

Assessment of Production Potential and Prospects of Dairy Cooperatives in Gondar Town

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Abstract

This study was conducted in Gondar town to assess production potential and challenges of dairy cooperatives. Three dairy cooperatives were selected purposively and total of 60 (20 from each cooperative) sample respondents were selected by systematic random sampling. Both primary and secondary sources of data were utilized to collect both quantitative as well as qualitative data. Household survey through semi structured interview schedule, key informant interview and focus group discussions were principally used to gather relevant data. Through the aid of SPSS version16 descriptive statistics like, mean and percentage were used to analyze the collected data. As result 32.26%, 35.5% and 32.2% from Enatna lijoch, Tagleh edge and Yewotet ray dairy cooperatives respectively reported as the milk production potential of dairy cows was low. According to the reports from the members of the three cooperatives, milk marketing has higher demand in the town. However, the respondents faced several production problems. The major production and processing problems listed by the sampled cooperative members were lack of supply of concentrate feed, lack of milk processing facilities and skills, insufficient production area, unpredictable marketing system specially during fasting season lack of water availability, poor milk production potentials of dairy cows, lack of storing and transporting equipment, milk quality testing laboratory and well organized milk shop of most cooperatives. The average amount of milk supplied for market per day per cooperative was 160 liters and 40 liters for yoghurt. In non-fasting season, Demand is always above the supply. However, during fasting season only 100-120 liters of milk and 20-35 liters of yoghurt could sell to the consumers out of the supplied amounts in lower price. Therefore, urgent solution is required to save surplus milk either in the form of extending a suitable market linkage or fulfilling necessary inputs for processing it into different milk varieties like: cheese, ghee, and butter.

Keywords: Dairy cooperatives; Dairy products variety; Milk-processing; Production potential.

INTRODUCTION

Ethiopia is believed to have the largest cattle population in Africa. Despite its huge population, the livestock subsector in the country is less productive in general and compared to its potential, the direct contribution to the national economy is limited [Kedija, 2008]. Dairy production, among the sector of livestock production is a critical issue in Ethiopia where livestock and its products are important sources of food and income and dairying has not been fully exploited and promoted in the country [Sintayehu et al. 2008]. To enhance sustainable production the efforts to improve the productivity of smallholder dairy production and improve its market orientation needs to be supported and informed by detailed understanding of the current and dynamic conditions of production, marketing, processing and consumption of milk and dairy products [Asfaw, 2009]. However, in the country, milk production, handling, processing, consumption and marketing is traditional and constrained by multiple problems. Moreover, limited researches have been done to identify the handling, processing, and consumption of milk [Fikrineh et al 2012].

Cooperatives play a significant role in ensuring sustainable supply of raw milk to the dairy industry by coordinating the flow of milk from their members and assisting them by supplying the required dairy farm inputs. [Emana, 2009.] Reported that there are 180 cooperatives engaged in milk production and marketing operating in different parts of the country. However, this number makes only 0.74% of the total number of agricultural and non-agricultural cooperatives and 2% of agricultural- based cooperatives in the country

. In order to attract more cooperatives in to the sector for a better enhancement of dairying in the country; improving the profitability of existing dairy cooperatives through supporting, promoting, solving their production limitations and assessing consumers demand has a paramount importance. Hence, exploring the available dairy products in the area and the existing demand for it gives a direction for dairy cooperatives to scale up their production potentials. Though Gondar town have some dairy cooperatives their production potential is inefficient and compared to its potential, the direct contribution to town is limited. In the town, milk production, handling, processing, consumption and marketing is traditional and constrained by multiple problems. Moreover, limited or no researches were done to identify the production potential, processing, and consumption of milk. The main objective of the study is to assess the production potential and challenges of dairy cooperatives in Gondar town.

