



Milk Value Chain Analysis: The Case of Urban and Peri-Urban Areas of Ambo and Dendi Districts, West Shewa Zone, Oromia National Regional State, Ethiopia

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Abstract

This study was aimed at analyzing value chain of milk in Urban and Peri – Urban areas of Ambo and Dendi districts of West Shewa Zone. The study made use of both primary and secondary data collected from 146 smallholder farmers, 30 consumers, 10 Hotels and Cafeterias and 2 primary milk cooperatives through application of individual interview schedules, focus group discussions and key informant interview. The analysis was made using descriptive statistics and value chain analysis. The value chain analysis revealed that the major actors in the districts milk value chains are input suppliers, milk producers, collectors, processors and consumers. Accordingly, the value chain activities in the chain were input supply, production, processing, marketing and consumption. Four milk marketing channels were identified and relative to all other fresh milk marketing channels, producers get a higher proportion of total gross marketing margin when they sell milk to cooperatives. Profitability analysis result for dairy production indicated that, a dairy producer obtains average gross margin of 83.65per improved cow per day, in the study areas which shows that dairy production was a profitable venture for smallholder dairy producers. Milk value chain in the study areas was hindered by shortage of feeds, continuous increasing price of feeds, poor AI service provision, poor supply of genetically improved cattle breeds, limited availability of credit services, limited extension service provision, poor feeding and animal husbandry practices, low level of market linkage among the value chain actors, absence of milk processing plant and non-market oriented milk production. Therefore, policy aiming at increasing farmers' access to modern inputs, feed conservation practices, adequate training provision to AI technicians, developing and improving infrastructure, cooperative development and improving extension services are recommended to accelerate the milk value chain's development in the study areas.

Keywords: *Inputs, Marketing Channel, Gross Margin.*

INTRODUCTION

The roles of livestock in enhancing the livelihoods of the poor in developing countries are well recognized. Livestock and their products are estimated to make up about a third of the total value of agricultural gross output in the developing countries, and this share is rising from time to time (ILRI, 2005). Livestock production in developing countries is increasing rapidly in response to the fast growing demand for livestock products resulting from increasing population especially that of urban areas, and rising consumer income and the sector is found to play an increasing role in peri-urban systems (Woldemichael, 2008).

Ethiopia has the tenth largest livestock inventory in the world and first in Africa. The country has 56.71 million cattle population including 11.4 million dairy cattle and 58.44 million shoats (CSA, 2014). Livestock production is an integral part of Ethiopian agricultural system. The sub-

sector is estimated to contribute about 16.5% of the total GDP, 35.6% of total agricultural GDP, and 60-70% livelihoods of the Ethiopia population (MoFED, 2011). The estimated annual growth rates are 1.2% for cattle, 1% for sheep and 0.5% for goats (CSA, 2006). The percentage of total livestock population found in highlands of Ethiopia including peri-urban and urban areas are 70-80% of the cattle, 48%-75% of sheep and 27%-55% of goats (Halderman, 2004).

Ethiopia has a complex dairy value chain, with both formal and informal channels. Only 5% of the milk produced in Ethiopia is sold in commercial markets (Livestock and Livestock Characteristics, 2012). The dairy value chain has a variety of entrepreneurial actors, smallholder and commercial producers, small and large processors, service and inputs providers, farmers' organizations and cooperatives. The dairy sector is growing in Ethiopia and is receiving new investment, although the demand for investment exceeds the supply. Value chain actors are investing in milk production,

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collection and processing, and increased demand would likely lead to increased investment. Market opportunity is anticipated to lead to value chain deepening and upgrading, more solid horizontal and vertical relationships, and investment in core value chain operations as well as needed services and inputs.

A review of literature in agro-industry value chain in Ethiopia indicates that the sector faces many challenges due to limited market outlets, limited efforts in market linkage activities and poor market information among actors (Dereje, 2007; Kaleb, 2008; Dendenaet al., 2009). Correspondingly, Mamo (2009) argued that small scale, dispersed and unorganized producers are unlikely to exploit market opportunities as they cannot attain the necessary economies of scale and lack bargaining power in negotiating prices.

Even though Ethiopia has a huge potential for dairy production, the existing income generating capacity of dairy products as compared to its immense potentials in the country has not been exploited since the production system is not market-oriented. According to LMD (2013), the dairy sector in Ethiopia is dramatically under performing in its key metrics: Its productivity is low and its levels of consumption and demand are also low, yet there are indications of latent demand.

Problems in the dairy value chain hinder the potential gains that could have been attained from the existing opportunities. In this regard, milk value chain analysis is an interesting process that has not been investigated much in the study areas. Value chain analysis of milk conducted by Ulfina (2013) in Western Oromia including Ambo town identified different production and marketing problems. However, the gross margin obtained by different actors, the benefit share of different actors in the value chain. To this effect, the value chain analysis of milk has to be done to identify the actors along the chain, their relationship, factors affecting them, the slot and leverage intervention points which affect the chain development in the study areas.

Objectives of the Study

1. To identify the major milk value chain actors, map their linkage and describe their roles in the study area.
2. To estimate milk marketing margins and producers market share along the value chain.
3. To identify the key constraints and opportunities of milk value chain in the study areas

RESEARCH METHODOLOGY

Description of the Study Areas

The study was conducted in two districts of Western Shewa Zone; Ambo and Dendi districts. Ambo district is located in Western Shewa Administrative Zone of Oromia Regional state at about 114 km West of Addis Ababa. The District shares boundary with Dendi District in the East, Wanchi District of South west Shewa Zone in the South, Ilfeta District in the North and Tokekutaye District in the West. Ambo district is characterized mostly by flat and to some extent by undulating

land features. The district has a mean annual temperature ranging between 23-25°C and a mean annual rainfall of 1300-1700mm. Topography of the district covers 17% lowlands, 60% midlands and 23% highlands. The altitudinal ranges of the agro-climatic zones in the Ambo district fall between 500 and 3,200 meters above sea level (AWARDO, 2014). According to CSA (2007), the population of Ambo district is 108,406 of which 54,186 were male and 54,220 were female. Dendi district is located in Western Shewa Administrative Zone of Oromia Regional state at about 78 km West of Addis Ababa. The District shares boundary with Ejere District in the East, Wanchi, Waliso district of South west Shewa Zone, and Dawo districts in the South, Jeldu and Ilfeta Districts in the North and Ambo district in the west. Dendi district has a mean annual temperature ranging between 9.3-23.8°C and a mean annual rainfall of 750-1170mm. Topography of the district covers 29% highlands, and 71% midlands. The altitudinal ranges of the agro-climatic zones in the Dendi district fall between 2000 and 3288 meters above sea level (DWARDO, 2015). According to CSA (2007), the population of Dendi district is about 209,545 of which 106,050 are male and 103504 are female.

