186.

Amistu K, Sanago S, Dawit C (2016). Assessment of traditional dairy production, milk marketing and processing system: In the case of Alle district, Segen Peoples Zone, Southern Ethiopia. *Journal of marketing and consumer research*, 24.

Amistu K, Melese A, Degefa T (2015). Evaluation of Hygienic Status and Marketing System of Raw Milk in Different Points of Oromia Special Zone, Oromia, Ethiopia.

Asrat A, Feleke A, Ermias B (2016). Characterization of Dairy Cattle Production Systems in and around Wolaita Sodo Town, Southern Ethiopia. *Scholarly Journal of Agricultural Science*, 6(3): 62-70.

Ayantu M (2006). Women's role on production, processing and marketing of milk and milk products in Delbo watershed of Wolayta. M. Sc. Thesis, Hawassa University, Ethiopia.

Azage Tegegne, Berhanu Gebremedhin, Dirk Hoekstra, Berhanu Belay, 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.

Azage Tegegne, Million Tadesse, Alemu Yami, Yoseph Mekasha, 2006. Market-oriented urban and peri-urban dairy systems. *Urban AgricultureMagazine*, 2: 23-24.

Azage T (2003). Financing Market-oriented Dairy Development: The case of Ada'a Liben District Dairy Association, Ethiopia. Urban Agricultural Magazine No. 9. Koninklijke, Netherlands.45pp.

Bekele A, Fekadu B, Mitiku E (2015). Handling, processing and marketing of cow milk in urban and peri urban area of Dangila Town, Western Amhara Region, Ethiopia. *Global Journal of Food Science and Technology*, 3(3):159-174.

Belay Duguma, G.P.J. Janssens (2014). Smallholder Milk Processing and Marketing Characteristics at Urban Dairy Farms in Jimma Town of Oromia Regional State, Ethiopia.

Belete A T, Azage, Fekadu B, Berhanu G (2010). Cattle milk and meat production and marketing systems and opportunities for market-orientation in Fogeraworeda, Amhara region, Ethiopia. ILRI [International Livestock Research Institute]. Nairobi, Kenya.

Central Statistical Agency (2010). Agricultural Sample Survey 2009/10. Livestock, Poultry and Beehives population. Federal Democratic Republic of Ethiopia. Addis Ababa, Ethiopia.

Central Statistical Agency (2014). Agricultural Sample Survey 2013/14. Volume 2, Report on Livestock and Livestock Characteristics. Addis Ababa, Ethiopia.

Central Statistical Agency (2015). Agricultural Sample Survey 2014/15 Volume II Report on Livestock and Livestock Characteristics (Private Peasant Holdings).

Central Statistics Agency (2007). Welfare Monitoring Survey. Analytical Report.

Daniel, 2000. Role crop residues on livestock feed Ethiopia high lands. In B: HDowela (eds.) African plant genetic resource, evaluation and forage germ plasm and extensive livestock production system proceeding of the third PANESA workshop held in Arusha, Tanzania, 27-30 April 1999 pp: 430-439.

DDLF (2016). Derashe District Livestock and Fishery Development Office annual report. Gidole, Ethiopia.

DDAO (2015). Derashe Peoples Development Association Office. Annual report. Gidole, Ethiopia.

Derese T (2008). Present situation of urban and peri urban milk production and quality of raw milk produced in west Shoa zone, Oromia Region Ethiopia. M.Sc. Thesis Haramaya University Ethiopia.

Eyasu S, Asaminew T (2014). Small-scale milk processing, utilization and marketing of traditional dairy products in Bahir Dar Zuria and Mecha districts, Northwestern Ethiopia. *Journal of Food Technology Research*, 1(2):122-132.

Fayo D, 2006. Assessment of Milk Production Marketing, Feeds and Feeding System of Dairy Cows in and Around Dire Dawa Town. M.Sc. Thesis presented to the School of Graduate Studies of Alemaya University, Ethiopia.

Food Hygiene Regulations (2006). A practical guide for milk producers to the food hygiene regulations, England. 6 p.

Gezu Tadesse, Haftu Kebede (2015) Production, processing and constraints of cow milk in and around Hosanna Town, Hadya Zone, Southern Ethiopia. *Global Journal of Dairy Farming and Milk Production*, 3: 92-98.

Hanfer M, Nigussie A, Patrick E (2016). Cattle and camel milk production and marketing: The case study in Asayita district, Afar Regional State, Ethiopia. *Journal of Marketing and Consumer Research*, 22.

Kedija H, Azage T, Mohammed Y, Berhanu G (2008). Traditional Cow and Camel Milk Production and Marketing in Agropastoral and Mixed Crop–livestock Systems: The Case of Mieso District, Oromia Regional State, Ethiopia.

Lema F (2004). Assessment of butter quality and butter making efficiency of new charns compared to smallholders'butter making techniques in east showa zone of Oromia, Ethiopia, Msc, thesis. Alemaya Univestity of Agriculture Dire Dewa, Ethiopia.

Melese A, Tesfaye W (2015). Bacteriological Quality and Safety of Raw Cow's Milk in and around Jigjiga City of Somali Region, Eastern Ethiopia.*International Journal of Research Studies in Biosciences*, 3(5):48-55.

Melku M (2016). Milk production and reproductive performance of local and cross breed cows in selected districts of West Gojjam Zone, Amhara National Regional State Ethiopia. An MSc Thesis presented to the school of graduate studies of Bahir Dar University.

Menale G, Yilkal T (2015). Dairy production, Processing and Marketing in Chencha and Kutcha districts, Southern Ethiopia. *Journal of Marketing and Consumer Research*, 9.