Materials and Methods

The study was conducted in and around Gondar town. The study districts selected purposively due to existence of more numbers of dairy cooperatives. This study was based on cross sectional survey through the help of semi-structured interview schedule. Both quantitative and qualitative data were collected form primary as well as secondary sources. Primary source of data includes household survey, key informants and focus group discussion. A secondary source includes previous research journals, internets and other books. The study employed two stage sampling techniques to select sample dairy cooperatives and respondents (cooperative members). Total of 60 individuals selected by simple randomly among the members of three cooperatives 20 individual from each. The collected data coded, processed and analyzed through Statistical procedures for Social Sciences (SPSS) version 20 by descriptive statistics like, mean and percentage and presented in the form of tables and figures.

RESULTS AND DISCUSSIONS

Demographic characteristic of respondents

General demographic as well as socioeconomic characteristics of households have direct or indirect relation and influence on their dairy production potential. As indicated in figure 1 from the total respondents 61.7% of the interviewed respondents were male, while 38.7% were female.

With regard to marital status of respondents majority of the respondents were married (60%), next to this 25% of respondents are single (table 1). Orthodox religious (91.7%) covers for respondent's large number sharing religious, while Muslim has 6.7% and other religious cover small percentage of the sample (table 1). Concerning the educational background of the interviewed households are about 10 % were illiterate. Among the literate (90%) members, highest proportion covers read and write (38.3%), and attending elementary school (21.7%), secondary school (16.7%) higher education and college graduated students (13.3%) which are peculiar households they need training and assisting from concerned body. Principal occupations of respondents are self-employed (48.3%), government employer (43.3%) and non-governmental profession shares 8.3% of sample respondents (table 1). The result shows that majority of the respondent's age group lies above 40 years. This could imply that most of adult and elderly those could have better economical and social status who are expected to actively participate in cooperative because of they develop more experience that enable them to work in cooperation for better production and productivity to get higher return.

Overview of dairy cooperatives and cooperatives milk production potential

The study incorporates *Enatna lijoch*, *Tagleh edge* and *Yewotet ray* dairy cooperatives in Gondar town. Since the study depends on the survey data, it was difficult to measure objectively the milk production potential of the cooperatives in a definite figure. The production potential was assessed subjectively based on the perception of sample dairy cow owners. As indicated from Table 2, most of the cooperative, 32.3%, 35.5% and 32.2% from *Enatna lijoch*, *Tagleh* and *Yewotet ray* dairy cooperatives respectively reported that, the current milk production potential of the dairy cows was low. The Dairy households were highly complaining on the low milk production potential of their cows. It is consistent with the previous finding reported by [Ruerd et al, 2017] which pointed out that in central part of Ethiopia the average milk output per cow remains too low for reaching economies of scale hence, most of respondents (43.3 %) believed that milk production capacity at a farm level was not sufficient to fulfill the livelihood requirement of the households.

On the other hand, the focus group discussion revealed that the existing dairy products demand in Gondar towns did not always met by the current production potential especially during non-fasting season. Because, demand is always rises due

