JLSB
Journal of Life Science and Biomedicine

J. Life Sci. Biomed. 6(6): 120-126, November, 2016

ISSN 2251-9939

Handling, Processing and Utilization of Milk and Its Products in Gondar Town, Ethiopia

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Received 28 Sep. 2016 Accepted 05 Nov. 2016

ABSTRACT: The study was conducted from November to May, 2016 with the objective to assess the handling, processing and marketing of milk and its product in Gondar town. Data were collected with the three representative kebeles (kebele 18, 19 and 20) purposively. The study was carried out through informal and formal surveys. From those kebles a total of 45 respondents were taken randomly. From the respondents majority of them were male (86.7%). 42.2% of the respondents were keep dairy cow under the age of 47-62. In the study area, the overall average family size was 5.7%. The equipments used for milking were gourd (28.9%), plastic jar (64.4%) and aluminum jar (6.67%). Equipments used for milk processing were gourd (48.89%), cream separator (15.5%), clay pot (11.11%) and others (24.4%). More than half of the respondents had not used refrigerator for handling of milk and its products. All milkers were washed their hands before milking however, only 62% of the respondents were washed the cow udder before milking. 60% of the respondents were processed the milk in traditional way. Preferred milk processed products were skim milk (48.89%), butter (40%), yogurt (6.67%) and the remaining were cheese (4.44%). Half of the respondents were used yogurt for household consumption however, 77.77% of the respondents were selling milk in the market. Generally milk production in Gondar town is contributing a role for the household livelihood improvement however, handling, processing and utilization of milk and its products should need further improvement.

Author Keywords: Gondar, Handling, Processing, Utilization of Milk

ORIGINAL ARTICLE
PII: S225199391600020-6

INTRODUCTION

Demand for milk and dairy products has increased in the tropical areas where peoples growing. However, despite milk's contribution to gross domestic products and its value as a food, sub-Saharan Africa in general and Ethiopia in particular has failed to attain self-sufficiency in dairy production [1]. Dairy processing plants are few in numbers, much of the milk produced by rural small holders is processed on farm using traditional technologies and milk processing is based on sour milk [2]. This is due to high ambient temperature, small daily quantities of milk produced, consumer preference, the better shelf life of fermented milk as well as the type and capacity of the locally available processing materials and methods used. Ethiopians, like other countries, have been using milk as part of their diet for centuries. Milk is used for rearing calves and children and the surplus is soured for Ergo (Ethiopian naturally fermented milk) and/or butter and Ayib (Ethiopian cottage cheese) making. Arera (defatted sour milk) is used for human consumption or for Ayib-making.

In Ethiopia, there is no standard hygienic condition followed by producers during milk production. The hygienic conditions are different according to their production system. In most of the cases under smallholder condition, the common hygienic measures taken during milk production especially during milking are limited to letting the calf to suckle for few minutes and/or washing the udder before milking. The quality of the water used for cleaning purpose (washing the udder, milk equipment, hands), however, is not secured [3]. Milk production under Ethiopian smallholder condition can therefore generally be characterized as free from poisoning. Dairy products are manufactured and consumed in many parts of the country. Fresh whole milk, whole sour milk (Ergo), butter, Arera (defatted sour milk) and Ayib (a traditional cottage cheese) are the major dairy products produced and consumed in many parts of the country [4-6]. Many of these products are produced using artisanal technologies on-farm and the types and processing steps of these dairy products can vary considerably from one area to the other.

The mainstay of the population in the Amhara region is rain-fed subsistence agriculture. About 73% of the smallholders practice mixed crop-livestock farming, 19% practice crop cultivation, while the remaining 8%

undertake livestock rearing [7]. Like in other regions of Ethiopia, milk production is an integral part of the farming system. Local milk production is mainly from indigenous Zebu cattle which are kept by about half a million smallholder farming households [8] most of whom are poor. In Gondar town dairy production play a significant role in the household income as well as home consumption and also the demand of milk and milk products increased from time to time in the area due to increasing human population, urbanization and other factors. So that identification and understanding of traditional dairy products, handling, processing and utilization of milk and milk products were essential in order to devise appropriate development interventions that would result in improved production and quality of dairy products. Therefore, the overall aim of this study was to assess the practices of handling, processing, and utilization of milk and milk products in Gondar town.

