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Full Length Research Paper

Dairy cattle milk production, handling, processing, utilization and marketing system in Bench Maji Zone, Southwest Ethiopia

Teshome Gemechu* and Tesfaye Amene

Department of Animal Science, College of Agriculture and Natural Resources, Mizan-Tepi University, P. O. Box 260, Mizan-Tepi, Ethiopia. *Corresponding author. E-mail: tgemechu4@gmail.com. Tel: +251-910420141.

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The study was conducted to assess the general milk production system, handling practices, processing, utilization and marketing system of raw cow milk produced in Mizan Aman, Debub and Shey Bench Districts. A total of 270 respondents (thirty respondents from each study area) were selected using simple random sampling technique and interviewed by using a semi structured questionnaires. The results of current study showed that the respondents of Shey Bench and Debub Bench were entirely (100%) engaged in farming activities, predominately mixed production system. Similarly, majority (82.2%) of the respondents of Mizan Aman were also pre-dominantly involved in mixed crop livestock production while the remaining 17.8% were involved only in Peri-urban production system. Majority of the respondents in the three districts (91.1, 100 and 90% of Mizan Aman, Debub and Shey Bench) had dairy cows from 1 to 5, some had from 6 to 10 and 11 to 15. About 95.6, 94.4 and 78.9% of the respondents in Mizan Aman, Debub and Shey Bench use plastic buckets for milking. As reported by most of the respondents (95.6, 58.9 and 55.6% of Mizan Aman, Debub and Shey Bench districts, respectively), clay pot is used for storage of milk until the wanted amount is accumulated for processing. About 60.0, 26.7 and 20.0% of the respondents utilize raw milk or fresh milk in Mizan Aman, Debub and Shey Bench districts, respectively. Majority of the respondents (97.8, 92.2 and 70.0% in the Mizan Aman, Debub and Shey Bench districts) reported that scarcity of milk is the main problem of milk and milk products marketing in the study areas. The common milk production constraints and prioritized by the sampled farmers were shortage of feed and scarcity of land, diseases, accessibility to marketing place, limitation of market information and inadequate infrastructure. Therefore, it was concluded that the majority of the milk produced in the study areas were not processed, marketed and mainly utilized by household family for home consumption. These suggest the need for enriched dairy cattle production scheme in the study areas.

Key words: Bench Maji, milk handling, raw milk, utilization of milk.

INTRODUCTION

Ethiopia is a home for an estimated 56.71 million cattle, 29.11 million goats, 29.33 million sheep, 2.03 million

Figure 1. Study area map.

horses, 7.43 million donkeys, 0.4 million mules, 56.87 million chicken and 1.16 million camels (CSA, 2015). However, the productivity of the livestock resources and the benefits obtained from the sector do not commensurate with the high livestock population. Given the considerable potential for smallholder income and employment generation from high-value dairy products, development of the dairy sector in Ethiopia can contribute significantly to poverty alleviation and nutrition in the country (Mohammed et al., 2010).

A small amount of milk is produced by a large number of small holder dairy producers, but low marketable outputs in Ethiopia hinder the possibilities of exploiting distant but rewarding markets due to high transaction costs arising from transportation and high opportunity costs of labor involved. As reported by Muriuki and Thorpe (2008), the vast majority `of milk produced outside urban centers in the country 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 and Peters, 2004).

Dairy products are essential for family consumption and serve as source of income when sold as butter and Ayib (Ethiopian cottage cheese). Due to small volume of daily milk produced, producers keep milk produced over 3 to 4 days until sufficient amount is accumulated to be processed into more shelf stable products. In Mizan Aman town, Debub and Shey Bench districts, traditional milk production, processing and handling are a common practice. Traditional milk products are generally reported as substandard quality mainly due to inadequate dairy infrastructure such as refrigeration facility and clean water and limited knowledge of the hygienic handling of milk and milk products. This necessitates better understanding of the traditional processes and handling of milk and milk products, which is a prerequisite for development. Even though milk production represents an essential part of the livelihood of the rural and urban community in targeted areas, there are no documented data on milk processing, handling, utilization and marketing. Understanding the prevailing traditional practices of milk production, processing and storage is of paramount importance to make future improvement interventions. Therefore, the objectives of this study are to assess milk production system, handling practices, utilization and marketing systems and to identify the major constraints and opportunities of milk production in Bench Maji Zone.