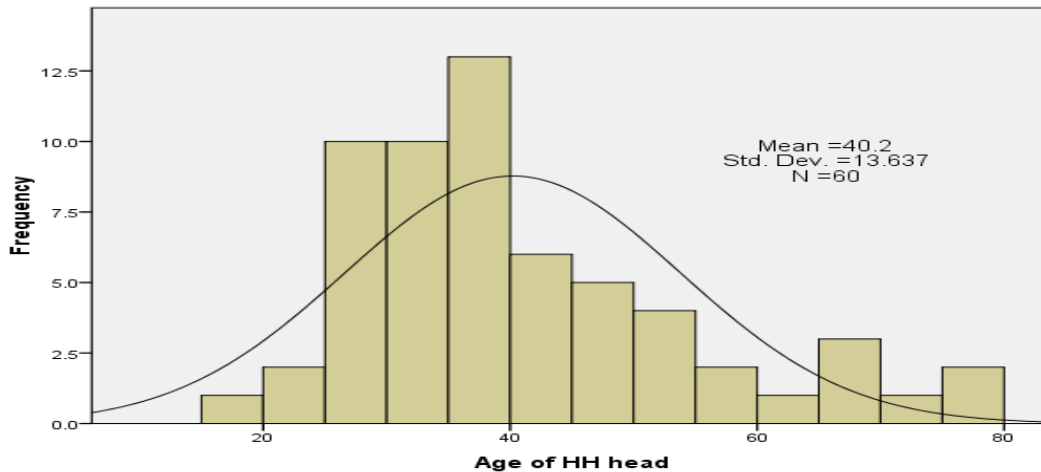


Table 1: Socio-economic characteristics of sample respondents

Socio-eco character	Parameters	Frequency	Percent
Sex	Male		38.3
	Female		61.7
Religion	Orthodox	55	91.7
	Muslim	4	6.7
	Others	1	1.7
Marital status	Married	36	60.0
	Single	15	25.0
	Divorced	4	6.7
	Widowed	5	8.3
Educational level	Illiterate	6	10
	Read and write	23	38.3
	Elementary	13	21.7
	Secondary	10	16.7
Major occupation	Higher education	8	13.3
	Self-employee	29	48.3
	Governmental NGO	26 5	43.3 8.3

to high population density that can consume dairy products regularly. Roughage feedstuffs were frequently reported as the main feed type utilized in the cooperatives dairy farm. As summarized in Table 2, majority respondents reported as they used some concentrate feeds for their cows along with high proportion different types of roughage feeds. Therefore, maximizing milk production on the bases of poor quality and less digestible roughages seems impossible. Hence, poor feed takes the lion share for low milk production potential of the dairy cows besides with poor genetics. A previous study about dairy products marketing system declares that, in Ethiopia, 95% of the national milk is marketed through informal channels and is unprocessed [Netherlands Development Organization, 2008].

The FGD participants pointed out that, marketing system for dairy products produced in the cooperative dairy farms is not as such competitive and attractive, especially in the fasting season, consumers demand for dairy products is dropped, and cooperatives are being exposed to expenses. It is in line with the study that noted seasonal variations and fasting periods in Ethiopia affect consumption of dairy products [(Netherlands Development Organization, 2008)]. In Ethiopian Orthodox Christian religion, half of the year is fasting season that followers refrain from consumption of livestock products. In terms of religion, about 95.5% of the population of Gondar towns is Orthodox Christians [9]. Hence, this limited demand during fasting season might contribute as factor for low productivity potential of the cooperatives.

Table 2. Milk production status and sources of feed types in cooperatives farms

Variables	parameters	Enatna lijoch		Tagleh edge		Yewotet ray	
		N=20	%	N=20	%	N=20	%
Dairy production system	Intensive	15	34.9	13	30.2	15	34.9
	Semi-intensive	15	34.9	13	30.2	15	34.9
Feed type	other feed type	19	32.2	20	33.9	20	33.9
	Concentrate feed	1	100	NA	NA	NA	NA
level of milk production	High	3	27.3	5	45.5	3	27.3
	Medium	9	37.5	7	29.2	8	33.3
	Low	8	32.0	8	32.0	9	36.0
Amount of milk	Sufficient	14	41.2	9	26.5	11	32.4
	In-sufficient	6	23.1	11	42.3	9	34.6
Marketing system	Good	3	23.1	6	46.2	4	30.8
	Poor	17	30.9	19	34.5	19	34.5
Sources of dairy feed	Their own	6	40.0	3	20.0	6	40.0
	From the market	14	17	17	37.8	14	31.1

Table 3. frequency-percentage of handling and processing potential of dairy cooperatives

Variables	Categories	Enatna lijoch		Tagleh edge		Yewotet ray	
		N=20	%	N=20	%	N=20	%
Container sanitation	Proper sanitation	17	36.2	16	34	14	29.8
	In appropriate sanitation	3	23.1	4	30.8	6	46.2
Cow safety and hygiene	Applied	19	36.5	17	32.7	16	30.8
	Not applied	1	12.5	3	37.5	4	50.0
Amount of milk for processing	Below half	5	20.0	9	36.0	11	44.0
	Above half	7	35	9	45	4	20
	All produced	8	53.3	2	13.3	5	33,3

Handling and milk processing potential of dairy cooperatives

As recognized FGD cooperatives member develop milk production and processing habits besides their home consumption, this is similar with as stated; the demand for milk by the family and its neighbors and access to a close market is determinant for the level of extra milk production [10]. But sampled respondents use traditional technologies to process milk to dairy product such as butter, ghee, ayib and sour milk. As reported in table 3: sample households faced several problems like: lack of keeping sanitation of milk equipment (23%) and their cows (13%) and they are un able to afford milk processing machines.