MATERIALS AND METHODS

Description of the Study Area

The study was conducted from November to May, 2016 in Gondar town which was found in Amhara Region state in North Western Ethiopia. The area is located at a distance of 737 km north of Addis Ababa. The area lies between an altitude of 12°35'60''N and longitude of 37°28' 20''E and has an elevation of 2300 meters above sea level (masl). Gondar has a varied landscape, dominantly covered with ragged hills and plateau formations. The annual average temperature was 19.7°c and its annual rainfall was 1772 mm. It could be categorized under woyna-dega climatic zone. The area is also classified mainly in to two seasons, the wet season, from June to September and the dry season from October to May. [9].

Figure 1. Map of study the area.

Data collection and sampling techniques

Data to be collected from the three kebeles namely Kebele 18, 19, and 20 were employed by using purposive sampling techniques. A total of 45 respondents were purposively selected. Both primary and secondary data sources were used for the study. Primary data sources included the household heads and dairy cooperatives in the respective districts. The secondary data was taken from zonal ARDO, NGO operating and from documents that have been written about the study area.

Statistical Analysis

The data was subjected to statistical analysis using statistical package for social sciences (SPSS) software, version 16.0. Descriptive statistics such as frequency, distribution and percentages were used.

RESULT AND DISCUATION

Demographic Characteristics of Respondents

Demographic characteristics of respondents in the study area were showed in Table 1. In the study areas majority of the respondents were male 86.7% and only 13.3% were female. Major of the respondents (42.2%) were found at the age between 47- 62, and the remaining 13.3, 35.6 and 13.3% were found at the age group between 15-30, 31-46 and greater than 62 years old, respectively. Their educational level showed that, 46.7% were read and write and others were illiterate (15.6%), attending elementary education (13.33%), secondary school (8.89%), attend above secondary school (11.11%) and spiritual or religious education (4.4%). Their marital status showed that 91.11% were married, 6.7% were divorced and the remaining 2.22% were single.

Table 1. Demographic characteristic of respondents in Gondar town

Gender	**N**	**%**
Male	39	86.7
Female	6	13.3
Total	45	100
Age		
15-30	6	13.3
31-46	16	35.6
47-62	19	42.2
>62	6	13.3
Total	45	100
Educational Level		
Illiterate	7	15.6
Read and Write	21	46.7
Elementary	6	13.33
Secondary	4	8.89
Above secondary	5	11.11
Spiritual	2	4.44
Total	45	100
Marital status	**N**	**%**
Single	1	2.22
Married	41	91.11
Divorced	3	6.7
Total	45	100

Family Size

The average family size and percentage of male and female in the study area were shown in Figure 2 and 3, respectively. Based on the information obtained from the respondents the overall average family size in the study area was 5.7. From the total of the population male and female population showed that 47.85% were females and 52.15% were males. From this result it could be conclude that males are more engaged in the dairy production than females.

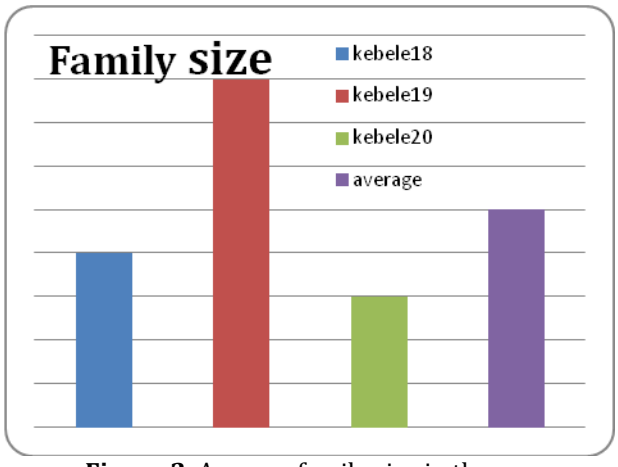

Figure 2. Average family size in the study area

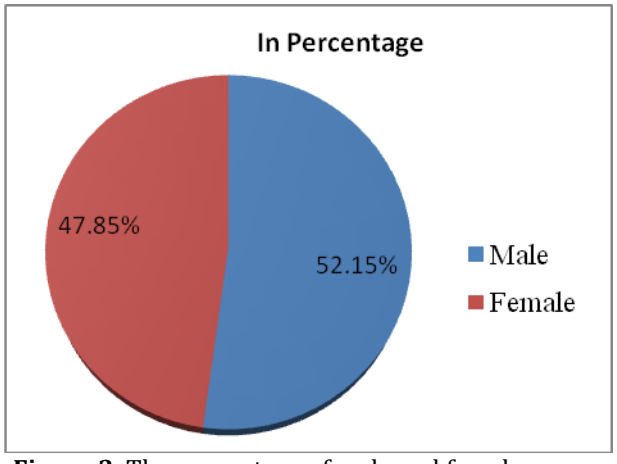

Figure 3. The percentage of male and female in the study area

Cattle Population in the study area

The overall cattle population in the study area was shown in Table 2. Based on the information obtained from the respondents the overall cattle population in the study area was 419, of which 55 local cows, 138 crossbred cows, 16 local heifers, 27 crossbred heifers, 37 local bulls, 26 crossbred bulls, 33 local calves and 87 crossbred caves.

