Full Length Research Paper

Assessment of factors and factors affecting milk value chain in smallholder dairy farmers: A case study of Ada'a District, East Shawa Zone of Oromia regional State, Ethiopia

Girma Debele[1]* and Marco Verschuur[2]

[1]Girma Debele Delelesse. Adami Tulu Agricultural Research Center P. O. Box 35, Ziway, Ethiopia.
[2]Marco Verschuur. Van Hall Larenstein University of Applied Science Part of Wageningen University, Co-coordinator of Professional Master Program Agricultural Production Chain Management (APCM) and Co-coordinator of APCM Specialization Livestock Chains, Netherlands.

Analysis of factors affecting milk value chain in smallholder dairy farmers was conducted in Ada'a district to strength the position of smallholder dairy farmers in milk value chain. Purposive and simple random sampling was employed as sampling techniques to select 100 smallholder dairy farmers 50 from urban area and 50 farmers from rural area to collect the required information. The data was collected through semi-structured questionnaire survey and analysed by using appropriate Statistical Package for the Social Sciences (SPSS) statistical software. Value chain mapping was used to show both qualitative and quality data collected during the filed study period. Different factors affecting milk value chain in smallholder dairy farmers were identified. Among these factors reduction in volume of milk produced, high cost of different inputs (animal feeds, improved breeds), high barging power of trader, weak relationship of dairy cooperative with its members, long fasting period of Ethiopia Orthodox Church are identified as the major factors affecting milk value chain in smallholder dairy farmers. Out of the total interviewed farmers in the urban area about 50% of the respondents produced 10.5 L of milk per day per cow from cross breed cow. On the other hand, smallholder dairy farmers live in the rural area only produce 2.6 L of milk per day per cow from local cow. Hence, to improve the position of small holder dairy farmers in milk value chain there should be strong relationship between dairy cooperative and smallholder farmers inorder to get economic benefit and to secure market access from dairy cooperative.

Key words: Factors affecting milk value chain, smallholder dairy farmers, animal feeds, dairy cooperative.

INTRODUCTION

In Ethiopia, agriculture is the most important economic sector contributing by 43% to the gross domestic product (GDP), providing 85% of the foreign earnings and employing 85% of the labour force (Deresa, 2010). Hence, the capacity of the nation to address food insecurity, poverty, and to bring sustainable national

*Corresponding author. E-mail: debelegirma@gmail.com, Tel. +251911776412.

economic growth and development is highly dependent on the improvement of agriculture. The livestock sub sector also plays a vital role as sources of food, income and foreign currency to Ethiopian economy and contributes about 12 and 33% of the total and agricultural GDP, respectively.

Ethiopia holds the largest livestock population in Africa estimated to about 52.13 million cattle, 24.2 million sheep and 22.6 million goats (CSA, 2012). The total annual national milk production in Ethiopia comes from about 10 million milking cows and is estimated by 3.2 billion litres that is, 1.54 L/cow on average (CSA, 2012). The dairy value chain comprise about 500,000 smallholder rural farmers who produce about 1,130 million litres of milk of which 370 million litres of raw milk, 280 million litres of butter and cheese and 165 million litres is consumed by the calves (Mohammed, 2009). The remaining 315 million litres was marketed through both informal and formal retailers through farmers' organizations.

Ada'a District is one of the 12 districts of East Shawa Zone of oromia regional state which is well known in dairy production and produce huge amount of milk per annual which is estimated about 10, 678,045 L of milk. In the study area, this milk is marketed through different channels, formal through dairy cooperative and informal via private milk processing company.However, the concept of milk value chain development approach is not well known in Ethiopia and the underlying factors affecting the milk supply are not well addressed. As a result of this, most small holder dairy farmers' could not get fair share from milk value through sustainable milk and milk products marketing.

Moreover, this share is exploiting by middle man (traders) who collectedhuge volume of raw milk from smallholder dairy farmers in rural areas with low price. Therefore the research designed to cover the following objectives farmers with the following objectives: To identify different factors and actors affecting milk value chain in smallholder dairy farmers; to strengthen the position of small holder dairy farmers in milk value chain in the study areas; to examine the performance of smallholder dairy farmers and other actors in milk value chain in the study area; to assess milk quality measures exist along milk value chain in the study area.