In dairy cooperatives as well as coop members, milk is traditionally preserved into different products like ghee/ butter (23%) and cheese (20%). Since, milk products are more stable than fresh milk because they are more acidic and/or contain less moisture. Households processing milk into fermented milk products like; butter, (Enatna Lijoch, Tagleh edge, Yewotet ray; 29.2%, 29.2%, 41.7%) Ergo (Enatna Lijoch, Tagleh edge and Yewotet ray are 33.3%) and Ayib (Enatna Lijoch, Tagleh edge, Yewotet ray; 50%, 41.7%, 8.3%) respectively represent the most marketed products next to whole milk. It is therefore important to look into their processes in relation to hygienic conditions practice during handling. Milk processing is not well-developed in the cooperatives member. But, it is important to consider these processes and look to possible technological accessing to the study area dairy cooperatives production improvement.

Challenges and prospects of dairy cooperatives

At the beginning, the cooperatives principally established from local communities who have dairy cows and few college-graduated youths, which are responsible for coordination and marketing of the inputs and outputs. The principle was

Table 4. Types of processing milk product in cooperatives

Processed product	Enatna Lijoch		Tagleh edge		Yewotet ray	
	N=20	Percent	N=20	Percent	N=20	Percent
Whey	NA		NA		NA	
Yoghurt	5	33.3	5	33.3	5	33.3
Cheese	6	50	5	41.7	1	8.3
Butter	7	29.2	7	29.2	10	41.7

Table 5. problems and requirements of cooperatives (household's percentage)

Variables		Enatna lijoch		Tagleh edge		Yewotet ray	
		N=20	Percent	N=20	Percent	N=20	Percent
Government facilitate market	Yes	9	75.3	11	71.9	8	62.5
	No	11	34.7	9	28.1	12	37.5
access of improved breed	Accessible	5	71.4	2	28.6	0	0
	No access	15	28.3	18	34.0	20	37.7
Access to credit	Accessible	8	26.7	10	33.3	12	40.0
	No access	12	40	10	33.3	8	26.7
Breed replacement	Replaced	11	37.9	8	27.6	10	34.5
	Not replaced	9	29	12	38.7	10	32.3
access of land	Yes	14	34.1	12	29.3	15	36.6
	No	6	31.6	8	42.1	5	26.3
Access to training	Yes	7	35	5	25	8	40
	No	13	32.5	15	37.5	12	30
Access to water	Yes	17	39.5	14	32.6	12	27.9
	No	3	17.6	6	35.3	8	47.1
Marketing problem	Yes	3	23.1	6	46.2	4	30.8
	No	17	36.2	14	29.8	16	34.0

collecting the milk from each member of the cooperative by measuring the amount and then distributing it; if there is leftover, processing it (only pasteurizing and making yoghurt in traditional way). As depicted from Table 5, the minimum number of milking cows holding per personas 2 cows from *Enatna lijoch*, three cows from *Tagleh Edeg cooperative* and one cow from *Yewotet ray* dairy cooperative members. The major problems described by the sampled cooperative members during interview and focus group discussions were lack of milk processing facilities and skills, insufficient production area, poor sanitation, lack of water and fencing materials for farm site, and poor milk production potentials of dairy cows. Similarly, [Tegegne et al, 2013] who reported that differences in breed type hinder incentives for intensification of dairying at the producers' end of supply chain support it.