According to the report of the present study the main milk sources of the area were gain from cross breed dairy cows. However, the study was in agreement with that of the finding of Yilma et al. [10] which stated that milk production depends mainly on indigenous livestock genetic resources especially true in developing countries where production dominated by small holder farmer; more takes place under cattle. The indigenous breeds accounted for 99.19 percent, while the hybrids and pure practices. Thus, farmers and all who handle milk before exotic breeds were represented by 0.72 and 0.09 percent, respectively.

Table 2. The overall cattle population in Gondar town

Kebeles	Number of Cattle Population							
	Cows		Heifers		Bulls		Calves	
	Local	Cross	Local	Cross	Local	Cross	Local	Cross
Kebele 18	18	69	5	8	25	3	14	33
Kebele 19	15	39	3	8	4	7	11	31
Kebele 20	22	30	8	11	8	13	8	23
Total	55	138	16	27	37	26	33	87
Average	18.33	46	5.33	9	12.33	8.66	11	29

Equipment used for milking and storage in the study area

Equipment used for milking and storage were shown in Figure 4. In the study area respondents were used different milking materials for milking and storage of milk. Majority of them were used plastic jar which was 64.4% and 28.9% use gourd and 6.67% of them were used aluminum jar.

The result was agreed with the study of [5, 6] the use of gourd as a churn and a storage vessel. However, it was in agreed with the finding of O'Mahony et al. [11]. In general, the use of clay pot for storage of various dairy products and its use for churning observed.

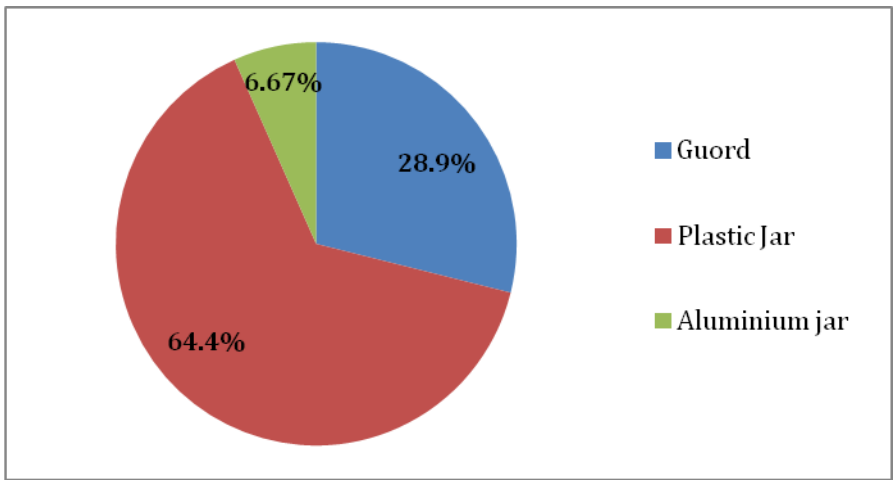

Figure 4. Equipment used for milking and storage.

Milking and handling of milk and its products

Milking and handling of milk and its product in Gondar town were shown in Table 3. All respondents were washing their hand before milking the caws and 62.2% were washing the udder of the caw before milking and 37.8% were not wash the udder's of cow. After washing, drying of udder was highly recommended. But 66.7% of them were not drying of the udder before milking. In the study area, 55.6% was not properly handled milk and its products in the refrigerator which was the main reason for loss and wastage of milk and its products in the area. However, the remaining 44.4% of respondents were used refrigerator for milk and milk product.

Milk processing materials used in the study area

Milk processing materials in Gondar town were shown in Table 4. In the area respondents were processing milk both in traditional and modern ways. Major of respondents 48.89% were used traditional material i.e gourd and 11.11% were used clay pot whereas some 15.5% were processing milk by using cream separator. The

remaining 24.5% were used other material for processing of milk. The present study was agreed with the study of [5, 6] gourd was the major milk processing container.