Sampling Techniques

A multistage sampling procedure was used to select representative households from the study areas. In the first stage, Ambo and Dendi districts were selected purposively as they are one of the potential milk production areas of the west Shewa zone. In the second stage all peri – urban kebeles were taken from each district, which means: 3 and 5 potential peri – urban kebeles were selected from Ambo and Dendi districts, respectively. In the third stage, out of potential peri-urban kebeles; 2 peri-urban kebeles were selected randomly from each district namely; Kisose and Awarokebeles from Ambo district and Dano Ejersa Gibe and Gare Arera from Dendi district. In addition to this, Ambo town from Ambo district and Ginchi town from Dendi district were selected purposively on the basis of milk production potential. Total of 146 urban and peri-urban smallholder milk producers were selected using a simplified formula provided by Yemane (1967).

Data from other actors such as traders, cooperatives and consumers were also collected. Hotels and Cafeterias were selected purposively to cover small size Cafeterias, medium and to some extent larger restaurants/Hotels because of milk selling price differences at different Hotels and Cafeterias. Accordingly, 3 Hotels and 3 Cafeterias were selected from Ambo district and 2 Hotels and 2 Cafeterias were selected from Dendi district. One cooperative from each district was taken, because only one milk cooperative is there in both Ambo and Dendi districts. In addition, 15 consumers were selected randomly from each district.

Sources of Data and Method of Data Collection

Both primary and secondary data from different sources were used. Primary data were collected by the formal survey through interviews with selected farmers using semi-structured questionnaires in July 2015. Focus Group

Discussions were held with farmers group in each district by using Checklists in order to guide the discussions. Key Informant Interview was also used to collect information from cooperative managers, Hotels/Cafeterias managers, input suppliers and staff from office of districts livestock development. Secondary data were collected from review of relevant published and unpublished documents, reports of CSA, different organizations including government institutions such as districts agricultural offices.

Methods of Data Analysis

To process and analysis the collected data, value chain mapping and marketing margin analysis was employed. Data collected through semi-structured questionnaire survey was processed by using Stata version 11 statistical software. Descriptive statistics were used to analysis the survey data collected from smallholder dairy farmers.

Computing the gross marketing margin (GMM) is always related to the final price paid by the end buyer and is expressed as a percentage (Mendoza, 1995):

$$GMM = \frac{\text{End buyer price} - \text{First seller price}}{\text{End buyer price}} \times 100 \quad (1)$$

Where, GMM is gross marketing margin. It is useful to introduce the idea of ‘producer’s participation’, ‘farmer’s portion’, or ‘producer’s gross margin (GMMP) which is the portion of the price paid by the consumer that goes to the producer. The producer’s margin is calculated as a difference:

$$GMMp = \frac{\text{End buyer price} - \text{Gross marketing margin}}{\text{End buyer price}} \times 100 \quad (2)$$

Where, GMMp is Gross Marketing margin for Producers, which is the producer’s share of consumer price.

$$NMM = \frac{\text{Gross margin} - \text{Marketing cost}}{\text{End buyer price}} \times 100 \quad (3)$$

Where, NMM is Net Marketing Margin

RESULTS AND DISCUSIONS

Milk Value Chain Actors

Milk passes through different market stages in the value chain before it reaches to final consumers. In milk value chain there are primary or direct actors who involved in commercial activities in the chain and different chain supporters who provide financial or non-financial support services.

Table 1. Milk value chain actors and their roles in the study areas

Main Actors	Main roles in the value chain
Smallholder dairy producers	Supply inputs (feeds), producing, processing, marketing and consumption of milk
Local flour and oil factories, Alemakaudijis plc.	Supply feeds like oil seed cake, wheat bran and different dairy rations.
Hotels and Cafeterias	Process milk in to different milk products, retail milk
Primary milk cooperatives	Serves as collectors and retailers of milk, supply feeds
Consumers	Consume milk and milk products
Service providers	Roles in the value chain
Districts AI Centers	Provides AI Service to smallholder producers
Districts’ Livestock Development and Health office and DAS	Provides extension services like training, provides forage seeds, sources of information
Holeta research center	Provides training and cross breed heifers
Ambo University	Provide cross breed heifers to low income households
NGO(ACDI/VOCA)	Provides training and material support to smallholder farmers and primary milk cooperatives.
Oromia Credit and Saving Share Institution	Provide financial services

Source: survey result, 2015

The milk value chain in the study areas involves five distinct value-adding activities from the inception of milk production to final consumption. These activities include input supply, production, processing, marketing and consumption.

Input Supply and Services Provisions

The major inputs required for dairy production include purchased feeds like concentrate feeds (industrial by-products) and hay, Artificial Insemination (AI), veterinary, Extension Services and credit services/financial services.

Feed Supply

In urban areas, the majority of feed resources for dairy cattle such as crop residue, oilseed cake, wheat bran, mill house scraps, finger millet ‘atela’ balled hays and native grass hays were obtained through purchase while in peri-urban areas, the majority of the feed resources were obtained in two ways; on farm production (For improved forage and crop residues) and through purchases in case of oilseed cake, wheat bran and native grass hay. The dominant feed in the study areas

were found to be crop residues (47.32%) followed by natural pasture (34.25%), native grass hay (13.70) and improved forage (4.11%). Improved forage production and their contribution to on farm dairy feed base were observed to be generally low.

About 95.74% of crop residues and 72.34% of native grass hay supplied by rural farmers to urban smallholder milk

producers with price of 2.92birr per kg and 69.26birr per donkey load for crop residue and hay, respectively. In case of peri – urban smallholder milk producers, off the total respondents, 86.87% of farmers conserve their own crop residues after cereal crop harvested and utilize for their dairy animals especially, during dry season. Teff straw is reported as the dominant crop residue followed by wheat straw in the study areas.

Table 2. Major purchased dairy feeds and their sources in the study areas.