Metaferia F, Cherenet T, Gelan A, Abnet F, Tesfay A, Ali JA, Gulilat W (2011). Review to Improve Estimation of Livestock Contribution to the National GDP. Ministry of Finance and Economic Development and Ministry of Agriculture. Addia Ababa, Ethiopia.

Miles Theresa (2000): Agribusiness Sub Sector Assessments in a guide to Developing Agricultural Markets and Agro-enterprises. Daniel Giovannucci (eds). World Bank.

MoA (2012). Livestock Growth Strategy and Action. Draft Discussion Paper. Addis Ababa: MoA (Amharic version).

Moges Abebe, Asaminew Tassew, Bimrew Asmare (2021). Appraisal of Milk Production, Processing and Marketing In Selected Urban and Peri- Urban Dairy Production Systems of Northwestern Ethiopia.

Muriuki HG, Thorpe W (2008). Smallholder Dairy Production and Marketing in Eastern and Southern Africa.

O'Mahony F, Peters J (2004). Options for Smallholder Milk Processing in Sub-Saharan Africa. International Livestock Center for Africa (ILCA) Bulletin 27. Addis Ababa, Ethiopia pp. 206-247.

Rahel G (2008). Traditional and improved milk and milk product handling practices and composition and microbial quality of raw milk and butter milk Delebo water shed of Wolayita Zone, Ethiopia.

Sale, A Dehinenet, G Zemenu Y (2018). Handling, Processing, Utilization and Marketing System of Milk and Milk Products in Huet Eju Enesie District, East Gojjam Zone, Ethiopia.

Shitahun . (2009). Feed resources availability, cattle fattening practices and marketing system in Bure *Woreda*, Amhara Region. MSc. Thesis, Mekelle University.

Sintayehu D Berhanu A (1991). Dairy Marketing in Ethiopia: Markets of First Sale and Producers' Marketing Patterns, Addis Ababa, ILCA.

Solomon Mebrahtu (2014). Exploration of Challenges and Prospects of Dairy Production: A survey study of Mekelle City, Ethiopia. MSc Thesis Mekelle University, Ethiopia, pp: 35-49.

Southern Nations, Nationalities and People Regional State's Bureau of Agriculture, 2014. Livestock Resource Extension Annual Plan Cooperative Agreement. The next stage in dairy development for Ethiopia.

Takele T, Habtamu L (2009). Traditional backyard cattle fattening in Wolayta: Systems of operation and the routine husbandry practice. *Ethiopian Journal of Animal Production*, **9** (1): 39-56.

Tegegne A, Gebremedhin B, Hoekstra D, Belay B, Mekasha Y (2013) Smallholder dairy production and marketing systems in Ethiopia: IPMS experiences and opportunities for market-oriented development. Addis Ababa, Ethiopia.

Teshager A, Belay D, Taye T (2013): Traditional cattle fattening and live animal marketing System in Different Agro-Ecologies of Ilu Aba Bora Zone, Oromia, Ethiopia. *Global Veterinaria,* **10 (5):** 620-625.

Teshome and Tesfaye (2017). Dairy cattle milk production, handling, processing, utilization and marketing system in Bench Maji Zone, Southwest Ethiopia.

Teshome G, Fikadu B, Mitiku E (2014). Handling Practices and Microbial Quality of Raw Cow's Milk Produced and Marketed inShashemene Town, Southern Ethiopia. *International Journal of Agriculture and Soil Science,* 2(9):153-162.

Tsadkan Z, Gurja B (2018). Handling and utilization pattern of cattle milk and milk products in Northern Ethiopia. African Journal of Agricultural Research.13(34).

Tsedeke K (2007). Production and marketing systems of sheep and goats in Alaba, Southern Ethiopia, M.Sc. Thesis. Hawassa University, Awassa, Ethiopia. 174p.

Tsegaye L, Gebreegziabhar Z (2015). Marketing of dairy products in selected districts of Wolaita Zone, Southern Ethiopia. *Journal of Marketing and Consumer Research,* 14.

Wayua F, Okoth M, Wangoh J (2012). Survey of postharvest handling, preservation and processing practices along the milk chain in Isiolo district, Kenya. *African Journal of Food, Agriculture, Nutrition and Development,* 12(7).

Woldemichael S (2008). Dairy Marketing Chains Analysis: The Case of Shashemene, Hawassa and Dale Districts' Milk Shed, Southern, Ethiopia.

Wondatir Zewdie, Mekasha Yoseph (2014). Feed resources availability and livestock production in the central rift valley of Ethiopia. *International Journal of Livestock Production*, 5(2):30-35.

Yilma Z, Emannuelle G B, Ameha S (2011). A Review of the Ethiopian Dairy Sector. Ed. Rudolf Fombad, Food and Agriculture Organization of the United Nations, Sub Regional Office for Eastern Africa (FAO/SFE), Addis Ababa, Ethiopia, pp 81.

Yisehak K, Taye TM, Aynalem H (2013). Characteristics and constraints of livestock in Jima Zone, Southern, Ethiopia. OAU: Nairobi.

Yohannes G (2015). Conflicts of Indigenous Farming Practices and Modern Agriculture in Konso Community, Southern Ethiopia.

Zelalem Y (1999). Smallholder Milk Production Systems and Processing Techniques in the Central Highlands of Ethiopia. MSc thesis. Swedish University of Agricultural Sciences, Uppsala.

Zelalem Y, Emmannuelle G, Ameha S (2011). A Review of the Ethiopian Dairy Sector. Ed. Rudolf Fombad, Food and Agriculture Organization of the United Nations, Sub Regional Office for Eastern Africa, Addis Ababa, Ethiopia, pp 81.

Zewudie W (2010). Livestock production system in relation with feed availability in the Highlands and Central Rift Valley of Ethiopia. An MSc Thesis Presented to the school of graduate studies of Haramaya University.