Research questions

(1) What are the different factors and actors that affect milk value chain in small holder dairy farmers in the study area?
(2) What is the current potential of milk production in the study area?
(3) What are the different factors that determine farmers to choose different marketing channels in the study area?
(4) What quality control measures are applied by actor in the chain?

MATERIALS AND METHODS

Description of the study areas

The study was conducted in Ada'a district located at 38 km South East of Addis Ababa, the capital city of Ethiopia at 8°44N and 39°2E, and an altitude of 1880 m above sea level. The area receive a mean annually rain fall of 865 mm with mean minimum and maximum annual temperature of 15 and 28°C, respectively. This district covers an area of 1750 km², stretching East of the Bole international airport to the North of the Koka dam. The population in Adama, Addis Ababa, Mojo and Bushoftu create a large market opportunities for most dairy products produced in this district . Simple random sampling methods was employed to select a total of 100 smallholder dairy from urban and rural areas to generate the required information. Then 50 smallholder dairy farmers both from urban and rural areas were purposively selected. Finally 25 members and 25 non-members of dairy cooperative were again purposively selected to collect the required information through semi structure questionnaire survey.

Method of data collection

Semi-structured questionnaire survey (with check lists) is/are the main tool(s) of data collection   to extract the required information both from urban and rural in the study areas. Value chain mapping of was implemented to show both qualitative and quantitative data collected during the field study period.

Method of data analysis

To process and analysis the collected data, value chain mapping and Statistical Package for Social Sciences (SPSS) statistical software of 19 version was used. Data collected through semi-structured questionnaire survey was processed by using SPSS statistical software version of 19.Chi-Square tests and descriptive statistics were used to analysis the survey data collected from smallholder dairy farmers through semi- structured questionnaire survey in the study areas.

RESULTS AND DISCUSSION

Different actors involved in milk value chain were interviewed to illustrate their position and roles in milk value chain in the study area. Smallholder dairy farmers live in urban and rural areas were interviewed during the field study time and its results were summarized and presented in the Figure 1.

Demographic characteristics of dairy producers

Demographic characteristics of dairy producers interviewed with semi-structured questionnaire survey during the field study period are presented in the following sections.

Age

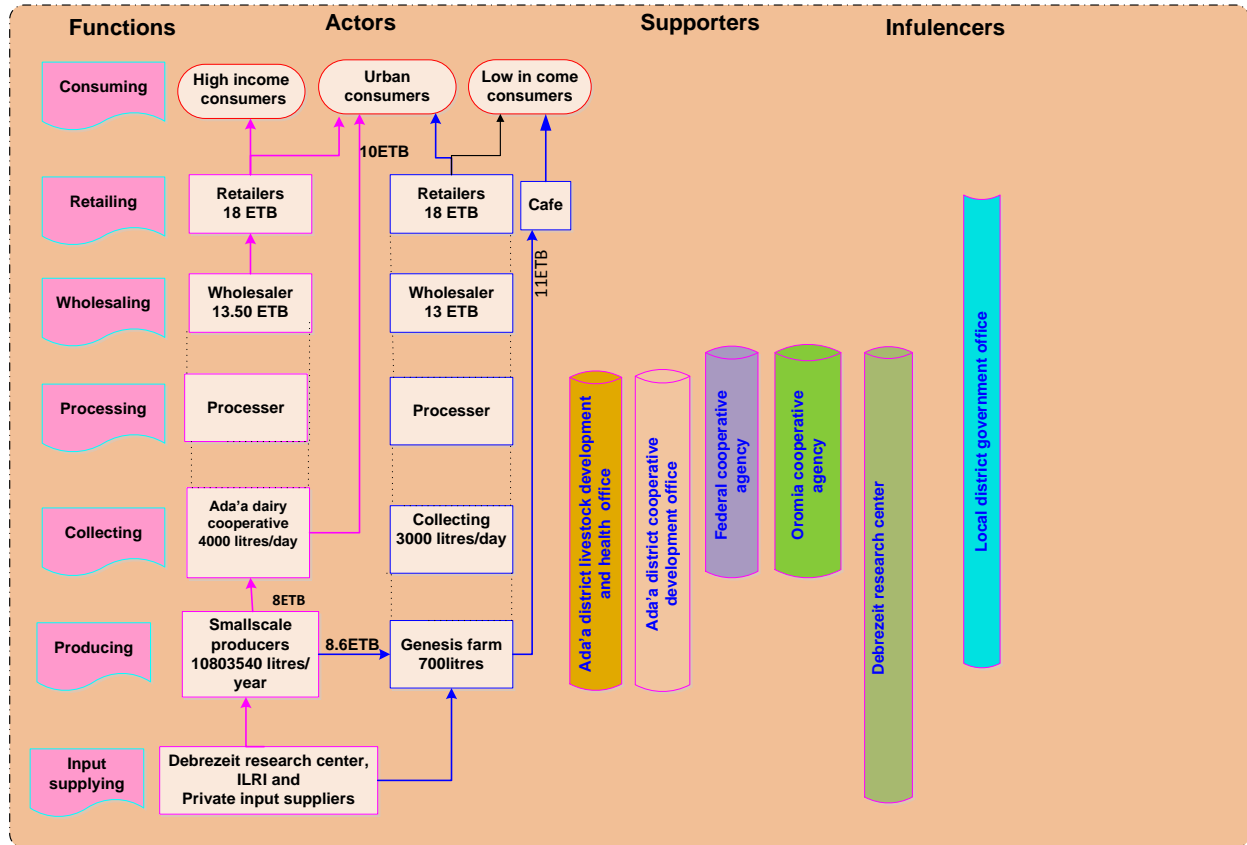Dairy farmers live in Urban area had an average age of 43 while rural dairy farmers who do not involved in formal