In order to maximize milk production potentials and profitability of the cooperatives, focus group discussion participants pointed two possible ways that evoke urgent action. They believed that the genetic potential of their dairy cows is poor especially for milk production traits. About (49.4 %) of the respondents indicated that breed replacement by other more productive strain/blood group is a typical solution for the low productivity of the cooperatives. However, majority of the respondents (51.6 %) believed that breed replacement along with practical based training can effectively reduce our expenses and will improve our profitability and productivity (Table 5).

In order to make cooperatives more profitable and capable to feed their households as well the community, participants listed many prospects that needs the hand of government or NGOs. Currently, the cooperatives are trying to supply dairy products to consumers by their own effort without any technical and scientifically support. As their report, there was no any extension service that motivates and supports them in nearby distance about how to run an effective dairy business. This is supported by [Ruerd et al, 2017] reported that most cooperatives lack clear vision and goal, are inefficient and ineffective, have limited knowledge and skill in dairy husbandry and dairy business, lack transparency and accountability and tend to be more dependent on support from the public sector and NGOs. Particularly, they had high interest to obtain milk-processing machines in order to save surplus milk from spoilage and lose during fasting season. In addition, processed milk into

Table 6. average supply and selling of products at cooperatives shop

Types of product	During non-fasting season		At the fasting season	
	Amount of supply in litter	Price/litter	Amount of supply in litter	Price/litter
Milk	135 -150	18	90	10
Yoghurt	40 -55	20	20 -35	15
Cheese	15	40	10	35
Butter	6	180	9	170

different type of cheese and butter has high demand in the area.

As they indicated in the focus group discussion, their income is limited, purchasing these equipments by themselves become difficult and over their current purchasing capacity. At the same time, about (88.3%) of the respondents also showed their high interest to have improved cattle breeds as depicted from Table 5. The cows kept by the households are less productive and even their exotic blood level is undefined/unknown. Hence, for the future a condition that can fulfill their interests' interims of presenting the recommended level of exotic cattle blood composition and processing equipments are expected from government bodies or any other NGOs. Moreover, the cooperatives also seeks a professional training about farm management and ways of product processing and handling; loan for fulfilling necessary inputs and watering system for the farms were also among the list of cooperatives expectation from concerned body. Presenting/ providing suitable working areas, if possible fencing materials for their farm compounds and a suitable market linkage were also reported as the main requests of the cooperatives for anyone who involved in any development activities.

Supply and current prices of milk products in the cooperatives

The focus group discussion revealed that, raw milk is the only dairy product supplied regularly to the local consumers by *Enatna Ijoch*, *Tagleh edge* and *Yewotet ray* dairy cooperatives throughout the year. In some instance, pasteurized milk and or yoghurt also presented to the market. However, the remaining milk products like cheese, ghee, and butter were not processed and produced by the cooperatives due to lack of necessary equipments and skills for processing it. In contrary to the current study furred [Phanchung et al, 2012] reported that dairy cooperatives in central part of Ethiopia processed milk into reduced fat milk, butter, cheese, and yogurt and then directly sold to the consumers. The average price per liter of milk at cooperatives shop was 18 and 20 ETB for yoghurt (Table 6). Transporting milk for long time to in each milking session seems somewhat difficult, tedious, and labor intensive. It is because of inaccessible transport facilities and the weak capacity of the cooperatives to rearrange the conditions by themselves. Hence, transportation is one of the factors that hinder the supply of dairy products to the consumers. It is in line with the previous study that says, in Bhutan supply of dairy products is influenced by a variety of factors including production, transportation, price, and season [Ruerd at al, 2017]. As showed from Table 7, the average amount of milk supplied for market per day per cooperative was 142.5 liters and 47.5 liters for curd/yoghurt.

