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Review of Dairy Value Chain in Ethiopia

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Abstract
Ethiopia has a huge potential to be one of the key countries in dairy production for various reasons. It includes a large population of milk cows, a huge potential for production of high quality feeds under rain fed and irrigated conditions, existence of a relatively large human population with a long tradition of consumption of milk and milk products and hence a potentially large domestic market. Despite its potential for dairy development, productivity of indigenous livestock genetic resources in general is low, and the direct contribution it makes to the national economy is limited. the main source of milk production in Ethiopia is cattle but small quantities of milk are also obtained from goat and camel in pastoralist areas of the country. Based on the system of production, Milk production can be viewed at three different sources. These include: Pastoral milk Production, The highland smallholder milk production and Urban and peri-urban milk production. Milk and milk products are channeled to consumers through both formal and informal marketing systems. Ethiopia has a low level of milk consumption compared to other countries in the region (Kenya = 90 lt/cap; Uganda = 50 lt/cap). Challenges and problems for dairying vary from one production system to another and/or from one location to another. Underdevelopment and lack of market-oriented production, lack of adequate information on livestock resources, inadequate permanent trade routes and other facilities like feeds, water, holding grounds, lack or non-provision of transport, ineffectiveness and inadequate infrastructural and institutional set-ups, prevalence of diseases, illegal trade and inadequate market information (internal and external) are generally mentioned as some of the major reasons for the poor performance of this sector.
Keywords: Dairy, Value chain, Market channel, Ethiopia

Introduction

Ethiopia has a huge potential to be one of the key countries in dairy production for various reasons (Pratt*et al.,* 2008). It includes a large population of milk cows in the country estimated at 9.9 million (CSA, 2008), a huge potential for production of high quality feeds under rain fed and irrigated conditions, existence of a relatively large human population with a long tradition of consumption of milk and milk products and hence a potentially large domestic market (Holloway *et al*., 2000). Ethiopia was home for an estimated 53.4 million cattle, 22.8 million goats, 25.5 million sheep, and 1.1 million camels (CSA, 2011). However, the Smallholder farmers and pastoralists together produce and supply 98% of the total annual milk production of the country (Abebe et al., 2013).

In Ethiopia dairy production depends mainly on indigenous livestock genetic resources; more specifically on cattle, goats, camels and sheep. Cattle has the largest contribution (81.2%) of the total national annual milk output, followed by goats (7.9%), camels (6.3%) and sheep (4.6%) (CSA 2009). Despite its potential for dairy development, productivity of indigenous livestock genetic resources in general is low, and the direct contribution it makes to the national economy is limited. For example, in 2009 average cow milk production was estimated at only1.54 liters/cow per day (CSA 2009), and the per capita milk consumption was only about 16 kg/year, which is much lower than African and world per capita averages of 27 kg/year and 100 kg/year, respectively (FAOSTAT 2009). A recent report by CSA (2010/11) indicated that the total production of cow milk is about 4.06 billion liters, and this translates to an average daily milk production/cow of 1.86 liters/day. The MoA (2012) also reported some improvement in per capita consumption of milk and estimated it at 19.2 kg. According to CSA (2011), over 85% of the milk produced by rural households is consumed within the producer households with the proportion marketed being less than 7%. The small amount of milk produced by a large number of producers but the low marketable output in Ethiopia posses limitations on the possibilities of exploiting distant but rewarding markets due to high transaction costs arising from transportation and high opportunity costs of labor involved. As reported by Muriuki and Thorpe (2001) the vast majority `of milk produced outside urban centers in the country is processed into milk products at household level using traditional technologies.

2. Historical Development of Dairy Production in Ethiopia

2.1. The emergence of modern dairying in Ethiopia (1960 -1974)

During the first half of the 20th century, dairying in Ethiopia was mostly traditional (Ahmed et al. 2003).Modern dairying started in the early 1950s when Ethiopia received the first batch of dairy cattle from United Nations Relief and Rehabilitation Administration (UNRRA). With the introduction of these cattle in the country, commercial liquid milk production started on large farms in Addis Ababa and Asmara (Ketema, 2000). Government intervened through the introduction of high-yielding dairy cattle in the highlands in and around major urban areas. The

government also established modern milk processing and marketing facilities to complement these input-oriented production efforts.

