Full Length Research Paper

Improving the competitiveness of dairy production via value chain approach: The case of Lemu-Bilbilo district in Arsi highlands of Ethiopia

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This study was initiated with the purpose to assess the dairy value chain in Lemu-Bilbilo district of Arsi zone, Ethiopia. This study made use of both qualitative and quantitative data collected from primary and secondary sources. Different Participatory Rural Appraisal (PRA) techniques were utilized to collect primary data in July 2012. The dairy value chain in Lemu-Bilbilo district involves six distinct value adding activities including input supply, production, gathering, processing, transportation and retail trading. The proportion of milk off-take rate by dairy producers was only 15%. Some of the challenges for dairy production at input, production, processing and marketing stage include low quality and poor timeliness of Artificial Insemination (AI) service, information gap on credit services, feed shortage, lack of awareness and knowledge regarding improved feed formulation, unavailability of government and private ranches and multiplication centers for the supply of improved dairy animals. Therefore, to create knowledge based commercial dairy development in the area, there is an urgent need to encourage the introduction and development of improved forage seed, organize recurrent training for dairy producers on improved forages, feed conservation, formulation and feed preservation techniques.

Key words: Dairy; market channel; gross margin; forage; artificial insemination.

INTRODUCTION

The global production, trade and consumption of livestock products in developing countries have increased rapidly in the last two decades and are expected to continue to rise (Delgado et al., 1999; Delgado 2003; Hall et al., 2004). This trend has been termed as the 'livestock revolution' (Delgado et al., 1999). The livestock revolution has brought both opportunity as well as risk to smallholders. Farmers would benefit from the created market opportunities arising from change in consumption habits of consumers. At the opposite extreme, consumers have started to attach more weight to the safety and standardization of dairy products than ever before.
Consumers are demanding food products with certain characteristics, such as products perceived to be safe, healthy, and convenient or produced in ways that are beneficial to the environment and take animal welfare and equitable labor concerns into consideration (Hall et al., 2004). According to Negassa (2009), small dairy farmers are also facing threats of losing traditional domestic market outlets. This is because an increasing number of urban consumers might depend on supermarkets rather than traditional markets as their main food sources. All these issues pointed out the necessities for the existence and functioning of a vibrant dairy sector whereby every player in the supply chain are aware of the standards and quality traits requirement of end-users. In order to capitalize the created opportunity and respond to the dynamic consumer demand, small-scale livestock farmers need to get appropriate technical and policy support.

Ethiopia holds large potential for dairy development due to its large livestock population and the favorable climate for improved, high-yielding animal breeds (Mohammed et al., 2004). Milk represents an important livestock product and makes a significant contribution to the nutrition as well as income of the livestock owner. In Ethiopia, the whole fresh cow milk production trends have been increasing since 2000. The country produced 4, 3.3 and 3.8 million liters of cow milk in 2010, 2011 and 2012, respectively (FAO, 2014). Per capita milk production as well as milk yield/cow/day was stagnant for four decades (1960 to 2000). During these years, on average the milk production was 200 L/cow/annum and 1 L/day/cow. These figures arrived by taking into account the 6 months lactation length of a milking cow in Ethiopia. However, this trend have shown significant improvement and twist since 2002. Milk yield has improved substantially from 1.1 L in 2001 to 3.4 lites/cow/day in 2002 indicating an improvement by 196%. That is the per capita milk production increased from 204 L per cow per annum in 2001 to 604 L/cow/year in 2002 (Figure 1). Increase coverage of livestock extension service, use of improved inputs (improved breeds and feed) and introduction of market liberalization policy in early 1990s have jointly contributed to the dramatic growth of the dairy sector. Although the performance of the sector so far are positive when compared to the past, the historical performance of the dairy sector in Ethiopia has been disappointing given its immense potential. Therefore, interventions targeting improvement of the traditional dairy sector are crucial for the development of the livestock sub-sector. This in turn needs identification of root causes for the slow development of the dairy sector and specification of leverage points that could be used as entry points to bring about the desired developments in the sector. This study is initiated to assess the dairy value chain of Lemu-Bilibilo district of Arsi zone with the purpose of identifying major constraints and opportunities in the milk and milk products value chain. The results from this study can provide points of entry for research, policy and development interventions to revitalize the dairy sector of the study area. The rest of the article is organized as follows. Section two describes the data source and analysis approaches followed in the study. Section three presents results of the study. Finally, section four gives recommendations of the study.