Feed staff	Major supplier/Sources	Ambo district		Dendi district	
		%	Average price	%	Average price
Crop residue	Farmers	54.17	2.91birr/kg	25.68	2.45birr/kg
	Own by producers	45.83	-	74.32	-
Hay	Native hay producing Farmers	52.78	65.50birr/donkey load	27.03	68.21birr/donkey load
Oilseed cake	Small scale oil factory	93.75	9birr/kg (noug seed cake) 13.50birr/kg (linseed cake)	68.75	8.50birr/kg (nougseed cake) 13.30birr/kg (Linseed cake)
	Small traders	6.25	9.50birr/kg (noug seed cake) 14birr/kg (linseed cake)	25%	9birr/kg (nougseed cake) 13.80birr/kg (Linseed cake)
	Cooperatives	-	-	6.25	8birr/kg (nougseed cake)
Wheat bran	Floor factory	86.96	5birr/kg	67.74	5birr/kg
	Small traders	13.04	5.80birr/kg	12.90	6birr/kg
	Primary cooperatives		-	19.85	5.50birr/kg
Atela	Local brewery	100	1birr/liter	100	0.80birr/liter

Service Provisions in Milk Value Chain

Artificial Insemination Service Provision

Artificial Insemination is important input to the dairy sub-sector. The survey result revealed that almost 100% of AI service is delivered by government in both districts, while natural service is provided by bulls owned by individual farmers in the study areas who charge nothing. The AI service is delivered at the districts health clinics in the study areas. According to the survey results, about 58.33% and 50% of the respondents in Ambo and Dendi districts uses AI services, respectively while the remaining ratio uses natural bull services for breeding in both districts. Almost all farmers use AI service for their cross breeds even though some farmers use AI service for local breed cows with good body size if recommended by the districts AI experts. On average, the service charge was reported to be 6 ETB per conception.

The farmers in the study areas complained that they bring their cow to the AI center several times, due to service per conception failures to succeed. In principle a farmer can repeat up to 3 times if conception fails to happen. But dairy producers reported that there were cases where the conception fails to happen even after 5 times insemination which is not economical for the farmer as it prolongs production time and increases cost of feed without production. Although farmers know the greater advantage of AI services, they forced to depend on the natural mating due

to the above stated inefficiency of the AI services. This result is aligned with the finding of Yamiet al. (2012), who reported that there were cases where AI service fails to succeed after 6 times conceptions.

Animal Health Services Provision

veterinary services in most cases are supplied by the government extension service in the study areas, while few respondents get veterinary services from private venders in both districts. About three fourth (75%) of smallholder dairy producers from Ambo district and 78.38% of smallholder producers from Dendi district reported to get veterinary services from government clinics, while the rest 25% and 21.62% of dairy producers from Ambo and Dendi districts, respectively get the services from private veterinary service providers. Majority of the farmers reported that government veterinary services were rated insufficient and with limited resources (drugs). On the other hand, household respondents reported that, service from private veterinarians is expensive and with limited access.

Financial Services Provision:

Finance is an important input for livestock production as it is the basics for enabling farmers to adopt new technologies and provide enough feeds for their animals, but is very limited in some villages of the two districts while still in others only one government micro finance institution is operating to a

limited extent and capacity in the study areas. Oromia Credit and Saving Share Institution provide credit to some 30.56% and 24.32% of the producers in Ambo and Dendi districts, respectively. The vast majority of respondents reported that they took credit from neighbors and relatives informally. No non-governmental micro-finance institution was reported to provide financial services for smallholder producers in the study areas. Even though milk cooperatives are established in two districts and put credit provision as one of their establishment objectives, they are at infancy stage and hence have not started giving financial service.

Extension Services Provisions

Extension service in the study areas is provided by development Agent (DAs) and districts' agricultural office, NGO, Holeta research center, Ambo University and Neighbors/relatives (Table 14). DAs and districts' agricultural expert were the main sources of livestock training in both districts.

The survey result showed that more than half (55.48%) of respondents in the study areas get extension services from development agent and bureau of agriculture. Concerning sample location, 54.17% and 56.75% of sample respondents from Ambo and Dendi districts, respectively found to get extension contact from DA's and districts' dairy expert. Non-governmental organization, especially 'ACDI/VOCA' is reported to give training for livestock experts and some progressive smallholder dairy producers on improved feed formulation methods in both districts. Ambo University was also reported as one of the extension service providers in Ambo district and it provides cross breed heifers to low income smallholder dairy farmers. On the other hand, Holeta Research Center was also another actor who provides extension services for the surrounding farmers including smallholder dairy producers in Dendi district as it reported to provide training for progressive farmers and crossbred heifers for low income farmers in the study areas.

Table 3. Sources of extension services for smallholder producers in the study areas.

Sources	Ambo (%)	Dendi (%)	Total (%)
Development agent and bureau of agriculture	54.17	56.75	55.48
NGO	2.78	10.28	6.43
Holeta research center	-	7.35	3.42
Ambo University	5.56	-	2.73
Neighbors/relatives	4.17	12.70	8.90
No extension access	33.3	13.50	23.29
Total	100	100	100

Source: Own computation from survey result, 2015

Milk Production

Dairy producers are the major actors who perform most of the value chain functions right from farm inputs preparation on their farms or purchases of the inputs from other sources to end product handling and marketing. The major value chain functions that dairy producers perform include feed and other input preparation, milk production and post-harvest handling and lastly marketing or processing in some cases. Dairy farming households are the main operators at this stage of the value chain in the study areas.

Smallholder dairy producers in the study areas produce an average of 10.05 and 2.37liters of milk per day per cow from crossbreed and local cow, respectively. The result is in accordance with the finding of Girmaet al. (2013) who reported that average milk yield per cow per day from cross breed and local cow were 10.50 and 2.6 liters, respectively. According to survey results, some farmers get up to 18 liters per day per cross breed dairy cow while the minimum value was 6 liters per day per cross breed. This suggests a potential to increase milk yield from the current average of 10.05 liters per day per cow to 18 liters, which is comparable to about 80% increases. The current problem of low milk yield

is attributed to poor feeding, low genetic makeup of existing breeds and general poor animal husbandry practices.

The survey result showed that the average milking days/lactation period in the study areas was found to be 249 days for local breed dairy cows and 236 days for cross breed dairy cows. This was because of the fact that some of the local dairy farm owners reported that they have milked their cow even during the whole pregnancy period which was not economical as it may prolong the next heat period. This result is aligned with the findings of Weldemichael (2008) who reported that average lactation length for local breed and cross breed cows was 240 and 232 days, respectively. But the average lactation length for cross breed in the study areas was found to be smaller than national average lactation length for cross breed (279days) which reported by Felleke and Gedda (2001). On average, farmers in the study areas produces 590 and 2372 liters of milk per cow per lactation period from local breed and cross breed cow, respectively. The current average milk produced from the two breed type comparable to the finding of Girmaet al. (2013) who reported average lactation milk yield of 535.5 and 2520 liters for local cow and crossbred cow, respectively. This result also found

in the range of national milk yield per lactation reported by Felleke and Gedda (2001) which was 400–680 liters/local cow per lactation period and 1120–2500 liters /cross breed cow per lactation period.