To facilitate growth of the sector, UNICEF established a public sector pilot processing plant at Shola on the outskirt of Addis Ababa in 1960. The plant started by processing milk produced by the large farms. The plant significantly expanded in a short period and started collecting milk from smallholder producers in addition to large farms. This led to further expansion of large dairy farms. During the second half of the 1960s, dairy production in the Addis Ababa area began to develop rapidly because of the expansion in large private dairy farms and the participation of smallholder producers with indigenous cattle facilitated by establishment of the milk collection centers (Ahmed et al. 2003). Subsequently, different dairy development projects were launched in different parts of the country. The distribution of exotic dairy cattle, particularly the Holstein Friesian, in different parts of the country, especially around the major urban areas, also contributed to the further development of dairying in Ethiopia (Sintayehu, 2008).

With the advent of modern dairying, the government of Ethiopia established the Addis Ababa Dairy Industry (AADI) in 1966 to control and organize the collection, processing and distribution of locally produced milk. Further, with the help of UNICEF, the Shola plant was expanded in 1969 and several government-owned dairy farms were established to supply the formal market and to serve as demonstration centers for the large commercial farms. In addition, the government introduced regular programs and projects for dairy development. The first effort, initiated by the governments of Ethiopia and Sweden, was the establishment of the Chilalo Agricultural Unit (CADU), later named Arsi Rural Development Unit (ARDU), between 1970 and1980. The unit produced and distributed crossbred heifers, provided artificial insemination (AI) services and animal health service, in addition to forage production and marketing. In addition to collecting milk, the DDA sold milk and dairy products through its kiosks and shops as well as to institutions. It also facilitated the creation of dairy cooperatives to ease the provision of credit and technical and extension service to dairy producers (Staal, 1995, cited in Brihanu, 2012).

2.2. Dairying during Dergue Regime (1974-91)

The DDE was established to operate the nationalized state farms, establish a milk collection network, process and market dairy products, provide advisory and limited technical service to farmers, and sell veterinary medicaments and feed to farmers. The enterprise had a capacity to process 60,000 liters of milk at its inception (Yigezu, 2000). The programs and projects implemented included the Minimum Package Program (MPP), Addis Ababa Dairy Development Project (AADDP), Dairy Rehabilitation and Development Project (DRDP), Artificial Insemination Service (AIS) and Selale Peasant Dairy Development Pilot Project. Although the programs or projects implemented differed in their intensity, most of the efforts were input-oriented. As a result of these promotional efforts, total milk production increased significantly during this phase with the exception of mid 1980s when the country experienced a debilitating three-year drought (Mohamed *et.al.* 2004). Despite the significant increase in aggregate milk production, per capita milk production was declining. This phase was characterized by low producer prices which discouraged production, emphasis on cooperatives in rural areas, and neglect of most important producers in urban areas.

To bridge the gap between supply and demand, dairy imports increased significantly during second phase beginning from 1978. This was partly due to increased food aid, World Food Programme (WFP) milk powder imports, and a level of dairy production development that lagged far behind the demand (Tsehay, 2001). Imports reached a peak of 279,651 and 314,726 metric tons in 1985 and 1986, respectively during the drought period. Reda (2001) also indicated that import dependency rose steadily during this phase. For instance, dairy imports as a percent of total consumption increased from 4.1 percent to 12.8 percent between 1977 and 1989. Commercial imports grew rapidly at 24.18 percent per year (Felleke and Geda, 2001).

2.3. Dairying during the transition to a market-oriented economy (1991-Present)

In post-Dergue market-oriented development, the private sector has begun to enter the dairy market as an important actor. Several private investors have now established milk-processing plants in Addis Ababa to supply fresh milk. Currently, privately held Sebeta Agro- industry is competing with DDE in supplying milk to urban consumers. DDE remains, however, an important factor in the formal dairy market. In 1993, the producer price paid by DDE increased from Birr 0.65 per litter to Birr 1.00 per litter and later to Birr 1.25. Meanwhile, government privatized inefficient state farms, reducing the number of state farms from fourteen to only two. Moreover, the government accorded attention to the urban dairy producers and began serving them after they officially registered by the MOA.