Sample cooperative members reported that, during non-fasting season there is marketing, all dairy products could be sold immediately it reaches at a collection site. However, during fasting season, out of these daily supplied milk and yoghurt, only 90 liters of milk and 20-35 liters of yoghurt can be sold to the consumers. As the difference indicates, there is probability of wastage of milk and yoghurt that considered as expenses for the cooperatives. Therefore, urgent solution is required to save left over milk either in the form of extending a suitable market linkage or fulfilling necessary inputs for processing it into cheese, ghee, and butter that are known by long shelf life. Because, the local consumers still brings these dairy products from Addis Ababa or importers in a high prices (Table 6). Demand of liquid milk in Gondar towns

As we know, the product of dairy farms is milk and milk by-products. This milk also needs a consumer that can generate revenue and then the income will motivate the farm owner for better enhancement. At the same time, this survey tried to assess the daily demand of direct dairy product consumers like hotels, restaurants, and cafeterias. According to the information obtained from hotels and restaurants, the average purchasing price of milk was 16 Ethiopian birr per liter (ETB) and 18 ETB for a liter of curd/yoghurt (Table 6).

There is a slight price difference between milk sold to customer hotels and sold from cooperatives shop. Since, hotels had a contractual agreement, the prices for them is slightly lower than the selling price of milk at the shop for any one-time customers. In addition, yoghurt is not always available like milk. Yoghurt is only processed when, the season/ day is fasting time, or in a condition at which transporting and delivering fresh milk to consumers become difficult. The average demand of milk and yoghurt per hotel per day was 10 and 8, liters respectively (Table 7). The reported average intake of both milk and yoghurt per hotel per day was also varying 5 to 7 liters. Even if private dairy households are also involved in supply of dairy products, the hotels, restaurants, and cafeterias daily intake is below their current daily demands. Hence, when we

Table 7. Hotels average demand and purchasing price of milk products

Variable	Parameters	Milk	Yoghurt	Cheese	Butter
Availability of dairy product in coop/litter	Demand/day/hotel/litter	10	8	4	1.5
	intake/day/hotel/litter	7	5	2	1
	Price/litter	16	18	200	200

Table 8. demand and purchasing price/litter of processed products in Gondar town

Variables	Pasteurized milk	Mozzarella cheese	Roller cheese	Provolone cheese	Parnassian cheese	Local butter	Ghee
Price	20	200	100	120	150	105	180
Demand/hotel/week	25	17.2	8	6.7	7	11.5	7
Source	Bahir Dar	Addis Ababa	Addis Ababa	NA	Addis Ababa	Local	Local

examine the difference between the current daily intake of direct consumers and their daily demands, there is a considerable gap. Around 3 liters of milk and/or yoghurt demand per day per hotel is not filled. This uncovered demand of consumers might be considered as an opportunity to sustain and expand the cooperatives fate. It can be seen as deriving force for the dairy cooperatives to strengthen their full power for a better productivity and profitability. Demand of processed dairy products in Gondar towns

At every town Ethiopia, milk is available in a reasonable price when we compared it with cheese and other processed dairy products. Nevertheless, processed milk into different cheese and butter types are not commonly found at anywhere of the country. They are available in a limited amount in only the capital and/or some regional cities of the country. However, there is high demand for processed dairy products in tourist destiny sites like Aksum, Gondar, Lalibela, and so on. It is contrast with the reports of [15] who stated that consumer demand for improved dairy products is also limited, thus restricting their willingness to purchase higher quality dairy products. Since, Gondar is one of the centers of tourists, different types of processed dairy products are highly demanded. Due to this fact, considerable amounts of processed dairy products were also transported from the center of the country to the Gondar town.