METHODOLOGY

The study area

The study was conducted in Lemu-Bilibilo district, located in Arsi...
The study district was purposively selected based on its dairy production potential as well as its inclusion into the Agricultural Growth Program (AGP). This area is part of the former Bekoji district and located about 235 km southeast of Addis Ababa. The area is characterized by a bimodal rainfall pattern with yearly average rainfall of 940 mm. The average annual temperature ranges from 6°c to 26°c. This area is part of the highland area delineated as a dairy shed district due to its comparative potential for improved dairy production. The major crops grown in the area are malt and food barley, fababean, field pea and wheat. In the past, the study area benefited from sustained developmental effort by the Chilalo Agricultural Development Unit (CADU) and Arsi Rural Development Unit (ARDU) in the late 1970s financed by Ethio-Swedish integrated rural development project. As livestock and cattle in particular play an important role in the smallholder economy in Arsi, efforts to improve livestock production formed a natural and important part of the project. Activities included crossing local and exotic cattle and sheep breeds; conducting feeding and management experiments; investigating new fodder crops to level out seasonal fluctuations in pasture production; carrying out vaccination campaigns; and implementing milk collection and marketing programs. Specifically, the study was conducted in Bokoji Negesso Peasant Association (PA) with an altitude of 2876 masl. Bokoji Negesso PA was purposively selected based on its accessibility from the 25 PAs available in the district. Out of a total 2678 ha (91.8%) is allocated for crop production, 5.8% is for grazing and about 2% of the PA land is covered by forest (Figure 2).

**Data collection and data sources**

This study used qualitative and quantitative data collected from primary and secondary sources. Different Participatory Rural Appraisal (PRA) techniques such as Focus Group Discussions (FGD), Key Informant Interviews (KII) and Personal observation were utilized to collect primary data. Secondary data was collected using a wall-to-wall fieldwork.

**Secondary data collection and desk reviews**

Before primary data collection, reviews were made from different published and unpublished document that are relevant for the study. Such reviews were made to know previous works in dairy value chain studies in Ethiopia and elsewhere as well as to know the existing information gap. Moreover, secondary data were collected from reports of CSA, different organizations including government institutions such as agricultural offices (regional, zonal and district) and primary dairy cooperatives.

**Focus Group Discussions (FGD)**

Focus group discussions were held with two farmer groups for two days on 26 and 27th of July 2012. Each FGD has a minimum of 15 to a maximum of 21 farmers. Checklists were used in order to guide the FGD with farmers.
Key Informant Interviews (KII)

Information gathered from FGD with farmers was cross-checked and complemented with the existing secondary sources and through KII. A wide range of stakeholders including cooperative managers, input suppliers, processors, private traders and collectors, staff from different offices (office of district livestock development, cooperative promotion office, partner NGOs) and union managers were used as key informants.

Observation

In order to grasp the business practices and transactions in dairy value chain of the study area major milk products (butter and cheese) market at Bekoji town was visited on the major market day (Saturday). During field observations, discussions were made with butter and cheese collectors and traders, private veterinary drug venders, grain milling factories that supply wheat brans and nouge cake to the surrounding dairy producers.

RESULTS AND DISCUSSION

The dairy value chain in Lemu-Bibilbo district involves six distinct value-adding activities (core functions) from the inception of milk production through reaching to the final consumer. These activities include input supply, production, gathering (bulking), processing, transportation and retail trading.

Input supply and services

The major inputs required for dairy production include purchased feeds like concentrate feeds (industrial by-products) and green fodder, Artificial Insemination (AI), veterinary and credit services, land and labor.

Feed supply

The study area is characterized as mixed crop-livestock farming system. In mixed farming system, crop residues are mainly used as source of livestock feeds together with natural pastures. The dominant crop residues available and used as feeding options for dairy production includes straws of wheat, barley, linseed, faba bean and field pea. The main source of crop residues is from own harvest, but in some cases, farmers also buy from market or other farmers. Preferences for crop residues differ for different crops. Due to its relative palatability of the straw, most of the farmers prefer barley straw to feed their dairy animals.