When we compare the two study sites, the mean daily milk yield of local cows recorded was found to be almost equal for the two sites (2.3 and 2.4 liters) for Ambo and Dendi districts, respectively. But there was significant differences on average milk yield per day per cross breed cows between the two districts, which was found to be 11.4 liters in Ambo and 8.6 liters in Dendi districts. With regard to volume of milk production per lactation length of cross breed, 2640 liters and 1856 liters of milk produced per cross breed in Ambo and Dendi districts, respectively. These differences could be due to variations in husbandry practices and extent of exotic blood level of the population studied, among other factors. According to the survey result, there is, however, seasonal variation in milk production; the lowest being at the time of winter (between February and May) and the highest being at the time of summer (between July and December), and this variation is the result of fluctuation of feed availability between dry and wet seasons.

Milk Processing

The survey result showed that there were no formal milk collection and processing activities in both study locations. Milk processing here thus refers to the act of traditionally converting milk into milk products at home or by catering service providers to derive other milk products. Therefore, at this stage of value chain in the study areas; smallholder dairy producers and catering service providers (Hotels and Cafeterias) are the main actors who process milk into regularly consumed products like butter, traditional ghee, buttermilk, cottage cheese, plain hot milk, a mix of coffee and milk (macchiato) and fermented whole milk. At household level, milk processing activities are carried out using traditional processing methods and materials. The survey result revealed that 41.67% and 52.70% of producers from Ambo and Dendi districts were process milk in the home, respectively even though the volume of milk processed is reported to be very small when compared with milk sold to the market. Among those who process their milk in Ambo district, 80% process milk into butter and cheese for home consumption, 16.37% for both home consumption and market purpose and only 3.33% of the respondents processed milk directly for market purpose. This is because; almost all of the milk produced from cross breed milking cows was delivered to market as fresh milk rather than processed in the home, due to its low fat content while the quantity of milk obtained from local cows was reported to be insignificant to process for market purpose. The same trend was observed in Dendi district as the majority of producers

process their milk for home consumption (55.26%) while only 5.26% of households process their milk to butter and cheese for direct sale to market. In both districts, buttermilk and ghee are considered as by- product of butter and cheese by smallholder processors and simply used in the home.

Hotels and Cafeterias on the other hand, are other actors at this milk value chain stage and they process fluid raw milk into yogurt, plain hot milk and a mix of coffee and milk (macchiato); the main milk products delivered to end consumers from Hotels and Cafeterias in the study areas. In the study areas, there is no any private milk processing plant or units reported except, Ambo Cheri milk processing cooperative in Ambo which process milk into butter and cheese occasionally only when surplus milk is collected beyond available market and remain unsold.

Milk Marketing

A marketing chain may link both formal and informal market agents. The survey results depicts that milk in the study areas was found to be marketed through both formal and informal marketing channels even though the former system was very limited. Out of the total milk marketed by sample households 88.07% of milk channeled through informal markets while only 11.93% of milk sold in formal markets through primary milk cooperatives. This result is comparable with findings of FAO (2011), which reported that about 95 percent of the marketed milk at national level is channeled through informal system. Further, the survey result revealed that milk marketing chains prevailing in the study areas is found to be comprised of few milk marketing channels and market outlets with limited number of respective market players. The major milk marketing actors in the study areas were still found to be smallholder producers, Hotels/Cafeterias and primary milk cooperatives:

Dairy Producers

Producers are the first link in the milk marketing chains and they are predominantly smallholders and have always supplied milk for consumption to neighbors, Hotels and primary cooperatives. In general the proportion of milk marketed (milk off-take rate) by sample household was found to be 64.46% of the total milk produced (2086.5 liters) in the study areas. The rest 35.54% of the produced milk was reported to remain within the household either for household consumption or for processing purposes. The main reason given for not selling that much milk was low-level of milk production, which was not sufficiently larger than home consumption especially for those who owned only local milking cows and located mainly in peri-urban areas.

Hotels and Cafeterias

are the dominant milk marketing actors as they directly

purchase fluid milk (morning and evening milk) from the producers and milk cooperatives based on contractual agreements in the study areas. The average daily intake for raw milk reported up to 18 liters/day/Hotel or Cafeteria from producers in the study areas. They consider quality parameters such as freshness, adulteration with water and thickness for their decision to buy liquid milk. According to the survey result, Hotels/Cafeterias collect more than half (57.26%) of the fresh milk marketed by sample respondents in the study areas.

Dairy Cooperatives

In Ambo, a single primary cooperative named as 'Ambo Cheri milk processing primary cooperative' was established in the year 2,000 with sole aim of creating sustainable milk sale outlets for the members. The founding members were 16 with a single share of 100 ETB. The informal discussion made with chairperson of the cooperative at the time of survey revealed that their current capital was about 42, 000 ETB including the milk shed constructed. The purchasing and selling price of a liter of milk in this cooperative was 14 and 16 Birr, respectively during the survey period. The cooperative used to process raw milk into butter and cheese, which was more occasionally done during surplus of market and intense fasting period although it was found to be unprofitable because of its limited capacity to process high volume of milk. According to chairperson, material support was given to the cooperative by non – governmental organization 'VOCA' at the time of establishment but, the cooperative did not made bright progress since its establishment and its daily intake capacity was found to be limited to only 65 to 70 liters per day which accounts about 7.92% % of the total milk marketed per day (821liters) by the sample households in the area. The cooperative could not even increase its members from those who established cooperative. As raised by chairperson, the reason for limited members of cooperative and sale volume per day was due to availability of a number of alternative milk marketing channels/outlets for the milk producers in the area, lack of technical support through intensive training and advisory services, the cut off supply volume of milk by members of cooperative and low milk production by the producers in the area. However, information obtained from the members exposed that the reason why cooperative did not made progress was mainly due to defect-defined rule and regulation of the cooperative and low milk price paid to producers relatively when compared with Hotels, which demotivate producers, even members to continue with cooperative. Therefore, some producers were not trustful to deliver the milk they committed to bring to cooperative as they could have alternative milk sale outlets with better price. Further, informal discussion conformed that the probability of this cooperative to continue its operation

seems to be in danger and looks ready to collapse in near future if it continues in its current condition.