Figure 1. Milk chain map of the study areas.

milk marketing channel had 41 years old.

Religion

Due to long fasting period of Ethiopia Orthodox religion church, most of the consumers in the study area do not consume animal origin during this time. The survey result revealed that Orthodox religion is the most dominate type of religion in the study area and has great influence on milk marketing system in the study area.

Sex

Out of the total respondents about 58% of the interviewed small scale dairy farmers involved in formal milk value chain are male whereas 42% involved in informal milk marketing channel are female.

Educational background

Out of the total interviewed about 64 and 20% of the respondent farmers have reached primary and secondary education, respectively whereas about 14% of the respondents have never been in school. The survey results showed that 6% of the interviewed farmers who have not been in school did not deliver their milk to the dairy cooperative and they sell their raw milk to private milk collectors and direct to local consumers. Only 10% of the interviewed farmers who live in urban and rural area and who completed secondary school level have delivered their milk to dairy cooperative. From the total interviewed farmers both in rural and urban areas, about 35% of the respondents dairy farmers have reached primary education level and sell their milk to directly to the local consumers and private milk collectors.

Quantity of milk produced, consumed and sold by smallholder farmers

The interviewed made with small scale dairy farmers indicated that milk yield is highest during the first five months of lactation and declines then up to the end of the lactation period. However its production depends on the month of calving and availability of feed during the summer season of the year when there is an excess amount of animal feeds. Milk production is high during

May to September since feed supply is adequate. The mean milk yield produced per day by smallholder farmers during the rainy season was 24 l, of which 10.41 and 89.59% was home consumed and sold respectively while during the dry season of the year the mean milk yield in the study area was 21 l, of which 7.6 and 92.4% was home consumed and sold, respectively. Milk sold during dry season is relatively higher than milk sold during summer season because of high demand of milk during dry season than rainy season.

On average 75% of the interviewed small scale dairy farmers in the study area had 3 milking cows. Out of the total 50% of the interviewed farmers in the urban area were produced 10.5 l of milk per day per cow from cross breed cow. On the other hand, smallholder dairy farmers live in the rural area only produce 2.6 l of milk per day per cow from local cow. Because of this, most of the interviewed farmers in the rural area do not want to have local cows. Most of the interviewed small scale farmers in study area indicated that, the average laction length of cross breed and local cow were 240 and 255 days, respectively.

Approximately 10, 803,540 volume of milk is produced per year in this district's. In the study area, most of smallholder farmers in urban area use zero grazing to feed their cows. The interviewed made with rural dairy farmers indicated that large portion of milk produced in this area was directly sold to local consumers where the producers can earn high price per litre of milk. About 63% of the interviewed farmers in the study district reported that the trend of their milk production was decreased because of the herd size is reduced as a result of shortage of animal feeds. Out of the total interviewed farmers 61% of the respondents farmers indicated that their average herd size decreased as compare to the previous year. Out of the total interviewed, 68% of the respondents indicated that dairy derived income was decreased due to reduction in volume of milk produced as a result of limited number of herd size and shortage of availability of animal feeds.