Specially, different cheese types are vital to make tourists favorite foods like pizza, burger, and so on. Different cheese types are always transported from Addis Ababa to Gondar across 738km distance. This is because of the lack of processing facilities and skills in the area. The existing dairy cooperatives reported, as they want to process the milk collected in their center during fasting time and supply to the surrounding consumers/hotels. To do this, they sought a training plus support of necessary processing equipments and continual buttress from extension services. Even due to long distance transportation, the prices of cheese types seem costly when we relate it with production site (Table 8). Table The focus group discussion revealed that, only two types of cheese and two types of butter are regularly transported from Addis Ababa to the area. The highly demanded cheese type by the local hotels was Mozzarella, which cost 200 ETB per kg. The average demand in Gondar town for this type of cheese per week/hotel was 17.2 kg (Table 8). The second type of cheese demanded by local consumers was Roller cheese, which costs 100 ETB per kg. Relatively it is the cheapest cheese type and its average demand of hotels was 8 kg per week. Provolone and Parnassian cheese types were reported, as they are transported from Addis Ababa to study area in order to satisfy the demand of local consumers and tourists. As indicated from Table 7, on average 6.7 kg of Provolone cheese demanded per week per hotel. At the same time, ghee and local butter were also transported from Addis Ababa to the study sites, when a scarcity and quality matter exists. On average 7 kg of ghee per week per hotel was required especially during non-fasting season. Hence, except milk, yoghurt and a limited local butter the remaining dairy products are supplied from Addis Ababa and Bahir Dar.

CONCLUSION AND RECOMMENDATIONS

The current production potential of dairy cooperatives was found very low due to poor quality and supply of feeds and poor genetic potentials cows for milk production. The dairy products varieties supplied by the cooperatives for local consumers are raw milk, curd/yoghurt, cheese and butter. This limited supply potential of dairy product varieties in dairy cooperatives is due to concurrent effects of lack of milk processing facilities, low initial capacities, insufficient production area, and shortage of water, low extension service and consultancy of expertise, lack of government support, accidental death of dairy cow,

shortage of yard and fence, and low production potentials of dairy cows. During the fasting season milk supply is always greater than demand unlike the non-fasting season. Hence, presenting milk-processing technologies with practical based trainings should be expected from government bodies or any other NGOs, and then capable local cooperatives to process surplus milk into cheese/butter during fasting season. On the other hand, different cheese and butter types have high demand in the area, better price, and long shelf life than liquid milk. Actually the farmer may difficult to fulfill all necessary requirements, therefore, to satisfy the demand; the existing cooperatives must be empowered through supporting and fulfilling their limitations.

References

- Asfaw Negassa, (2009).. Improving smallholder households marketed supply and market access for dairy products in Arsi Zone, Ethiopia. Research Report 21. ILRI (International Livestock Research Institute), Nairobi, Kenya, pp. 1-109.
- Emana Bezabih, (2009).. Cooperatives: a path to economic and social empowerment in Ethiopia. Coop Africa Working Paper No. 9. ILO Dares Salaam, Tanzania, p. 44.
- Fikrineh N, Estifanos T, Tatek W, (2012).. Microbial quality and chemical composition of raw milk in the Mid-Rift Valley of Ethiopia. *AJAR* 7(29): 4167-4170.
- Getachew Felleke, (2003).. Milk and Dairy Products, Post-harvest Losses and Food Safety in Sub Saharan Africa and the Near East. *A Review of the small scale milk sector in Ethiopia*
- Kedija Husien, (2008).. Characterization of milk production system and opportunity for market orientation: A case study of Mieso district, Oromia Region, Ethiopia. MSc thesis. Haramaya University, Ethiopia.
- Netherlands Development Organization. (2008).. Study on Dairy Investment Opportunities in Ethiopia. p. 1-59.
- Phanchung, Phub Dorji, Thubten Sonam, Kinley Pelden, (2012).. Smallholder Dairy Farming in Bhutan: Characteristics, Constraints, and Development Opportunities. p. 1-18.
- Ruerd Ruben, Alemayehu Dekeba, Bekele Birhanu, Megersa Lenjiso. (2017).Quality upgrading in Ethiopian dairy value chains: dovetailing upstream and downstream perspectives, *Review of Social Economy* 75(3).
- Sintayehu Yigrem, Fekadu Beyene, Azage Tegegne, BerhanuGebremedhin, (2008).. Dairy production, processing and marketing systems of Shashemene-Dilla area, South Ethiopia. Improving Productivity and Market Success of Ethiopian Households: Project Working Paper 9. ILRI, Nairobi.
- 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. IPMS (Improving Productivity and Market Success) of Ethiopian Households Project Working Paper 31. ILRI, Nairobi, p. 1-78.