In Dendi district, similar to Ambo; only one cooperative called 'Weltane primary milk producer's cooperative' was operating at the time of survey. The cooperative is located at the center of Ginchi town (the capital of Dendiworeda) and it was established in the year 2006 having 18 members with the aim of forming reliable milk sale outlet and supply of dairy feed at reasonable prices for the members of cooperative. The amount of initial establishment capital was 9000 ETB with individual share of 500 ETB. After one and half year of its establishment at the time of survey, the number of members rose to 54(16 female and 38 male) and the current capital of cooperative is reported to be 92,000ETB. The informal discussion made with chairperson of the cooperative revealed that current purchasing and selling capacity of cooperative was 120 liters of milk per day or 3600 liters of milk per month which accounts about 22.90% of the total milk marketed per day (524 liters) by sample respondents in the area. The purchasing and selling price of a liter of milk in the cooperative was found to be 11.0 and 12 Birr, respectively. In addition to serving as sustainable milk market outlet, this cooperative is also providing concentrate feeds for members from Alemakaudijis feed private leading company which found in Bishoftu with fair price by only charging transport cost on it. Although this cooperative is on infant stage, it is recording progressive development and it may achieve the vision outlined which was 'establishing their own milk processing unit' in near future.

Milk Marketing Outlets

It is identified that there were different types of milk marketing outlets in the study areas during the survey period. On average, 88.07 % of total sample dairy household had one milk sale outlet in the study areas. The proportion of sample households that had two milk sale outlets in Ambo and Dendi districts were 17.86% and 5.66%, respectively. Furthermore, the survey result indicated that none of the sample dairy household had three milk sales outlets. Figure 4 below depicts the type of milk sale outlets that used by sample dairy producers in the study areas of the two districts during the survey period. The figure shows that although dairy producers have multiple outlets for their milk, selling to Hotels and Cafeterias was found to be the most important milk marketing channel for Ambo dairy producers and accounts for about 50.06% of the total milk market participants per day, whereas delivery to buyer in the immediate neighborhood (to direct consumer) is predominate and accounts for about 49.06 % of total market participants per day in Dendi district.



Figure 1. Milk market outlets for study areas.

Source: Survey result, 2015

Major Milk Marketing Channels

The number of intermediaries in a given marketing channel would have a bearing effect on both producer and consumer milk prices. The shorter the channel, the more likely that the consumer prices will be low and the producer will get a higher return. Different types of milk marketing channels are identified in the study areas during the survey period:

Channel I: Producer → Consumer

Producers are predominantly smallholders and have always supplied milk for consumption to neighbors as the most efficient way to dispose surpluses quickly and cost effectively for payment. The channel was found to be the shortest of all milk channels identified during the survey period and it represents 33.52% of the total milk marketed per day in the study areas. This channel accounts for 24.08%, and 48.29% of total milk marketed per day in Ambo and Dendi districts, respectively.

Channel II: Producer → Hotels/Cafeteria → Consumer

This was the most dominant channel representing about 54.20% of milk marketed in the study areas and 68% and 28.81% of total milk marketed by sample households in Ambo and Dendi districts, respectively. This channel is found to be the most important alternative milk sale outlet for milk producers and the most important supply source for Hotels in Ambo district

Channel III: Producer → Primary Cooperatives → Consumer

The channel is representing 12.36% of total milk marketed by sample respondents in the study areas and 5.78% and

19.32% of total milk marketed in Ambo and Dendi districts, respectively. In this channel primary cooperatives serve as milk retailers in both districts as they simply collect milk from producers (from members and non-members in case of Ambo and only from members in case of Dendi) and retail to urban consumers. Producers gain benefit of assured market for their milk at a price that is not always known in advance, but applied equally to all producers in a given locations and time period. Especially, producers from peri-urban areas who live at some distance from urban market used primary cooperatives as guarantee of continuous outlets. But, the channel is identified to be the least important milk sale outlet for producers in Ambo districts as they reported that relatively other milk sale outlets especially, Hotels can fetch them better price than cooperative. Despite its limited capacity, this channel is relatively organized and formalized.

Channel IV: Producer → Primary Cooperatives → Hotels/Cafeteria → Consumer

This was the least channel among others that representing 2.70% of total milk marketed in the study areas and 2.14% and 3.58% of total milk marketed in Ambo and Dendi districts, respectively. In this channel primary cooperatives were serving as semi-whole seller in both districts as they simply collect milk from producers and supply to Hotels and Cafeterias based on contractual agreements.

Milk Consumption

In the study areas, milk and milk products are consumed by family members and urban itinerant consumers. Individual consumers are the last link in the milk value chain. At household level, children are prioritized in consumption allocation followed by entire members of the family.

Table 4. Total milk produced, consumed and processed per day by sample respondents

Total	Ambo district	Dendi district	Total
Milk produced (liters)	1183.5	903	2086.5
Milk consumed (%)	9.97	12.24	10.95
Processed (%)	20.66	29.73	24.59
Milk sold (%)	69.37	58.03	64.56
Total (%)	100	100	100