Purchased feeds

During the rainy seasons, farmers rely mainly on natural pasture to feed their dairy animals. As a result, demand for concentrate feeds and their associated prices decrease during such seasons. However, farmers start seeking concentrate feeds as their natural pasture dwindles. They get these concentrates from flour and oil mills at Bekoji town. According to the response of farmers, the price of concentrate feeds increases from year to year. For instance, the price of oil seed cakes increased from 600 ETB\textsuperscript{1}/100 kg in 2010 to 900 ETB/100 kg in 2012 and price of wheat bran increased from 140 ETB /100kg in 2010 to 360 ETB /100 kg in 2012. This is becoming unaffordable for farmers and has a negative bearing on the milk supplied by smallholder farmers. Farmers tend to reduce the amount of concentrate feeding to livestock as its price increases. Moreover, most farmers provide supplementary concentrate feed only to oxen and lactating cows because of the high price, which made them costly to feed to other animals. Most farmers did not have access to training on ration formulation and improved feeding techniques.

Artificial insemination

There are two categories of AI service providers in the study area: government and community service providers. There is only one government technician who provides AI services in the study area. This AI technician is based at the district health clinic at Bekoji town. The service charge is 6 ETB per conception. A farmer can repeat up to 3 times if conception fails to happen. However, there are cases where the conception fails to happen after 6 times repeated insemination. In the remote areas of the study areas, farmers travel more than 4 kilometers to get the AI service. To expand AI service in the remote areas of the study area, Orimnia Livestock Agency with the financial support of FAO has trained nine secondary school graduate farmers as Community Artificial Insemination Technicians (CAIT). Four out of the nine CAITs were provided with the necessary AI equipment including Liquid Nitrogen container, glove, semen container and inseminating gun. These CAI technicians are also regularly provided with semen and liquid nitrogen. The CAIT service providers charge 12 ETB per conception of one animal. Since they do not have permanent salary from the government, they take 10 ETB for themselves as service charge and pass over the remaining to the government.

Animal health

The most prevalent animal diseases mentioned by key informants and farmers were mastitis, Foot and Mouth Disease (FMD), black leg and parasites. Currently, there are seven animal health posts serving the 27 PAs available in the district. There are also three private drug

\textsuperscript{1} Ethiopian Birr(ETB), during the survey time 1S=17.25 ETB
stores and one private clinic at Bekoji town. The Regional Government of Oromia has allocated 40,000 ETB as a revolving fund for veterinary drugs for the district. However, there is still shortage of drugs to treat important diseases such as mastitis.

Financial services

Dairy cooperatives and unions in the study area were not involved in the provision of any financial services in a way of credit in kind (inputs) to individual farmers. Dairy producers are appreciative for the efforts of FAO in the provision of in kind credit through distribution of heifers to selected milk producers. However, FAO was unable to continue delivering these services due to unavailability of heifers supplying institutions and had to revise alternative source of AI delivery system through use of CAI model. Even if farmers have access to formal credit sources like Oromia Credit and Saving Institution (OCSI), they tend not to use this service due to short loan repayment periods. Farmers explain that OCSI credit is too small to procure dairy animals and it should be repaid within one year starting from the date the loan is taken. However, dairy production needs at least three to five years to generate return on investment and cannot be done using such very short-term credits.

Market actors

The main actors in dairy and its products market includes smallholder producers, private processor, cooperatives, hotels/cafeteria, individual consumers and farmers.

Dairy producers

The dairy industry in the study area is mainly comprises smallholder farmers. According to the FGD results, the average herd size per household for local breeds is decreasing while that of improved breeds is increasing. This is presumably affected by reduced grazing lands and increase of cultivated lands arising from high population pressure. There is also lack of push factor to relieve pressure on land due to the unavailability of jobs in the urban centers for the young educated farmers. As a result, there is a change in the commercial orientation of farmers towards milk production. In general, smallholder farmers in dairy farming in the study area are characterized as follows:

1. Most smallholder farmers on average held three local breeds and two improved breed cows. In some cases, exceptional progressive farmer owned as high as 37 heads of improved breeds, mainly Holstein-Friesian and Jersey breeds.
2. The number of non-lactating cows for local breeds per household was relatively high as compared to the improved ones, which is four and one, respectively. The number of lactating cows per household was two for local breeds and one for improved ones.
3. The feeding regime of the study area is dominated by communal grazing. Very few farmers practice paddocking, indoor feeding (zero grazing) and cut and carry feeding systems for improved breeds.
4. Average daily milk yield per local breed dairy cow is 2 L; for improved breeds it is 10 L (morning and evening milk). According to some key informants, some farmers get up to 17 L per day per cross breed dairy cow. This suggests a potential to raise yield per improved dairy cow from the current average of 10 L/day/cow to 17 L, which is equivalent to about 70% increases.
5. From FGD, the proportion of milk marketed by dairy producers was only 15%. The rest 85% of the produced milk remains within the households either for household consumptions or for processing purposes (butter and cheese). The main reason for not selling milk was low-level of milk production, which is not sufficient enough than home consumption.