Post 1991 producer groups such as the AADPA emerged encompassing 90 percent of all urban dairy producers and a large proportion of peri-urban producers within a radius of 100 kms of Addis Ababa (Staal, 1995). Dairy development efforts in the post reform period have focused on smallholder dairy producers. The two major donor funded SDDPP and SDDP projects focused exclusively on improving dairy production at smallholder level. Unlike the projects implemented during Dergue regime, these two projects addressed marketing problem of

smallholder producers in addition to provision of inputs.

3. Milk production in Ethiopia

Milk production in Ethiopia is largely from by the smallholder farmers in the high lands the pastoralists in low land areas of the countries. However, the production is not market oriented and a minor portion of the locally produced milk enters the commercial sector owing to the marketing constraints and lack of processing techniques suitable for smallholder dairying.In order to sustain milk production to satisfy the increasing demand, efforts to increase milk production should go hand in hand with efforts and knowledge to dispose milk surpluses above local requirement in the milk producing villages. The manufacture of stable marketable products including butter, low moisture cheese and fermented milks will provide smallholder producers with additional source of cash, facilitate investment in the milk production, yield by products for home consumption and enable the conservation of milk solids for future sale or consumption (care Ethiopia 2009). As the study of care Ethiopia (2009) the main source of milk production in Ethiopia is cattle but small quantities of milk are also obtained from goat and camel in pastoralist areas of the country. Based on the system of production, Milk production can be viewed at three different sources. These include:

3.1 Pastoral milk Production

Livestock production in pastoral areas system that supports an estimated 10% of population covers 50-60% of the total area mostly lying at altitudes ranging from below 1500 m.a.s.l is the major system of milk production in the low land. However, because of the rainfall pattern and related reasons shortage of feed availability milk production is low and highly seasonally dependent. In this system indigenous stock grazing in pastures in extended rangeland throughout the year and milked twice a day. No supplementary feeding is provided.

3.2. The highland smallholder milk production

The Ethiopian highlands possess a high potential for dairy development. These areas are occupying the central part of Ethiopia, over about 40% of the country. In the highland areas agricultural production system is predominantly substance smallholder mixed farming, with crop and livestock husbandry. In this system feed for livestock consists of forages, crop residues and stub grazing and hay native pastures. The majority of milking cows in the smallholders milk production are indigenous breeds which have low production performance with the average age at first calving is 53 months and average calving intervals is 25 months. The average cow lactation yield is 524 litres for 239 days, of which 238 litres is off-take for human use while 286 litres is suckled by the calf. But also a very small number of crossbred animals are milked to provide the family with fresh milk butter and cheese. Surpluses are sold, usually by women, who use the regular cash income to buy household necessities or to save for festival occasions (Mugerewa et.al. 2009). Both the pastoralist and smallholder farmers produce 98% of the country milk production.

3.3 Urban and peri-urban milk production

This system developed based on the high market demand in and around major cities and towns for milk and milk products. The main feeds sources are agro-industrial by products (Oil Seed Cakes, Bran, etc) and purchased roughage. The system comprises small and medium size dairy farms located mainly in the highlands of Ethiopia. Farmers use all or part of their land for home grown feeds. Generally, the primary objective of the production system is to sale milk as a means of additional cash income. The system basically characterized by small scale intensive husbandry with cross breeds not more than 10 heads and managed under zero grazing.

4. Dairy Marketing in Ethiopia

In Ethiopia, Milk and milk products are channeled to consumers through both formal and informal marketing systems. Price is usually set through negotiation between the producer (seller) and the buyer; this system is predominant in the rural dairy production system. Until 1991, the formal market of cold chain, pasteurized milk was exclusively dominated by the DDE which supplied 12 percent of the total fresh milk in the Addis Ababa area (Care Ethiopia, 2009).