Milk processing practice in the Study Area

Milk processing practice in Gondar town was shown in Table 5. Majority of the producers (60%) were follow traditional method of milk processing, and 17.78% were using modern processing materials and the remaining 22.2% were no further processed the milk.

The present study was in line with the report of Duguma and Janssens [15] in Jimma town the traditional milk processing materials were used and methods used in the study area were time consuming, laborious and inefficient in terms of fat recovery.

Table 3. Milking and handling of milk and its product in Gondar town

Variable	N	%
Wash hand	100	100
wash udder	27.99	62
not wash udder	17.01	37.8
Total	45	100
Dry udder	29.7	66.70
Not dry udder	15.3	33.70
Total	45	100
Use refrigerator	19.98	44.40
With no refrigerator	25.02	55.6
Total	45	100

Table 4. Milk processing materials in Gondar town

Milking Processing Equipment	N	%
Cream Separator	7	15.5
Gourd	22	48.89
clay pot	5	11.11
other	11	24.5

Table 5. Milk processing practice in Gondar town

Processing	N	%
Traditional	27	60.00%
Modern	8	17.78%
no process	10	22.2%
Total	45	100%

Preferable Milk processed products in the Study Area

Preferable Milk processed products in Gondar town were shown in Table 6. In the study area skim milk, butter, cheese, whey and yogurt were the preferred milk processed products. In the study area skim milk and butter were more required by respondent. From the respondents 48.89 and 40% were highly preferring milk and butter for household consumption as wells for marketing purposes respectively.

The processed products of the present study was in line with the report of Duguma and Janssens [15] the major products of the traditional milk processing were naturally fermented milk, traditional butter, butter milk, cottage cheese, whey and ghee.

Milk utilization

Milk utilization in Gondar town is indicated in Table 7. Respondent were used different milk product for house hold consumption such as yogurt, milk, cheese, whey. The majority of respondents (51.11%) were preferred to use yogurt for consumption.

The result was in line with the finding of Yilma et al. [13]. Ergo is one of the most common traditionally made fermented milk products in Ethiopia. The result also agreed with Duguma and Janssens [15] the majority of the respondents were process milk into sour whole milk (ergo), cottage cheese (Ayib), butter and ghee.

Table 6. Preferable Milk processed product in Gondar town

Variable	N	%
Skim milk	23	48.89
Butter	18	40
Cheese	2	4.44
Whey	0	0
Yogurt	3	6.67

Table 7. Milk utilization in Gondar town

Variables	N	%
Yogurt	23	51.11
Milk	5	11.11
yogurt and milk	8	17.77
Cheese	1	2.22
Whey	2	4.44
All	6	13.33
Total	45	100

Marketing of milk and milk products

Milk product used for marketing is indicated in Table 8. In the study area milk producers were selling milk to consumers. major of respondents 77.77% were selling milk to consumer, 11.11% were selling milk and butter, 6.66% were by converting milk into butter and they sell butter, the remain 4.44% were selling all milk product to the society.

The study was not agreed with the reports of Beyene [4] in the southern region, Yilma et al.[13] in the central highlands of Ethiopia, Tola [5] in eastern Wollega and Fita [6] in the east Shoa zone of the Oromia region, where most of the farmers do not sell fresh milk but sell butter. On the other hands this result were in line with the finding of Belachew et al. [14] which stated that the producers deliver milk to consumers or consumers may collect it at the producer's gate. Studies also indicated that in terms of volume 71% of intra-urban producers sell milk directly to consumers.

Table 8. Milk product used for marketing

Variable	N	%
Butter	3	6.66
milk and butter	5	11.11
milk	35	77.77
All	2	4.44
total	45	100

CONCLUSION AND RECCOMENDATION

Generally the overall results of the present study indicated that the handling, processing and utilization of milk and its product in Gondar town were lay in traditional and modern way. Milk was processed into different products such as butter, cheese, whey and yogurt. Milk processing was important for household consumption and marketing. In this area producers were consume yogurt in majority. Whereas milk were major product that were highly required for market. Handling of milk and its products were largely in traditional way. Generally in this area large number of respondents was do not have milk and its product processing material adequately, such as refrigerator and other modern material were not accused. Based on the above conclusion the following recommendations were forwarded; government should be try to fulfill the requirement of electric power in different rural kebeles for the use of refrigerator, the government should be offered extension service for the dairy producers for quality of milk, the producers should be used modern milk processing machinery rather

processing in a traditional way, milk collection and processing center should additionally establish and milk pasteurizing and packaging training should be given to the milk produce.

Competing interests

The authors declare that they have no competing interests.

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