Dairy cooperatives

In Arsi Zone, there are 24 primary dairy cooperatives and one zonal level cooperative union established with the support of FAO project at the time of this study. Dairy farmers in the study area supply milk to two dairy cooperatives. Farmers in Bekoji Negesso area supply to Bekoji Zuria dairy cooperative while farmers in Lemu area supply to Lemu Ariya dairy cooperative. Both dairy cooperatives are engaged mainly in bulking raw milk from members and non-members, processing and marketing of processed dairy products. The milk deliveries are received at the collection center only in the morning (60%) and the evening milk (estimated to be 40% of the total production) is not collected. The capacity of the cooperatives was limited in terms of the quantities of milk collected and processed, geographic coverage and number of dairy producers involved. The dairy cooperative’s product offerings were limited mainly to butter, skimmed milk2 and cheese. The direct sale of fresh fluid milk is not common.

Collectors

Collectors are one of the important actors in the dairy value chain. Some of collectors undertake their regular duties for private processor by collecting milk in their rented collection shops at Bekoji, Sigure and Lemu towns. These collectors have monthly salary of about 900 ETB and some commission. They collect about 600 L of

2 Skimmed milk is not pasteurized and it is usually sold after it get sour (become Ergo)
fresh milk per day from individual milk producers of Bekoji, Sagure and Lemu areas. They usually use plastic can to transport the milk to Assela town. In order to detect the milk quality, they mainly use acido meter tests and visual observations for their regular customers.

Private processor

One private dairy milk-processing firm (Dembela private milk processing) is involved in milk marketing in the study area. According to the information obtained from FGD and key informants, Dembela private milk processing commands about 15% of the fresh milk market. The firm collects about 600 L of fresh milk per day from the individual milk producers of Bekoji (250 L), Sagure (200 L) and Lemu (150 L) towns. The main market outlet for this firm was the urban consumers of Adama town.

Hotels/cafeterias

Hotels and cafeterias at Bekoji town directly purchase fluid milk (morning and evening milk) from producers based on contractual agreement. They purchase butter from local butter traders at a price of 140 ETB/kg. The average daily intake for raw milk reaches up to 21 L/day/hotel or cafeteria. According to the information obtained from FGD, hotels/cafeterias command about 70% of the fresh milk market of the study site. They consider quality parameters such as freshness, adulteration with water, taste, hygiene and price in their decision to buy liquid milk.

Individual consumers

There are three main dairy products consumed by individual consumers in the study area: raw milk, butter (edible and cosmetic) and cheese. Smallholder dairy producers are still very important sources of milk for individual consumers of the study area. Smallholder dairy producers sell fresh milk to their neighbor and other individual consumers on monthly contractual basis. In this case, the consumer collects milk from the producer’s gate. Since the two parties meet every day, they easily communicate the quality problems so that producers can correct them as much as possible. If not, the consumer looks for better quality milk from other producers usually after finishing the contract. On the other hand, for other dairy products like cheese, edible butter and cosmetic butter, the major points of purchase are town markets and cooperatives shops and the main sellers are traders, individual producers and cooperatives.

Marketing channels

Analysis of information obtained from different sources during the study depicts that there are five main market channels for fresh milk produced in Limu-Bilbilo district (Figure 3). The final consumers of dairy products in the study area are individual consumers and hotels/cafeterias of Assasa, Bekoji and Adama towns.