MATERIALS AND METHODS

Description of the study area

Bench Maji Zone is one of the 13 zones of the Ethiopian Southern Nations, Nationalities and Peoples Region. The administrative center of Bench Maji Zone (BMZ) is Mizan-Teferi which is found at a distance of about 561 km from Addis Ababa and 830 km from Hawassa (regional capital city). It is bordered with Keffa Zone in North, Debub Omo in North East direction, Sheka Zone in South West, with Gambela and South Sudden Republic in South direction (BMZFED, 2015) (Figure 1).

Agro-ecologically, Bench Maji Zone consists of 52% lowland (<1500 meter above sea level (masl), 43% mid altitude (1500-2300 masl) and 5% highland (>2300 masl). The altitude ranges from 500 to 3,000 masl. Bench Maji zone is found at 34°45' to 36°10' East and 5°40' to 7°40' North. The annual average temperature ranges from 15.1 to 27.5°C, while the annual rainfall ranges from 400 to 2,000 mm (BMZFED, 2015). Majority of the population depend on crop production, animal production and beekeeping. The main livestock species reared in the zone are cattle, sheep, goats, poultry and equines. About 324,442 cattle, 152,648 sheep, 80,996 goats, 9, 629 horses, 1,012 mules, 1,193 donkeys, 494,180 chicken and 82,969 beehives are estimated to be found in the zone according to the report of CSA (2015).

Sample size and sampling techniques

The current study was conducted in Mizan Aman town, Debub and Shey Bench districts, focusing on the potential area of milk and the amount of raw cow milk marketed in the study areas. Districts, *kebeles* and households were selected to undertake survey on milk production potential or dairy cow possessions and where milk is widely sold through informal channels. Accordingly, 3 *kebeles* were selected from each district using purposive sampling techniques. From each selected *kebele,* thirty households were randomly selected based on the number of cows, milk production potential, interest of households to take part in the study. A total of 270 respondents were selected using simple random sampling technique and interviewed by using a semi structured interviews.

Sources and methods of data collection

Both primary and secondary data collection methods were used to achieve the objectives of this study. Primary data were collected from all randomly selected 270 households who raised dairy cattle by using semi- structured kind of interview, questionnaire and field observation. In addition, informal surveys in the form of group discussion were conducted with *kebeles* administers and extension workers to acquire relevant information. Those enumerators who are fluent in the local language were employed as well as on the trends of the contents of the questionnaire and techniques of interviewing. Soon after training, data collection started under the close supervision of the researcher in order to minimize data collection error. Secondary data were also collected from written documents of agricultural office of each *woreda* and *kebele*, books and journals.

Data analysis

Quantitative and qualitative data analyses were done for the data collected. Simple descriptive statistics such as frequency, percentage and mean were used to analyze data using SPSS for windows version 20 (SPSS, 2011) and the result is presented in form of table.

RESULTS AND DISCUSSION

General characteristics of households dairy cow producers

Dairy cow production in Benchi Maji Zone, like in other developing countries, is categorized by subsistent type. The herd was dominated with unimproved local breeds. The general characteristics of respondents in the study areas are presented in Table 1. The average age of household and family size per household was 38.47±1.31 years and 5.93±0.15 persons, respectively. The age and family size reported in this study is lower than that of Belay et al. *(*2012) who stated the average age and family size of 51.26±10.99 and 6.02±2.52 persons, respectively.

The majority (47.4%) of the household heads had no formal education, while 38.5, 6.0, 4.4, 3.3 and 0.4 had primary school, junior secondary school, senior secondary school, college and university, respectively (Table 1). The percentage of household heads possessing college and university level education were lower than the report of Belay et al. *(*2012) around 35.2 and 7.4, respectively in Jimma, Southwestern part of Ethiopia.

The study revealed that the dairy production was mainly engaged by a male domain (84.4%), whereas only 15.6% were females. The dominance of male-headed household reported in current finding is in agreement with early findings of Belay et al. *(*2012) who described 75.9% males. Majorities (88.9) of the respondent heads were married and some of the respondent heads were unmarried (4.4%) and widows (6.7%). As indicated in Table 1, the respondents were engaged in different occupations such as household wives (20%), farmers (48.1%), civil workers (24.4%) and other businesses (7.4%).