Utilization of milk

In the study, district the interviewed farmers indicate that milk produced in rural area under go different process after the milk was produced. The dairy farmers 'also used the milk produced for different purposes. Some farmers directly sell their milk to the neighbouring consumers without processing of the milk whereas other farmers locally process their milk into different products such as butter and cheese to sell to local market.

Dairy activities and source of animals feeds

Dairy activities

The survey result revealed that about 67% of the

resopndents in the study district were used family labour for dairy production and dairy related activities. Whereas only 33% of the intereviewed farmers were used hired labour for their dairy business. Out of the total interviewed farmers 55 and 12% of respondents live in rural and urban area used family labour to carry out their dairy activities respectively. But only 27 and 6% of the respondends found in urban and rural area did not use family labour for dairy production.

Source of animals feeds

The survey result revealed that all of the interviewed dairy farmers live in urban area do not have any grazing land where as smallholder dairy farmers found in rural area have on average 1.3 ha of crop land and they use crop residues for feeding of milking cow especially during the dry season of the year at critical shortage of animal feeds (Figure 2).

The survey result indicated that most of the respondants in the study district were used purchased feeds such as nough cake, wheat bran, mixed feeds, grass hay and crop residues for feeding of their animals and they provide on average 2.5 kg of concentrate feeds per day per milking cow. However, if they want to get high volume of milk from their cow they slightly increase the amount of cencentrate given for their cow.

Factors and actors affecting milk value chain in the study area

During the field study period there is reduction in volme of milk produced by smallholder farmers due to low availability of animals feeds, high cost of animal feeds,high barging power of private milk collectors, weak relationship of dairy cooperative and its members were identified as the major factors and actors affecting milk value chain in the study areas. Some of the major problems/constraints that faced different actors involved in milk value chain of the study area were assessed and it resuluts was summaried in Figure 3.

Actors' shares in formal and informal milk value chain

Based on the collected information during the filed study period the value share of each actors involved in formal and informal milk value chain of the study area were calculated and shown in Figure 4.

DISCUSSION

Inputs providers

During the field study period some of the governmental

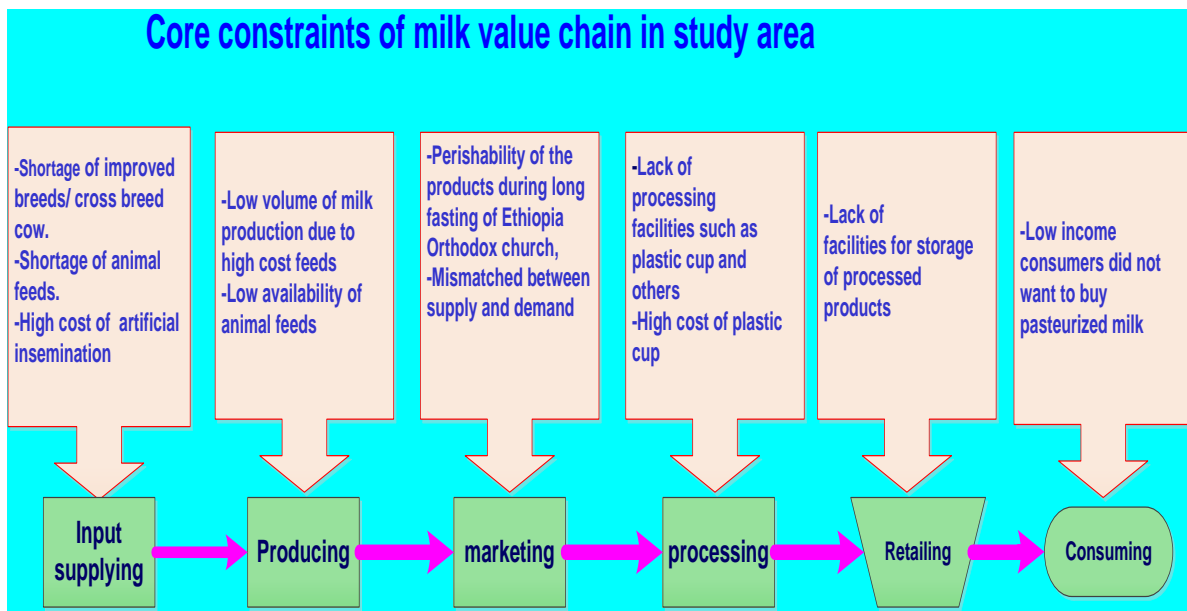**Figure 2.** Indicate marketing of crop residues for animal feeds.