Channel 1: Milk products supplied to individual consumers and hotels/cafeterias in Bekoji and Assasa towns

This is the first channel through which farmers sell fresh (morning) milk directly to the Bekoji Zurea and Lemu-Ariya dairy cooperatives. The cooperatives process and sell the milk products (butter, cheese and skimmed milk) mainly to individual consumers and traders of Bekoji and Assasa towns. According to the information obtained from FGD, about 7% of the fresh milk produced by farmers goes through this channel via cooperatives. The suppliers to the dairy cooperatives are mainly commercial farmers that have continuously supply milk throughout the year. The cooperatives process the raw milk into butter and skimmed milk and sell mainly to individual consumers and traders of Bekoji and Assasa towns. This channel is one of the largest market channels for skimmed milk produced by Bekoji Zurea dairy cooperative. Sale of skimmed milk is virtually made during the dry season. In dry seasons, the supply of fresh milk decreases significantly due to feed shortage, which is exacerbated due to lack of grazing pasture and high price of concentrate feed. During such season, the cooperative process the assembled milk into butter and sell the skimmed milk to Assasa district traders and members at the price of 3.50 ETB/L.

Channel 2: Milk supplied to hotels and cafeterias in Bekoji town

This is the second biggest fresh milk marketing channel in which about 70% of the milk produced in the study district is supplied to hotels and cafeterias of the study district. Bekoji town is the hometown of famous long distance runners. Nowadays, there is a growing number of investment on hotel and cafeterias in the study district mainly built with the remittance income obtained from athletics. Smallholder farmers who have little supply mainly opt this channel due to the flexibility of payments. Payments is made based on agreement between supplier and owner of hotels and cafeterias. In most cases, payment is made on weekly and bi-monthly basis, which gives farmers the choice to invest the income on concentrate feed especially during the dry season.

Channel 3: Milk consumed by individual consumers in Bekoji town

Due to change of life style, the per capita milk
consumption in Ethiopia has been increasing over the past few years. Individual households tend to include milk consumption as their daily dietary food intake although the volume and frequency is not enough. According to Central Statistical Authority (CSA, 2011), per capita milk consumption has reached 48 L in 2010/11, which rose by 25% and 29% compared to 2008/09 and 2009/10 seasons. As per the information obtained from FGD and key informants, about 7% of the fresh milk produced by farmers sold directly to individual consumers on contractual basis through this channel. Payment effected in advance on monthly basis. Most of the households consume the whole fresh milk (fresh, pasteurized milk or fermented sour milk). Some households churn the cream that is accumulated over a week to get butter and cheese (ayib) for household consumption.

Channel 4: Milk supplied to individual consumers in Adama area

Non-cooperative affiliated and relatively small milk producers usually follow this channel. This is the second biggest fresh milk market channel. About 15% of the morning milk produced by farmers reaches to private processor (Dembella private processor) through milk collectors. In this channel, the milk assembled by Dembella private processor is distributed to individual consumers in Adama town at Dembella selling shop in the form of fluid milk, sour milk (Ergo), cheese and butter. Almost 87% of the milk collected from Dembella private processor (i.e., 13% of the morning milk produced in the area) goes to individual consumers at Adama town. During transportation of the assembled milk, some of the collected milk is exposed to sun and becomes too sour for processing, which in turn sold as sour milk (Ergo) to individual consumers at Adama town.

Channel 5: Milk supplied to hotels and cafeterias in Adama area

In this channel, 13% of the fluid milk assembled by Dembella private processor (that is, 2% of the morning milk produced in the area) is distributed to hotels/cafeterias in Adama town on monthly contractual basis.
This channel is relatively better organized in terms of sustainability and trust. In this channel, collectors of Dembella processor and raw milk suppliers have developed strong relationship and trust. In this market channel, the milk rejection rates are relatively lower as compared to the first channel. Producers are allowed to mix the evening and morning milk to supply to collectors which otherwise is the bases for rejection, if they supply to cooperatives. The main reason mentioned by collectors is to attract the milk supply from farmers. Despite the fact that this channel is relatively organized and developed, collectors still use public transportation and Isuzu private trucks for transporting milk from major collection areas to milk processing plant at Assela town which is 56 km far away from the collection centers. Unlike other marketing channels, the most noticeable advantage of this channel is the constant price paid to supplier farmers during dry and wet seasons. This has attracted most farmers to rely on this channel.