Source: Own computation from survey results, 2015

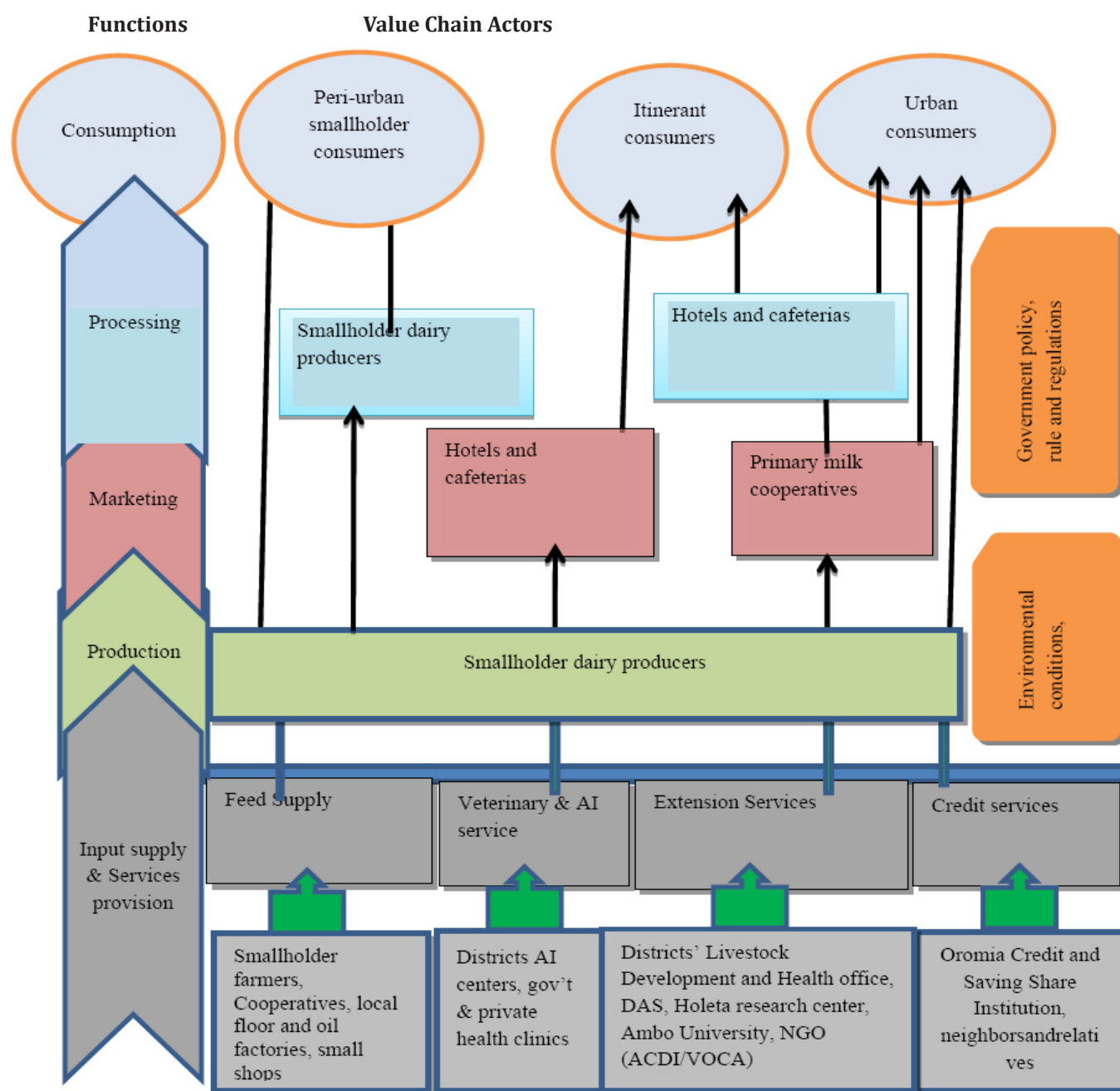


Figure 3. Milk Value Chain Map in the study areas

Profitability Analysis

Since most of the smallholder farmers in the study areas did not have records on costs and returns, the cost of production and amount of daily feed intake used for estimation of gross margin analysis is calculated based on the information obtained through key informant interview and focus group discussions. Profitability analysis for dairy production was made by considering the average selling price to which the majority of producers were selling their fresh milk to different stakeholders. Based on gross margin analysis, the major production cost for milk production goes for supplementary feed, which covers about 59% of production costs for both Ambo and Dendi districts. The reason for this is that majority of the smallholder farmers reported to use oilseed cakes

as the main supplementary feeds which is very expensive compared to other feeds. Even though concentrate feeds are available in the area with relatively cheaper price, suppliers reported that farmers lack awareness to use it, which need intervention by concerned body. On average, a dairy producer obtain a gross margin of 83.65 ETB per cross breed cow per day in the study areas. Since the cost of production in the two districts did not show great differences, the main factor that make huge differences of gross margin among the two sites is found to be average quantity of milk yield per day and price of milk per liter, which might be created due to differences in blood level of the crossbred cows and husbandry practices, respectively. However, involvement in dairy production was found to be a profitable venture for smallholder dairy producers in the study areas.

Table 5. Profitability analysis of cross Breed dairy cow per day in the study areas

Ambo district				Dendi district			Average
Feed Staff	Daily intake	Cost (ETB)	Remark on Birr/unit	Daily intake	Cost (ETB)	Remark on Birr/unit	
1. Crop residues	2.4kg	6.9	23/8kg	2.4kg	6	20/8kg	6.45
2. Hay	1kg	2.7	65.5/24kg	1kg	2.7	64.21/24kg	2.7
3. Oilseed cake	2.5kg	28.75	-	2.5kg	25.66	-	27.21
4. Wheat bran	1kg	5	-	1kg	5	-	5
5. Atela	1liter	1	-	1liter	0.80	-	0.9
6. Mineral	0.05kg	0.3	-	0.05kg	0.3	-	0.3
Labor cost	1man/day	3.3	100 payment/ month for half day work	1man/day	2.8	85payment/month for half day work	3.05
Total cost/cow/day		47.95	-		43.26	-	45.61
Milk yield Per/day		11.4	-		8.6	-	10
Price of milk/liter		14	-		11.5	-	12.75
Gross revenue/ day/cow		159.6			98.9		129.25
Gross margin/ day/cow		111.65	-		55.64		83.65

Source: Own calculations from survey result, 2015

Margins and Value Addition

Based on the costs of dairy production that indicated above, the margins of different milk marketing actors who participated in milk value chain is summarized under this section (Table 6). Each of the milk value chain actor add value to the product as the product passes from one actor to another, in a way that; the actors change the form of the product or create place and time utility. The proportion of value addition at each stage relative to the value added along the value chain is calculated for each actor in the different channels. The total cost for primary cooperatives and Hotels and Cafeterias are considered as the sum of marketing and processing cost and buying price of the milk. Price per liter of milk was used for the marketing margin calculations.

As indicated in above discussion, one of the milk marketing channels that identified was channel I, in which producers in the study areas sold their milk to individual consumers directly on the basis of monthly contractual agreement. Since this milk channel is short the margin earned by producers was the highest of all channels which confirmed that the channel was efficient for producers. In this channel,

because consumers get the milk from producer's residences; producers do not incur marketing cost. Due to this reason producers share in the consumers' price is 100%.

In the second channel (II), in which milk is sold to Hotels/ Cafeterias and then reached to individual consumers, the highest value addition was made by Hotels and Cafeterias. This is because Hotels and Cafeterias collect fresh milk from producers and add some values through changing it in to plain hot milk and a mix of coffee and milk (macchiato); and sold to their customers. This is the milk channel where higher proportion of milk produced in the study areas reached to consumers with higher final price. The share of value added by producers and Hotels/Cafeterias, respectively found to be 45.15% and 54.85% for Ambo and 27.64% and 72.36% for Dendi districts while the share of producers from the final price paid by consumer was found to be 60% in both districts. According to the information obtained from managers of Hotels and Cafeterias through key informant interview, on average 1liter of fresh milk produces 5 cups of plain hot milk and the average price of 1 cup was found to be 5ETB and 4ETB in Ambo and Dendi, respectively which results in 25ETB and 20 ETB per liter of milk in that order.