Recently, however, private businesses have begun collecting, processing, packing and distributing milk and other dairy products. Still, the proportion of total production being marketed through the formal markets remains small (Muriuki et. al 2001). Formal milk markets are particularly limited to peri-urban areas and to Addis Ababa. The only organized and formal milk marketing and distribution system comes from the two milk-processing plants which are both located in the capital Addis Ababa .As reported by many authors, farmers' milk marketing groups and dairy cooperatives play a key role for milk marketing outlets, which as a result encourages farmers to produce more (Zegeye 2003).

In the formal marketing system there are cooperatives and private milk collecting and processing plants that receive milk from producers and channel to consumers, caterers, supermarkets and retailers; this system does

exist in urban and peri-urban dairy system of Shashemene–Dilla milk shed, although the number of cooperatives is few and its performance is low (Woldemichael 2008). In the rural lowland agro pastoral system of Mieso, dairy producers use two different milk marketing methods: traditional milk associations/groups and individual sellers. The traditional milk producer associations/groups are locally called *Faraqa Annanni*, and are a traditional voluntary group that involves women who have milking cows or camels. Members are organized based on common interest of selling cow/camel whole milk, whereby milk is transported and sold by one of the member's thus reducing transport and marketing cost per unit of milk through economies of scale (Azage T.et al., 2013).The informal market involves direct delivery of fresh milk by producers to consumer in the immediate neighborhood and sale to collectors or traders nearby towns. In the informal market, milk may pass from producers to consumers directly or it may pass through two or more market agents. The informal system is characterized by no licensing requirement to operate, low cost of operations, high producer price compared to formal market and no regulation of operations. The informal (traditional) market has remained dominant in Ethiopia. The traditional processing and trade of dairy products, especially traditional soured butter, dominate the Ethiopian dairy sector.

4.1. Dairy marketing channels

The market channels of milk and milk products vary based on production system and type of the dairy product produced. Milk marketing channels in urban dairy production system of Hawassa, Shashemane and Yirgalem involved 2–4 channels (Table1 below). It is noticed that the role of cooperatives in the marketing channels is higher in Shashemane, as compared to Hawassa city, where the bulk of the milk is sold directly to consumers and private milk wholesalers and/or retailers.

Table 12Major milk marketing channels in urban dairy system of Shashemene–Dilla milk shed

Milk marketing channels	Urban dairy system		
	Hawassa %	Shashemane %	Yirgalem %
I. Producer → Consumer	21	4.7	23.4
II. Producer → Wholesaler → Retailer → Consumer	60	–	–
III.Producer → Cooperative → Retailer → Consumer	2.2	46.9	–
IV.Producer → Retailer → Consumer	16	38	76.6
V. Producer → Cooperative → Consumer	0.81	10.4	–

Source: Woldemichael (2008)

Marketing of butter in the urban consumption areas of the Shashemene–Dilla milk shed involves actors from outside due to limited supply of local butter from urban and peri-urban production systems. Rural dairy producers in Shashemane and Dale supply about 46.2% and 41.7% of the total butter marketed in Shashemane and Yirgalem towns. Producers/itinerant trader's accounts for about 72.6% of total butter marketed in Hawassa, 31.1% in Shashemane and 42% in Yirgalem. It is noted that such butter comes from other milk sheds such as Wolaita (Kucha, Areka, Gasuba and Waka), Sidama (Arbegona), Kofole in western Oromiya and Addis Ababa (Woldemichael 2008).

In the rural lowland dairy system of Metema, several butter marketing channels have been identified including market agents selling butter to Gondar town and Tigray Region, which are located at a distance of about 160 and 240 km, respectively. Butter is also sold to Sudan legally, crossing the Ethiopian–Sudan boarder in Gelabat (Tesfaye, 2007). It has been very difficult to quantify the major contribution of each channel, but based on the response channels ii, iii and v have significant contributions.