Challenges of dairy production and marketing

Technical constraints at input supply

Low quality and untimeliness of AI and animal health service provision: Based on farmers’ response during FGD, the service rendered by the AI technicians was inadequate and offering low quality services. Due to this problem, nowadays farmers tend to use bull service for breeding, which is more attractive from the point of view of its timely accessibility when service is required. Farmers complained that service per conception was 5 to 6 times and there were cases where they fail to succeed after 6 conceptions. Farmers identified three important reasons for this. The first reason was shortage of technicians. There was only one technician for five kebeles and he cannot be available when the animals were in heat. The second reason was poor semen quality. This could be the result of poor handling, especially because of shortage of liquid nitrogen to maintain the cold chain and keep the semen alive. The third reason was low technical capacity of the technician. Farmers indicated that they do not have confidence on the capability of the technician. However, farmers understand the importance of AI services over natural mating in terms of its proven quality in improving the genetic make-up of the cattle population through access to genes from superior bulls, disease control and cost effectiveness as compared to rearing bulls. Despite this superior advantage, farmers were forced to rely on natural mating due to the above stated inefficiency and inaccessibility of the AI services.

Information gap on credit services: With regard to credit, farmers and dairy cooperatives have limited awareness about the terms and conditions of credit providers. Currently, most farmers do not have good knowledge of how to get credit services, amount of credit and loan repayment periods for dairy farming activities. Farmers refrain from using credit services mainly due to lack of understanding of its terms.

Unavailability of budget for demonstration sites on improved forage production in Farmers Training Centers (FTC): Utilization of FTC as training ground for demonstration of improved forage development was not observed in the study area. The major problem behind this was budget shortage.

Shortage of multiplication centers for the supply of improved dairy heifers and bulls: Farmers stated that there was shortage of ranches that multiply and distribute improved heifers and bulls in the area. The government ranches that used to serve this purpose were privatized and are no longer multiplying and distributing breeding stock. Those ranches that are still multiplying breeding stock under the private ownership such as Gobe are too expensive to be accessible by farmers.

Technical constraints at production stage

Lack of awareness and knowledge regarding improved feed formulation: Despite the efforts of some non-governmental organization such as ACDI/VOCA Ethiopia in provision of trainings for few progressive farmers on improved feed formulation methods by using the idea of proper cost-effective ration techniques, farmers are still lack the basic skills for feed formulation techniques.

Very high price of industrial by-products for feed: Over the last three years, the price of industrial by-products has become sky rocketing. For instance, the price of oil cake increased from 600ETB/100kg in 2010 to 900 ETB /100 kg in 2012 and for wheat bran it increased from 140 ETB/100kg in 2010 to 360ETB /100 kg in 2012. This is becoming unaffordable for dairy producers. Farmers tend to reduce the amount of concentrate feeding to livestock as its price increases.

Technical constraints at processing and marketing stage

Lack of refrigerated trucks: To resolve the fresh milk marketing problems of the cooperatives, FAO had purchased milk cooler machine for the dairy cooperatives union. This was in order to enable primary cooperatives to supply morning and evening milk twice a day to the union at Assela town. However, this facility would be useful only if the cold chain of milk stored in the cooler
machine is maintained upon delivery to potential buyers. This needs the availability of trucks with refrigerated tankers. As a result, the cooling machine was left idle in the store. Thus, the union and primary dairy cooperatives have failed to accomplish their intended purposes.

Absence of quality based payments: Since there is no quality based payments for milk producers, milk supplied by farmers were in some cases adulterated with hot water and mixed with evening milk, which was below the required quality standard set by dairy cooperatives.

Weak vertical linkage between cooperatives and potential buyers: The dairy cooperatives have weak vertical market linkages with supermarkets, institutional buyers and private processing plants. Cooperatives immediately process milk into butter and the practice of transporting fresh milk to other regional markets is not common.

Legal and institutional constraints

Existence of too many unlicensed traders: This is the case for butter market, where most of traders are informal while only few of them are licensed. This means the licensed traders are paying taxes and compete with non-tax payers in the market. This in turn distorts the normal working environment of the butter market.

Weak coordination between union, primary cooperatives and farmers: The milk collected by dairy cooperatives of the study area was not delivered to the union. Rather, the primary dairy cooperatives limited their involvement only in processing fresh milk into butter and cheese. The dairy cooperative union of the study area was established at zonal headquarter of Assela town. The linkage of both Bekoji zuera and Lemu Ariya primary dairy cooperatives with that of the union was not strong. The immediate reason was the less involvement of the union in the marketing of fresh milk for which they were initially established. Moreover, the linkage between primary dairy cooperatives and farmers was also not as such strong since farmers are not getting the benefits they are expecting from their cooperatives. Cooperatives are not involved in provision of any capacity building trainings for farmers on milk handling and processing. Furthermore, they even did not supply inputs such as concentrate feeds, veterinary drugs and improved forage seeds. In other parts of the country, unions and dairy cooperatives are serving as major sources of heifers and link farmers to the sources, provide credit services and identify market outlets. For instance, Ada’a dairy cooperative has been sharing dairy related knowledge and information by providing training and advisory services on dairy production and marketing for their member farmers. However, such kinds of relationship and service provision were non-existent in the study area.