Milk production

The milk production system, species and sources of milk consumption in the study area are portrayed in Table 2. The results of present study showed that the respondents of Shey Bench and Debub Bench were entirely (100%) engaged in agricultural activities dominated by mixed production system; similarly, majority (82.2%) of the respondents of Mizan Aman were pre- dominately involved in mixed crop livestock production while the remaining 17.8% were involved only in Peri-urban production system. Dairy cattle production is a crucial component of the mixed farming system. They were kept as sources of draft power, milk, meat, skin and hides, and they are also the main sources of income and are closely linked to the social and cultural lives of the community.

As indicated in Table 2, majority of households from the three *districts* (83.3, 94.4 and 90% of Mizan Aman, Debub and Shey Bench, respectively) consumed milk produced from home or own dairy cows. However, 16.7, 5.6 and 10% of the respondents in Mizan Aman, Debub and Shey Bench, respectively obtained from neighboring milk producers. The major livestock reared in the area were cattle, sheep and poultry. As an integral part of the mixed farming system, dairy cattle production plays a substantial role in the household milk production or among different animal species cow milk production was the common for consumption and marketing as well.

Almost all the respondents in the three *districts* (91.1, 100 and 90% of Mizan Aman, Debub and Shey Bench, respectively) had dairy cows from 1 to 5 and some had from 6 to 10 and 11 to 15. A few respondents (1.1%) in the Shey Bench had from 16 to 20 dairy cattle. This result is in line with early results of Lemma (2004) who reported that 3.2, 3.1 and 2.2 for Adami Tulu Jido Kombolcha, Arsi Negele and Lume districts, and also in agreement with the report of Tesfaye (2007) which indicated 3.0±0.15 cows holding in Metema District. Smaller dairy cow holding in the current study could be justified by reduction in grazing land due to expansion of cultivation land, and

Table 1. Social characteristics of the respondents in the study area (n=270).

Socio-economic characteristics	Frequency	Mean±SD
Age	270	38.47±1.31
Family size	270	5.93±0.15
Level of education		**Percentage**
No formal education	128	47.4
Primary school	104	38.5
Junior secondary school	16	6.0
Senior secondary School	12	4.4
College	9	3.3
University	1	0.4
Gender		
Male	228	84.4
Female	42	15.6
Marital status		
Married	240	88.9
Unmarried	12	4.4
Widows	18	6.7
Owners occupation		
Household wife	54	20.0
Farmer	130	48.1
Civil worker	66	24.4
Business	20	7.4

n= Number of respondents.

Table 2. Milk production system and sources of milk consumption in the study area (n=270).

Variable	District		
	Mizan Aman (n=90)	Debub Bench (n=90)	Shey Bench (n=90)
	Percentage		
Production system			
Crop-livestock mixed	82.2	100	100
Peri-urban	17.8	-	-
Source of milk consumed			
Home produced	83.3	94.4	90
Neighbor milk producers	16.7	5.6	10
Dairy cooperatives	-	**-**	**-**
Animal species for milk			
Cow	100	100	100
Sheep	**-**	-	**-**
Goat	**-**	-	**-**
The average dairy cows per households			
1-5	91.1	100	90
6-10	5.6	**-**	8.9
11-15	3.3	**-**	-
16-20	-	**-**	1.1

n= Number of respondents.

Table 3. The milking procedure which followed by households in the study area (n=270).

Milking procedure	District		
	Mizan Aman (n=90)	Debub Bench (n=90)	Shey Bench (n=90)
	Percentage		
Technique of milking			
Washing teat	1.1	1.1	3.3
Calf suckling	98.9	98.9	96.7
Frequency of milking			
Once a day	-	2.2	1.1
Twice a day	100	97.8	98.9
Practice of washing the udder and teats before milking			
Yes	40	14.4	16.7
No	60	85.6	83.3
Practice of cleaning containers before and after milking			
Yes	32.2	90	88.9
No	67.8	10	11.1
Barn hygiene/cleaning			
Daily basis	48.9	65.6	51.1
Once a week	25.6	1.1	36.7
Twice a week	20	32.2	8.9
Three times per week	5.6	1.1	3.3

n = Number of respondents.

Population growth was forced to reduce their cattle number.