Figure 3. Factors affecting milk value chain in the study areas.

and non-governmental organization involved in provision of AI service, veterinary service, improved forage varieties and value addition technologies were identified. Among these actors Debrezeit agricultural research center, Addis Ababa university faculty of Veterinary medicine, National artificial insemination center, Ada'a dairy cooperative and private sectors are some of the major actors who closely support smallholder dairy farmers in provision of different inputs to improve production and productivity of livestock in the study area.

This field study result and the finding of Anteneh (2008) have similarity who reported that governmental organiaztion and private sector play a vital role in provision of different inputs. Anteneh (2008) also categorized the service delivery system of the study area into four main types such as animal feed suppliers, animal health providers, AI and improved bull service providers and financial service providers.

Non-governmental organizations also provided improved forage and pasture seeds, trainings and
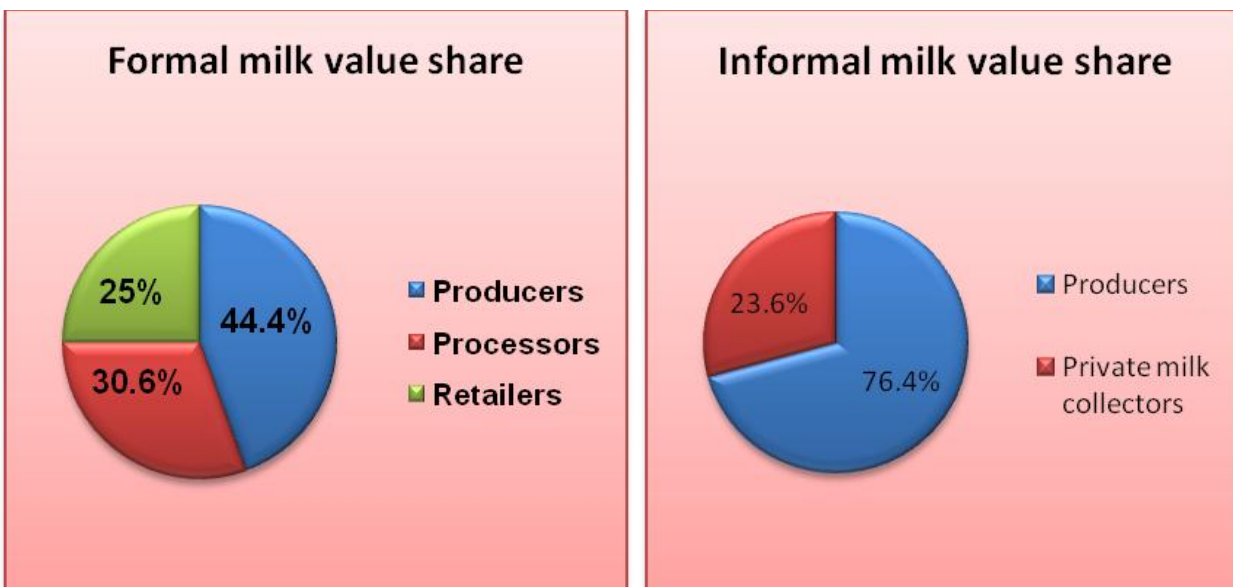
Figure 4. Indicate formal and Informal milk value shares.

demonstrate dairy technologies for the target farmers in the study area. However there is limited capacity of value chain actors in supplying inputs and there is high demand for cross breed dairy cow and other inputs from regional government. Some farmers indicated that AI service provided by private sector is very expensive (50 to 70ETB per cow) as compare to AI service provided by Ada'a dairy cooperative which cost 30ETB per cow. SNV(2006) reported that the cost of bull service is 15 ETB and the cost of AI service is 12ETB. This variation in cost of AI service is because of the cost of crossed breed heifer/cow is very expensive now a day. Hence farmer prefer to have crossbreed heifer by inseminating his loca cow with exotic semen rather than buying cross breed heifer with high cost.