Capacity of support service providers

Capacity gap among extension agents and agricultural experts in provision of training for feed formulation techniques: During the FGD, farmers indicated that they were not getting the required support regarding dairy husbandry practices like ration formulation techniques either from extension agents or from experts.

Existing opportunities

The major opportunities available to invigorate the transformation of subsistence dairy sector of the study area into market-oriented dairy farming includes:

1. Presence of model dairy farmers that have started improved dairy farming in the study area. The availability of few progressive farmers who have adopted the practice of keeping improved dairy cows becomes clear evidence that there is an opportunity to practice dairy farming as profitable farming system in the area.
2. Good policy road map that aimed at bringing the desired change in the livestock sector. For instance, Oromia Livestock Agency has placed more emphasis on improving the effectiveness and accessibility of AI service through the introduction of oestrus synchronization using mass artificial insemination campaigns.
3. Good infrastructural facilities: the study area is connected with good asphalt roads to milk deficient Shashemene, Hawassa, Assela and Adama urban towns.
4. Favorable climate and weather conditions with relatively abundant pasture land.

RECOMMENDATIONS

In order to improve the dairy value chain of the study area, the following recommendations are suggested as intervention options to overcome the constraints of the dairy value chain and make use of the available opportunities.

Training of farmers on improved feed formulation techniques

It is evident that the poor feeding system is partly attributed to the high cost of industrial by-products and less awareness on the part of farmers about the positive gains associated with improved feeding system. Therefore, in order to create knowledge based smallholder dairy development in the area, there is an urgent need for training of dairy producer farmers on feed formulation and feed preservation techniques. This should be accompanied by scaling up the achievements of few progressive farmers on achieving high milk yields.
through adoption of improved feed formulation techniques.

**Improve the effectiveness and efficiency of AI service**

Improvement in the current AI service could be made through:

**In-service training of local service providers**

In order to enhance the technical skills and knowledge of AI technicians, short-term training and refresher courses on relevant areas of AI service would play central role for enhancing the service provision of AI experts in the study area.

1. Training of farmers on AI service (especially heat detections and reporting) or encouraging the use of farmer AI technicians where it is necessary.
2. Training of farmers on community bull selections.
3. Expanding different organizational models on AI and animal health services. For instance in the study area, in collaboration with Oromia AI institute and Livestock Agency, FAO provided 30 days training for nine farmers on how to recognize various semen types, early detection of animal heat and proper insemination procedures. In the meantime, necessary equipment was provided for trained AI technicians. Expanding the number of trainee farmers by inclusion of participants from remote areas and improving the provision of facilities (like motor cycles) for trained community AI and animal health technicians could be the right step for transforming the traditional dairy system of the study area into more market oriented dairy sector.

**Revitalizing the activity of cattle ranches**

Farmers in the study area used to get breeding heifers and bulls from ranches such as Gobe and Abernosa. However, these ranches were privatized with the purpose to increase their efficiency and promote private sector participation in the livestock industry. Despite the intention of the government, these ranches could not provide the intended benefits to the surrounding community. Thus, there is a need to reconsider mechanisms to bring these ranches back to their main objective of supplying better genetic materials to the community. This could be done through a dialogue with the private sector and proper follow up to ensure that they stick to their initial plan of more efficient multiplication and dissemination of these materials.

**Awareness creation on credit service terms and conditions**

Micro-finance institutions need to create a platform for organizing training on credit service terms and conditions for dairy producers.

**Improving the service provision of the union**

In order to address the chronic shortage of trained AI technicians and high price of improved feeds, improving the service provision of the union to its members in the form of acting as “Business Hub” by providing those mentioned inputs would alleviate the current problems.

**Creating regular stakeholder forum for various value chain actors**

Creating regular platforms for dairy producers, dairy cooperatives, union, private traders and potential consumers as a mechanism for creation of market linkage and experience sharing platform is crucial. This initiative would enable them to discuss common problems, find solutions and strengthen networking between important dairy value chain players.

**Conflicts of Interests**

The authors have not declared any conflict of interests.

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