Hygienic condition of milk

Milking practice

All the respondents milk their cows by using hand milking either by washing cow teats or letting calf to suckle its dam for minutes to stimulate milk let-down. About 98.9, 98.9 and 96.7% of dairy producers milk their cows using hand milking after calf suckling in Mizan Aman, Debub and Shey Bench, respectively, whereas, a few respondents milk their cows by solely washing teats (Table 3).

As indicated in Table 3, all of the household milk producers at Mizan Aman and the majority of dairy cow producers at Debub Bench (97.8%) and Shey Bench (98.9%) milk their cows twice a day (morning and evening), while the cows are in the barn or under a tree shade. However, some of the respondents (2.2 and 1.1% of Debub Bench and Shey Bench, respectively) milk their cows once a day. This might be due to late stage of lactation. Most of the household milk producers do not clean the udder and teats of cows before milking. About 40, 14.4 and 16.7% of household milk producers in Mizan Aman, Debub and Shey Bench wash the teats and udder of the cows before milking. Washing of udder and teats before milking is not practiced; besides most households milk producers let the calf to suckle before milking and they believe that during calf suckling, the teats get washed by the saliva of the calf. Even though most of the household milk producers in the study areas wash their containers before and after milking, poor hygienic milking area and failure to use separate towel for individual cows can lead to high contamination of the milk with pathogenic microorganisms.

The practice of cleaning milking areas (barn and under a tree shade) varies among households. Accordingly, about 48.9, 65.6 and 51.1% of the respondents clean milking area on daily basis, 25.6, 1.1 and 36.7% clean once a week, 20, 32.2 and 8.9% clean twice a week and 5.6, 1.1 and 3.3% clean three times per week in Mizan Aman, Debub and Shey Bench. Food Hygiene Regulations (2006) reported that the milking area must minimize the risk of contamination from any source, including dust, flies, birds or other animals. However, in the present study, milking was usually done under poor hygienic condition and most of the households did not have separate place for milking. This may increase the bacterial contamination of milk from the milking environment.

Milk handling practices

The type of utensils used for milking, transportation,

Table 4. Milk handling practices in the study area (n=270).

Variable	District		
	Mizan Aman (n=90)	Debub Bench (n=90)	Shey Bench (n=90)
	Percentage		
Types of containers used for milking			
Plastic buckets	95.6	94.4	78.9
Nickel (Aluminum)	3.3	5.6	18.9
Stainless steel	1.1	-	2.2
Milk utensils used for storage (%)			
Clay pot (Ensira)	95.6	58.9	55.6
Kele	4.4	41.1	44.4
Methods of cleaning milk containers			
Washing	65.6	74.4	96.7
Smoking	1.1	-	-
Both	33.3	25.6	3.3
Water sources			
Tap water	33.3	3.3	3.3
Hand dug well water	53.3	45.5	21.1
River	13.3	50	75.6
Type of plants used for cleaning milking equipment's			
Kosorote (ocimum haardiense)	18.9	18.9	16.7
Tej sar (Cymbopogan martini)	45.6	57.8	40.0
Tenadem (Ruta chalepensis)	20.0	15.5	10.0
Woyira (Olea africana)	15.5	7.8	33.3

n = Number of respondents.

collection and storage of milk by milk sellers was found to be different (Table 4). Most of them used plastic buckets, Nickel (Aluminum) and the rest used stainless steel. As indicated in Table 4, about 95.6, 94.4 and 78.9% respondents in Mizan Aman, Debub and Shey Bench use plastic buckets for milking. Whereas, 3.3, 5.6 and 18.9% of respondents used Nickel (Aluminium) made containers for milking and collection in Mizan Aman, Debub and Shey Bench. However, a few percent (1.1 and 2.2% of Mizan Aman and Shey Bench) of respondents adopted stainless steel. This is in line with the findings of Yitaye et al. (2009), Teklemichael (2012) and Teshome et al. (2014) who reported that 83% of the surveyed urban dairy farms in Bahir Dar and Gondar, 75% of the surveyed in Dire Dawa town and Shashemene town used plastic utensils. Additionally, milkers dip their fingers in the milking vessel and moistening teats of the cows with the intention of facilitating milking. However, such practice may cause microbial contamination of the milk from the milkers' hand.