Milk production

Most of the interviewed small scale dairy producers in the study area produce on average 10.5 and 2.6 l of milk/ day/ cow from crossbreed and local cow, respectively. This finding is aligned with the finding of Anteneh (2008) who reported that average milk yield per cow per day from cross breed and local cow were 9.63 and 2.10 L, respectively. This variation in the average milk yield per cow between cross breed and local cow is attributed due to the difference in breed, management and feed systems. On average, farmers in the study area produces 2520 and 535.5 L of milk per cow per year from cross breed and local cow, respectively. The current average milk produced from local breed cow is comparable with the study conducted by Alemu et al. (2000) who report that the milk yield of local cow was 400-680 kg of milk

per cow per lactation period. Holloway et al. (2000) reported that cross breed cow produced 1120-2500 L over a 279 day lactation period.

The survey result revealed that average lactaion length of cross breed and local cows in the study area was found to be 240 and 255 days, respectively. This is because of the fact that some of dairy farmers reported that they have milked their cow even during the whole pregancy period. This finding have similarity with the finding Solomon (2008) who reported that the average lactation lengeth of cross breed daiy cow is 249.9 days. According to Holloway et al. (2002) the average lactation length of cross bred was 279 days. This difference in lactaion length of cross breed dairy cow is because of the effect of the availability of animal feeds during rainy and dry season which prolonged or shorted the heat period. Smallscale dairy farmers in the study area have 3 crossbreed and 1 to 2 local milking cows and they produced 23.95 and 21 L of milk per day during rainy and dry season, respectively.

Milk marketing channels

Out of the total interviewed smallholder dairy farmers, 59% of the respondents sold their raw milk through informal milk marketing channels. Whereas 41% of the respondents farmers were sold their milk through formal channels. There are many milk marketing channels through which smallholder dairy farmers sell their dairy products. However, most of the dairy farmers in the study area preferred to sell their milk through informal chain where they get high price per litre of milk. This finding have similarity with the finding of Van der Valk and

Tessema (2010) who reported that 98% of milk produced in rural area were sold through informal chain whereas only 2% of the milk produced reached the final consumers through formal chain.

The proportion of total production being marketed through the formal markets still remains small. Formal markets are particularly limited to peri-urban areas and to Addis Ababa. Van der Valk and Tessema (2010) reported that informal milk marketing channel is characerized by no licensing requirement to operate, low cost of operations, high producer price compared to formal milk marketing channel and no regulation of operations. Because of this, most of smallholder farmers in study area want to sell their dairy products where they get high price.This system of milk marketing channel still remained dominant in the study area.

The interviewed made with the General manager of Ada'a dairy cooperative indicated that Ada'a cooperative flow both formal and informal milk marketing channels to sell their raw milk and processed dairy products. On average, this organization sell 134 L of raw milk per day to low income urban consumers at each milk collection centres soon after collection of milk. The reason why this cooperative is involved in direct selling of raw milk to low income urban consumer is the high demand of milk in the study area. In this area, supply is very far below demand as a result of this, the dairy cooperative sell one litre of milk by 10 ETB to low income urban consumers. Some time when the demand is very high during dry season and before long fasting of Ethiopia Orthodox church, the dairy cooperative sell one litre of milk by 12 ETB. However, during long fasting period of Ethiopian Orthodox church almost for about two month started from mid-February to mid-April most of the people in the study district abstain eating of animal origin. During this time the demand of milk and milk product is very low and the cooperative and dairy farmers in the study area faced big challenge to sell their dairy products.

Van der Valk and Tessema (2010) indicate that the calendar of orthodox Christian church involves three prolong fasting period per year (before Easter, in August, in December) and two fasting period every two weeks (Wednesday and Friday) for a total of more than 200 days per year. During fasting period, most Orthodox Christians abstain from consuming products of animal origin. The survey result showed that about 57.5% of the interviewed farmers are Orthodox religion follower and they do not consume animal origin during this time. The study conducted by SNV (2006) also indicated that orthodox Christian comprises about 60% of population of the study areas. This indicates that many people of Ethiopia are Orthodox religion believers and they have great role in milk marketing during the long fasting period.

There is also mismatching in the supply and demand of dairy products during long fasting and after fasting period. After fasting most of the members of the dairy cooperative start to sell their milk to private milk collectors and directly to local consumers. As a result of this, Ada'a

dairy cooperative did not get enough amount of milk. But during the long fasting period all the members of the dairy cooperative return back to the dairy cooperative to sell their raw milk. Even though the dairy cooperative decrease the purchasing price of milk, the members accept what the cooperative paid for them due to they do not have any option. There is price difference during long fasting period and after long fasting periods. During long fasting period Ada'a dairy cooperative purchase one litre of milk by 7.25 ETB from its members and other private milk collectors did not change the purchasing price of milk from the farmers.