Table 6. Margins and value additions in different channels

Marketing margins (Birr)	Marketing Channels							
	Ambo				Dendi			
	I	II	III	IV	I	II	III	IV
Average selling price (prod.)	14	15	14	14	11.5	12	11	11
Average selling price (coop)	-	-	16	16		-	12	12

Milk Value Chain Analysis: The Case of Urban and Peri-Urban Areas of Ambo and Dendi Districts, West Shewa Zone, Oromia National Regional State, Ethiopia

Average selling price (hot/caf.)	-	25	-	25	-	20	-	20
Total cost (prd)	-	9.65	9.65	9.65	-	9.83	9.83	9.83
Total cost (hot/caf)	-	18.5	-	19.5	-	14.32	-	14.32
Total cost (coop)	4.2	-	14.21	14.21	5.0	-	11.08	11.08
TGMM	-	40	12.5	44	-	40	8.33	45
GMMproducers (%)	-	60	87.5	56	-	60	91.67	55
GMMcoop(%)	-	-	12.5	8	-	-	8.33	5
GMMhot/caf (%)	-	40	-	36	-	40	-	40
Net marketing margin (prod)(%)	-	-	-	-	-	-	-	-
Net marketing margin (cop)(%)	-	-	1119	7.16	-	-	7.67	4.6
Net marketing margin (hot)(%)	-	26	-	26	-	-	28.4	28.4
Value Added by producer	9.8	5.35	4.35	4.35	6.5	2.17	1.17	1.17
Share of Value Added by prod.	100	45.15	70.85	34.41	100	27.64	55.98	15.06
Value Added by coop.	-	-	1.79	1.79	-	-	0.92	0.92
Share of Value Add by cop(%)	-	-	29.15	14.16	-	-	44.02	11.84
Value Added by hot/caf	-	6.5	-	5.5	-	5.68	-	5.68
Share of Value Add byhot(%)	-	54.85	-	51.42	-	72.36	-	73.10
Prod. share of final price(%)	100	60	87.50	56	100	60	91.67	55

Source; Own calculations from survey result, 2015

The other raw milk marketing channel was channel (III) in which milk collected by primary cooperatives and then reached to consumers. In this channel the lowest value addition was made by the dairy cooperatives. This is because cooperatives simply collect fresh milk from either member or non-member producers and directly distribute to individual consumers and Hotels/Cafeterias without any or little value addition in both districts. Even though farmers receive higher value of consumer price in this channel (87.5% in Ambo and 91.66% in Dendi district), the farmers complained that the price paid by the cooperatives is not satisfactory when compared with price offered by Hotels and Cafeterias.

The last raw milk marketing channel was channel (IV) in which milk collected by primary cooperatives and then reached to consumers through Hotels and Cafeterias. In this channel the lowest value addition is made by the dairy cooperatives. This is because cooperatives simply collect fresh milk from producers and directly sell to Hotels/Cafeterias on contractual agreement with the same price that they distribute to individual consumers.

Constraints and Opportunities of Milk Value Chain

Constraints at Input Supply Stage

Feed shortage is one of the critical factors affecting milk production and productivity in the study areas. This problem is caused by the shrinkage of grazing land due to high population pressure, expansion of crop land and expansion of urbanization. Although the government attention was towards introducing improved forage for feed production, the issue of using improved forage is undermined and the involvement of farmers in forage feed production found to

be very limited in the study areas. The survey result shows that only 4.11% of the sample producers in the study areas reported to cultivate improved forage on their land. The main reasons for this problem are; lack of initial seeds and poor training for improved forage development and poor delivery of support and extension services by concerned body.

With regard to price of the feeds, it is found to be serious headache to the farmers as it keep increasing dramatically, especially, the price of industrial by-products has touched sky. For instance, the price of linseed cake increases from 900ETB/100kg in 2012 to 1400ETB/100kg in 2014/15 in the study areas. The same condition observed in case of wheat bran. Lack of awareness by the farmers about feed types and contents with alternative price was also contributing its own part for this problem. Especially, in Ambo district, Alemakoudjis feed processing private leded company opened its branch recently at the beginning of 2014 to distribute concentrate feeds for different animal classes including dairy cows. But as reported by manager of the center, due to lack of market they are going to close the center in its infancy stage.

The other thing that raised by smallholder farmers was the AI service constraints at the stage of input supply in the value chain. The most pressing problem with delivery of AI service is the failure of service per conception which disseminates farmers to lose their confidences on AI services and leads to the use of natural bull services. According to respondents, service per conception was goes beyond 5times to succeed which prolongs the production time up to 4 to 5 months. In line with AI problem, there is shortage of supply for improved heifers in the study areas. According to the survey

result, 95.8% and 64% of cross breed heifers sourced from market for Ambo and Dendi districts, respectively. But it is reported that cross breed heifers from market found to be too expensive to be accessible by farmers.

Extension service reported to be weak in the study areas. Especially in urban areas, current extension services are limited to AI services with problem raised above. There are no development agents in the urban kebeles, except AI technician who serves the whole district. About, 33.3% of sample smallholder dairy producers in Ambo and 13.50% of sample smallholder producers in Dendi districts are not totally getting any extension visit per month. With regard to veterinary services, the main challenge reported are; shortages and inconsistencies in drug supply, lack of quality drugs, and lack of veterinarians with dairy technical focus and high price of private veterinary outlet.

Even if it is common that; access to credit for financing investment and farm operations is crucial to the commercialization of smallholder agriculture; farmers have limited awareness about the terms and conditions of credit providers. Currently most farmers do not have good knowledge on way of getting credit services, amount of credit and loan repayment periods for dairy farming activities. Among all respondents in the study areas, about 72.6% had not access to credit services.

Constraints at Production Stage

Low milk yield is observed as the main constraints at this stage. The main factors that leads to low milk production in one way or in other, is reported as the result of those obstacles raised at input supply stage. According to the information obtained; poor feeding and animal husbandry practices, low productivity of the endogenous cattle breeds, inadequate access to veterinary and AI services, limited extension services, very high and ever increasing feed prices are among the most important problems raised at production stage that hinder the development of dairy production in the study areas.

Constraints at Processing Stage

The main constraints that hinder processing of milk in the study areas are found to be milk quality problems, problem of technical skills to process milk, low level of market linkage among the value chain actors, complete absence of milk processing plant and low demand for milk products compared to raw milk. The other important constraint raised by Hotels and Cafeterias on milk processing is low milk supply and low demand by consumer at Hotel for milk product compared with raw milk. The root problem that hinders milk processing at cooperatives are also reported as insufficient milk supply by producer, lack of market for processed product and lack of processing materials. In both Ambo and Dendi districts; dairy cooperatives have weak vertical market linkages with supermarkets, institutional users and private processing plants in other areas and they

did not use opportunity of transporting fresh milk to other markets than local consumers.