The interviewed households used different utensils for milk storage and processing. All respondents reported using clay pot (*Ensira*) for milk storage and churning (butter-making). As reported by most of the respondents (95.6, 58.9 and 55.6% of Mizan Aman, Debub and Shey Bench, respectively), clay pot is also used for storage of milk until the needed amount is accumulated for processing. Abebe et al. (2012) portrayed similar result where 88.3 and 96.7% in Dega and Woina dega agro-ecology in Ezha District of the Gurage Zone, Southern Ethiopia was obtained. As indicated by respondents, clay pot keeps milk well at the prevailing high ambient temperature compared to plastic containers. Whereas, some of the respondents use *Kele* (kind of utensil made up from local available hollowed woody) for milk storage and process (Table 4).

As indicated in Table 4, majority of the respondents (65.6, 74.4 and 96.7% of Mizan Aman, Debub and Shey Bench) washed milk containers with water without smoking techniques. However, 33.3, 25.6 and 3.3% of Mizan Aman, Debub and Shey Bench were using both washing and smoking techniques for cleaning milk containers. The majority of the respondents (50 and 75.6%) used river followed by hand dug well water (45.5 and 2.1%) and tap water (3.3 and 3.3%) in Debub and Shey Bench. Moreover, most of the respondents of Mizan Aman used hand dug well water (53.3%) followed by tap water (33.3%). In the current study areas, the quality of

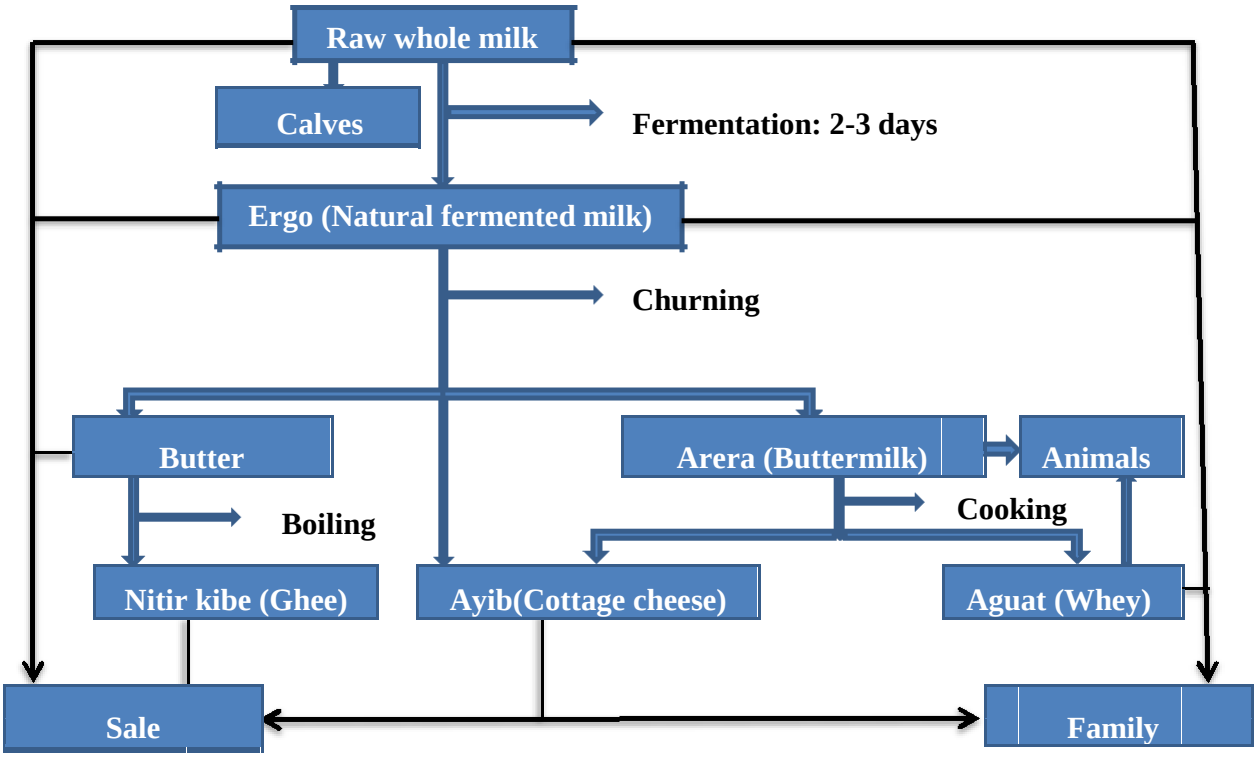

Figure 2. The process and utilization of milk and milk products in the study areas.

both river and hand dug well waters used for cleaning may not satisfy the recommended standard, thus can attribute to the poor quality of milk.