Reduction in volume of milk production

Out of the total interviewed farmers, 62.5% of the respondents indicated that the trend of their milk production decreased. Especially, respondents in the rural area mentioned that there is a shrinkage of grazing land in the study area because an expansion of cereal production due to an ever increasing of human population. As a result of shrinkage of grazing land, some of the interviewed farmers reduced their herd size and has changed large number of local cow to few number of crossbreed cows due to the problem of animal feeds. From the field study result, it was observed that 55% of the respondents were mentioned as the trend of their herd size is steadily decreased as compare to the previous year. This reduction in herd size in the study district lead to an overall reduction in volume milk produced in the study areas. As a result of reduction in volume milk produced by small scale dairy farmers, the members could not deliver the same volume of milk as they have been delivered. On top of this, availability of the required amount of feeds also create a big problem to produce and deliver the volume of milk needed by the processing plant.

Production cost

From the total interviewed farmers, 67.5% of the respondents farmers rank high cost of animal feeds as the main problem of milk production in the study area. UNIDO (2009) reported that due to severe shortages of animal feed supplies, the cost of running a dairy farm is becoming more expensive. He also indicate that ever increasing cost of feed was the primary reason that one of company assessed closed its dairy farm and continuning processing by outsourcing the milk. Similarly, some small holders in regional towns also closed their farms because of the scarcity of feed supply or excessive cost of feed. Similar to this finding, SNV(2006) reported that in cmmercial dairy production system, feed costs constitute 74% of the total on farm production costs while labour cost accounts for only 6% of farm costs.

SNV(2006) also stated that Ethiopia has high cost of

production because of about 70% of the farmers produce less than half of their fodder requriment and rely on bought commericial cut and carry fodder, brewer's waste and oilseed cakes.

The current field study also indicated on average smallholder dairy farmers in urban area cost 29 ETB to feed one milking cow per day to produce 10.5 L of milk per day per cow from crossbreed cow. Most of the interviewed farmers indicated that the cost of animal feeds increase from time to time but the price of milk is very cheap as compare to the cost of animal feeds. The study district is well known by cereal production especially white teff and other cereal crops. As a result of this there is no free grazing land, this make the price of animal feed very high relative to other places. There is a big problem in availability of animal feeds both in quantity and in quality which affect the volume of milk produced by the farmers consequently which influence the volume of milk collected by the Ada'a dairy cooperative. Out of the total interviewed farmers, 87.5% of the interviewed farmers indicate that the trend of availability of animal feeds is decreased. Not only cost of animal feeds but also the availability of animal feed is also very challenge for small-scale dairy farmers to feed their animals. This is because of an ever increase of human population which leads to expansion of cropping land and construction house for human dwelling. This leads to shrinkage of grazing land which is consequently affects milk production.

Conclusion

From the field study conducted, it was conculded that many factors affect milk value chain value of the study area. Among these factors, shortage of animal feeds which leads to reduction of volume of milk produced by small holder dairy farmers is identifed as one of the major factors which affect milk value chain of the study area. High cost of inputs especially feed cost negatively affects expansion of dairy farming activities as rural farmers do not use concetrate feeds to improve their milk production. This conesuqently affects overall reduction of volume of milk produced by smallholder dairy farmers to deliver enough volume of milk to milk processing companies and to local market. Trader play a vital role to expoilt smallholder dairy farmer's share of milk value by provided low price per liter of milk as compare to private milk processing comapany. In addition to this long fasting period of Ethiopian Orthodox religion church create a problem on milk marketing of smallholder dairy farmers during this time bacuase majority of Orthodox believers abstain from eating of animal origin food.

RECOMMENDATION

(1) To strengthen the position of smallholder dairy farmers in milk value chain adequate inputs should be provided for small holder dairy farmers in the study areas.
(2) Members must be delivered all volume of milk they produced to dairy cooperative in order to get equal economic benefit from the organization.
(3) For better marketing of milk and milk products, dairy farmers should be organized into dairy cooperative to sell huge volume of milk to dairy processing company/ plant in order to earn high price from their dairy products.

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