Table 13Table marketing channel of butter

Marketing channels of butter
Producers → Consumers
Producers → Consumers Producers → Itinerants → Consumers
Producers → Itinerants → Wholesaler/retailer →Consumers
Producers → Catering institutions →Consumers
Producers → Wholesaler/retailer→ Consumers
Producers → Itinerants → Catering institutions → Consumers
Producers → Itinerants → Wholesaler/retailer → Catering institutions → Consumers

Source: Tesfaye (2007).

A similar marketing structure can be seen in Fogera, where butter produced in rural areas is sold and consumed locally but also sold in external markets (Addis Ababa) through a system of inerrant traders. In the rural highland production system of Bure, the butter marketing channel is short and consists of producer→ consumer (volume marketed is small and butter is used mostly for cosmetics) and producer → retailer → consumer (Adebabay 2009). In general, prices of dairy products fluctuate and are influenced by a number of drivers such as season, distance and access to markets, fasting periods, festival and holidays, purchasing power of consumers; while quality, origin of the product, sales outlet (farm gate, delivery system or open market), and the production

system are especially important for butter.

5. Milking, Milk Handling and Processing in Ethiopia

5.1. Milking

Hand milking is the sole milking method practiced across all the production areas. Frequency of milking across the dairy production systems is twice daily, with the exception of the rural lowland agro pastoral production sub-system of Mieso where milking frequency is reduced to once a day during the dry season in order to cope up with feed shortage. However, unlike cows, camels are milked three times per day during the wet season and twice per day during the dry season in the rural lowland agro pastoral production system (Tegegne et al., 2013).

5.2. Milk handling

Sanitation of the milking and milk storage utensils varied between PLWs. In the rural lowland system of Metema, nearly all the producers clean milking and milk storage utensils by smoking it with fruits locally known as *Lifa*. The method is believed to improve the flavor, taste and quality of milk and milk products, and extends the shelf life of dairy products. In the urban and peri-urban dairy system (Shashemene–Dilla milk shed), the majority (70%) of the producers clean milk utensils with cold or hot water followed by smoking with different aromatic plants like Woira *(Olea africana)* and Tid *(Juniperous procera)*. Only about 23% of the producers in the urban and peri-urban system clean milk utensils with water and detergents. Different types of utensils are used for milking, milk handling and processing in PLWs. For example, in the rural highland production system of Bure and Fogera, most farmers use gourds which is made of *Lagenaria siceraria* (Quel), locally known as Gerera for milking, while in the urban dairy production system (e.g. Hawassa), most dairy farmers (92%) use plastic utensils. However, the use of clay pot or plastic containers is also common in the rural dairy production system (Tegegne et al., 2013).

5.3. Milk processing

Milk processing is basically limited to dairy farmer level and hygienic qualities of products are generally poor (Zelalem and Faye, 2006).The dominant milk processing method across all the PLWs is traditional home processing method and it involves processing of fluid milk into fermented or sour milk, butter and local cheese (*ayib*). Milk is either kept at warm temperature or in a warm place to ferment prior to processing (Mogessie, 2002). For example, in the rural highland system (Fogera), milk is fermented for 3 to 5 days before it is processed into butter and other milk products (Belete 2006). About 0.6 kg of butter is produced from 10 liters of milk (approximately 16.5 liters of milk is required to produce 1 kg of butter) through the traditional milk processing methods (refer www.ipms-ethiopia.com for traditional method of milk processing) (Tegegne et al., 2013).

In areas where the climate is hot and humid, the raw milk is spoiled easily during storage. Therefore, the smallholder with non-access to the modern preservative and cooling mechanism should seek products with a better shelf life by converting milk in to a more stable product like yoghurt, cottage cheese butter and ghee or by treating it with traditional preservatives (Getachew, 2003). Traditionally there are different types of plants used for smoking and cleaning of milking, storing, processing and marketing utensils in different parts of the country. In semi-arid pastoral system of Ethiopia, the most commonly used smoking plants are Acacia nilotica, Cordia glarfa, and Cordia ovalis. In Eastern Showa zone of Oromiya region, about 53.3% of the women in Lume district used ―Gufteǁ (Sida cuneifolia) and ―Hiddii hooiotaaǁ (Cucumis prophetarus) leaves to clean the milk vessels and processing, while about 47 % and 40 % of the women in Adami Tulu and Arsi Negelle, respectively used ―Kosoratalǁ (*Ocimum hardiense*). ―Ejersaǁ (*Olea Africana)* is the most frequently used plant for smoking milk vessels followed by Juniperous procera and Ocium hardienes (Lemma *et al.,* 2005).