Smoking of milking and storage containers was done by using Kosorote (*Ocimum haardiense*), Tej sar (*Cymbopogan martini*), Tenadem (*Ruta chalepensis*) and wood splinters of 'Weyira' (Olea africana) in the areas (Table 4). They mentioned that smoking is used to develop desirable flavor and aroma, increase shelf life of milk and facilitate fermentation. In addition to imparting pleasant flavor, it facilitates fermentation and increases shelf-life of milk and milk products. Smoking has anti-microbial activity, thus inhibits the growth of microorganisms in milk (Mogessie and Fekadu, 1993 cited in Teshome et al., 2014).

Milk and milk products utilization and marketing

Similar to other rural parts of Ethiopia, the common milk products manufactured and utilized in this study areas include raw milk, butter, Ayib (cottage cheese), whey (Aguate), Ergo (naturally fermented milk) and buttermilk (Arrera). As observed in the current study, about 60.0, 26.7 and 20.0% of respondents utilize raw milk or fresh milk in Mizan Aman, Debub and Shey Bench. Compared to Debub and Shey Bench districts, the majority of respondents in Mizan Aman utilize fresh milk more than other milk products. This might be the presence of proximate milk marketing place. All of the respondents produce traditional butter from naturally fermented whole milk (6.6, 20.0 and 13.3% of respondents produced butter in Mizan Aman, Debub and Shey Bench). Figure 2 depicts the process and utilization of milk and milk products in the study areas.

The study revealed that the majority (26.7%) of the respondents in the Shey Bench process raw milk into cottage cheese (*Ayib*) compared to the rest two *districts*. From different milk products butter and Ayib have better shelf life and fetch better market price. About 6.7 and 16.7% of the respondents in the Debub and Shey Bench areas used whey (Aguat) for household consumption and animals drinking particularly calves (Figure 2). In study areas, the surplus milk was processed for home consumption and marketing. This finding agreed with the report of Lemma (2004) who indicated that milk was processed to increase the family income through sale, diversify the products for consumption and to increase the shelf life of the products.

The means of milk transportation depend on the distance that milk producers were located (Table 5). Milk sellers away from marketing place like small shops/kiosks and hotels/cafeteria use Bajaj (6.7%) in Mizan Aman and the sellers close to marketing place transport their milk on foot (93.3, 100 and 100% in Mizan Aman, Debub and Shey Bench).

Table 5. Milk and milk product utilization and marketing place in the study area (n=270).

Variable	District		
	Mizan Aman (n=90)	Debub Bench (n=90)	Shey Bench (n=90)
	Percentage		
The utilized milk product			
Raw milk	60.0	26.7	20.0
Butter	6.6	20.0	13.3
Cottage cheese (Ayib)	10.0	20.0	26.7
Whey	-	6.7	16.7
Ergo	16.7	10.0	13.3
Butter milk (Arrera)	6.7	16.6	10.0
Means of transportation			
On foot	93.3	100	100
Bajaj*	6.7	-	-
Public transport or taxi	-	-	-
Milk marketing places			
Local market	60.0	26.7	43.3
Neighbour consumers/home	26.7	53.3	56.6
Cafeteria/hotel	10.0	3.3	-
Shop	3.3	16.7	-

n = Number of respondents; *Small vehicle which has three wheels.

Table 6. Milk marketing problem in the study area (n=270).

Problem	District		
	Mizan Aman (n=90)	Debub Bench (n=90)	Shey Bench (n=90)
	Percentage		
Scarcity of milk	97.8	92.2	70.0
Lack of market or collection center	1.1	3.3	15.6
Cultural restriction	1.1	4.4	14.4

n = Number of respondents.

As far as market information concerns, farmers used different sources of information for existing market prices of dairy products. About 60.0, 26.7 and 43.3% respondents get market information from market places and 26.7, 53.3 and 56.6% from neighbors in Mizan Aman, Debub and Shey Bench. A few respondents in Mizan Aman and Debub Bench get information from cafeteria and small shops/kiosks.