Constraints at Marketing Stage

About 67.9% and 94.29% of smallholder respondents in Ambo and Dendi districts respectively, reported different milk marketing problems in the study areas. Among raised constraints; poor linkage between primary dairy cooperatives and farmers, lack of adequate market information, limited number of market outlets for milk, deprived linkage among actors, seasonal variation of milk production due to fluctuation of feed availability, absolute absence of dairy processing plants in the areas and spoilage of milk due to its perishability in nature are the major constraints. In addition cooperatives do not providing any capacity building training to farmers on milk handling and processing which could improve marketing efficiency.

Constraints at Consumption Stage

Lack of awareness about nutritive value of milk, low quality milk supplied by producers (adulteration with water), the prevailing assumption that milk is meant only for children, the high milk price that prohibits the low income group of the society from consuming milk and the lack of consumers' knowledge on milk quality assessment are some of the major problems identified at the consumption stage in the study areas.

Opportunities of Milk Value Chain in the Study Areas

Among the opportunities identified; Favorable climate and weather conditions, cheap farm labor, high domestic demand for milk; Change of lifestyles in urban consumers due to increasing income from time to time which can improve milk consumption behavior; Good policy road map that aimed at bringing the desired change in the livestock sector (attention given at federal government especially, the sector become independent of other agricultural influence and structured at minister level recently) are the major opportunities. To some extent good road infrastructural facilities can also be raised as opportunity for milk value chain in the study areas: For instance, the study areas are connected with good asphalt roads to Addis Ababa with short distances where numerous milk processing plants are found so that it is possible to make linkage with them. Increasing number of Hotels as the towns are on the way of developing (especially in Ambo), establishment of primary cooperatives in both districts even though they are operating under extremely low designated capacity, support given to the sector by NGO (ACDI/VOCA) and effort made by universities and research centers are also identified as opportunities that can encourage development of milk value chain in the study areas.

CONCLUSIONS

The milk value chain in the study areas involves five distinct value chain functions or activities from the inception of milk production to the final consumption. These activities

include input supply, production, processing, marketing and consumption. In the study area, crop residues were mainly used as source of livestock feeds together with natural pastures. Majority of crop residue (95.74%) and native grass hay (72.34%) are supplied by rural farmers to urban smallholder milk producers. In the study areas, small scale oil factory and flour processing mills are the main suppliers of feed supplements like oil seed cake and wheat bran, respectively. Currently, almost 100% of respondents reported to get AI service from government at both districts.

Most of the interviewed smallholder milk producers produce an average of 10.05 and 2.37 liters of milk per day per cow from crossbreed and local cow, respectively. Maximum milk yield per day per cross breed cow was found to be 18 liters while the minimum value found to be 6 liters per day per cross breed which suggests a potential to raise yield per improved dairy cow from the current production of 10.05 liters per day per cow to 18 liters, which is equivalent to about 80% increases.

No formal milk collection and processing activities prevail in the study areas. Smallholder dairy producers and catering service providers (Hotels and Cafeterias) are the only actors who process milk into regularly consumed products like butter, traditional ghee, buttermilk, cottage cheese, plain hot milk, a mix of coffee and milk (macchiato) and fermented whole milk. Even though milk is found to be marketed through both formal and informal marketing channels, majority of sample milk market participants were sold their milk through informal markets. The major milk marketing actors were; smallholder producers, Hotels and Cafeterias and primary milk cooperatives.

About four milk marketing channel were identified in both districts during the survey period. Relative to all other fresh milk channels, producers get a higher proportion of total gross marketing margin in channel III, when they sell milk to cooperatives. Hence, this channel is relatively more efficient as compared to other fresh milk channels. Profitability analysis for dairy production indicates that on average a dairy producer obtains a gross margin of 83.65 per improved cow per day, in the study areas which shows that dairy production is a profitable venture for smallholder dairy producers.

Some of the challenges for milk value chain in the study areas at different value chain stages in general includes: shortage of feeds, continuous increasing price of feeds, poor AI service provision, poor supply of genetically improved cattle breeds, limited extension service provision, poor feeding and animal husbandry practices, low productivity of the endogenous cattle breeds, inadequate access to veterinary services, low level of market linkage among the value chain actors, absolute absence of milk processing plant and non-market oriented milk production.

Favorable climate and weather conditions, cheap farm labor, high domestic demand for milk; change of lifestyles in urban consumers due to increasing income from time to time, good government policy road map, increasing number of Hotels as the towns are on the way of developing, establishment of primary cooperatives in both districts, availability of concentrate feed suppliers, support given to the sector by NGO and effort made by universities and research centers are the major identified opportunities that can encourage development of milk value chain in the study areas.

RECOMMENDATIONS

On the basis of the results of this study, the following recommendations are suggested to overcome the constraints raised by different milk value chain actors and make use of the available opportunities in order to improve the milk value chain in the study areas:

To strengthen the position of smallholder dairy farmers in milk value chain; adequate inputs should be provided for smallholder dairy farmers in the study areas.

To create skilled based smallholder dairy development in the areas, training of dairy producer farmers on feed formulation and feed preservation techniques should be facilitated. In addition to this, it is required to scale up the achievements of few progressive farmers on achieving high milk yields through the adoption of improved feed formulation techniques.

To tackle the problem of poor AI service provision which may result from the low technical skills and knowledge of the AI technicians; adequate training should be provided to AI technicians to enhance the milk value chain development of the study areas.

Together with encouraging farmers to form dairy cooperatives, already established cooperatives also need to be strengthened in terms of basic infrastructural facilities. It was identified that, creation of the cooperative by itself is not economical, rather enabling them to diversify their operations by processing whole milk into milk products depending on market demand and resource availability in order to explore economies of scale is essential.

It was identified that lack of awareness about nutritive value of milk and the prevailing assumption that milk is meant only for children are the main challenges that hinders milk consumption by all societies. Therefore, government and other concerned bodies have to create awareness about nutritive value of milk to all classes of people to change the attitude of societies towards consumption of milk which is a crucial factor in improving the health of the people.

Large private investment on dairy sector should be promoted, as it will introduce new technology in the sector such as improved genotypes, feed and processing practices which will initiate smallholder producers to engage in the milk value chain activities.

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