The study revealed that the milk production was not market oriented; most of the milk produced is retained for home consumption. The surplus is mainly processed using traditional technologies into more shelf stable products such as *Ergo* (Ethiopian naturally fermented milk), butter, ghee and *Ayib* (Ethiopian cottage cheese) that are marketed through informal channel.

The informal market involves direct delivery of fresh milk by producers to consumers in the immediate neighborhood and sale to traders or individuals in nearby towns. In the informal market, milk may pass from producers to consumers directly or it may pass through two or more market agents (NDO, 2008).

There were numerous problems related with milk marketing in the study area (Table 6). Majority of the respondents (97.8, 92.2 and 70.0% in Mizan Aman, Debub and Shey Bench) report that scarcity of milk and milk products marketing are the major problem in the study areas. In addition, some of the respondents (1.1, 3.3 and 15.6% in the Mizan Aman, Debub and Shey Bench) say absence of milk collection center or lack of proximate marketing place; while a few households said cultural restriction (1.1, 4.4 and 14.4% in Mizan Aman, Debub and Shey Bench) were the major problems. This study agreed with the report of Tesfaye (2007) that the shortage of milk (49.8%) is the main problem of milk

Table 7. The major constraints of milk production in study areas (n=270).

Major constraints	Rank
Shortage of feed and scarcity of land	1st
Disease	2nd
Accessibility to marketing place and limitation of market information	3rd
Absence of improved breed and inadequate artificial insemination	4th
Inadequate infrastructure	5th

marketing; while other problems like lack of access to market (21.2%), cultural restriction (20.8%) and the desire to convert whole milk into other dairy products (8.2%) are the reasons for not selling whole milk.

Constraints and opportunities of milk production

Dairy cattle milk production system was constrained by a number of factors in the study area (Table 7). The most important milk production constraints prioritized by sampled farmers were shortage of feed, scarcity of land and diseases. The other most important constraints of marketing system were accessibility to marketing place, limitation of market information, lack of improved breed and inadequate artificial insemination (AI) and inadequate infrastructure. These constraints interactively affect the performance of the genetic potential of animals leading to subsistence level of milk production.

The available opportunities of dairy development in the study area have been assessed through group discussion made with dairy producers and development agents (DAs). In the areas, many farmers have more interest on dairy production; however, the increased income from crop production would likely influence the expansion of dairy cattle production in the areas. The other future opportunities for dairy cattle production in current study areas are fast growing population and urbanization. In this regard, road construction, water supply, electrification, communication activities would favor modern dairying of remote areas. Also included are enhancing the forage production and fodder conservation in the farmers' homestead lands, formal training on artificial insemination for selected farmers at each *woreda* and strengthening the artificial insemination service at *kebele* level in man power and equipment.

CONCLUSION AND RECOMMENDATIONS

The results of present study showed that all the respondents were engaged in agricultural activities which are dominated by crop-livestock mixed production system. Almost all the respondents in three areas had dairy cows from 1 to 5. Smaller dairy cow holding in the current study could be justified by reduction of grazing land due to expansion of cultivation land, and population growth was forced to reduce their cattle number. All the respondents milk their cows by using hand milking either by washing cow teats or letting calf to suckle its dam for minutes to stimulate milk let-down. The types of utensils used for milking, transportation, collection and storage of milk were plastic buckets, nickel (Aluminum) and some stainless steel. The majority of the respondents did not practice recommended hygienic practices (such as hand and udder washing) during milking and further handling (processing, storage and marketing) of milk and milk products. The common milk products manufactured and utilized in this study areas include raw milk, butter, Ayib (cottage cheese), whey (Aguate), Ergo (naturally fermented milk) and buttermilk (Arrera).

The common milk production constraints in the study area were shortage of feed and scarcity of land, diseases, accessibility to marketing place, limitation of market information and inadequate infrastructure. On the other hand, the promising future opportunity for dairy development in rural areas will be fast growing population and increment of urbanization. Distinguishing the significance of dairy cattle production in the livelihood of community in the study areas, the development interventions should require boosting of production and improving milk handling practices in order to process and utilize good quality milk products. Also the improvement of infrastructure should alleviate the problem of dairy cattle milk production, handling and increase the number of marketing options which is available to smallholder farmers.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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