Modern milk processing technologies in Ethiopia are emerged in the development of dairy sector. These technologies distributed around different parts of the country with different potential capacity. Currently the potential capacity of the DDE/LAME milk processing plant (60 ton/day) is not fully utilized. Data from ten years performance (1991 to 2000) indicate an annual processing average of 4,703.8 ton. Maximum utilization of the processing capacity of the plant was reported in 1981/82 with 52.8% while the lowest was in 1992/93 with 9.9% utilization. Over the periods 1981/82 to 1995/96 average intake was 33.5%. Sources of milk for processing were 44.1% from own production, 44.7% from farms other than its own and the rest 11.2% from powdered milk utilization. Powdered milk utilization was for years 1991 to 1997, the highest utilization being from 1991 and 1992 (Getachew F. and Gashaw G., 2001).

6. Consumption of milk in Ethiopia

Ethiopia has a low level of milk consumption compared to other countries in the region (Kenya = 90 lt/cap; Uganda = 50 lt/cap). Even though Ethiopia has the largest inventory of milk producing animals, (cattle, sheep, goats and camels), per capita consumption of milk is low compared to Kenya with fewer livestock and Sudan. The national per capita consumption of milk and milk products is estimated at 17 kg (Ahmed, 2004). Per capita income levels in Ethiopia place it in the range with Tanzania and Rwanda with annual per capita consumption of milk at less

than 20 kg. Average expenditures by households on milk and milk products are only four percent of the total household food budget (Staal, et al, 2008). Ethiopia is unique from other countries in the region because of the number of fasting days, over 200, and the cultural attitude that milk is mainly for children and the sick (SNV, 2008). Milk, butter, and cottage cheese are a central part of Ethiopian food culture. Milk is consumed either in fresh or fermented (sour) form. Out of the total annual milk production in rural Ethiopia, 48.48% was used for household consumption, 6.55% was sold, 0.41% was used for wages in kind, and 44.57% was used value addition (CSA, 2011). However, consumption pattern and preference of consumers vary from culture to culture and from urban to rural.

In the rural areas producers will consume fresh milk and will convert their milk to butter. It is estimated that 40% of the milk produced is converted to butter, while only 9% is converted to cheese. Traditional butter ferments slowly at room temperature and can be kept for a year or longer, offering rural consumers a readily storable and durable dairy product (GOE, LMP, 2007). Milk consumption in a region will depend on its herd size and the volume of milk produced.

In peri-urban, farmers use milk as cash generating commodity by directly selling milk. In most urban centers especially smaller towns, residents tend to own a few cows for milk production for home consumption and sales. Milk in the lowlands is primarily used as fresh for home consumption followed by sales to urban centers. Where there is no access to fluid milk markets, farmers process it into products (butter, and cottage cheese). However, even if market for selling fluid milk is available, decision making for processing depends on economic factors and meeting family needs for the products. In *Arsi* zone raw milk is taken alone, taken with other foods, processed into milk products (Asfaw, 2009).Household preference in fresh milk allocation is given to infants followed by children while adults and elderly are least considered. Per capita consumption of milk is estimated at 19 liters; this value is lower than African and world per capita averages, which are 27 kg/year and 100 kg/year. The poor genetic potential for productive traits, substandard feeding and low level of health care and management practices are the main contributors to the low productivity (Zegeye 2003).

Income will be a key driver of levels of milk consumption in the urban areas. As individual's income rises there is a greater proportional rise in their expenditures on dairy products. The highest expenditure group, which makes up around 10% of the Addis Ababa market, consumes 38% of the milk. On the other hand, 61% of the population who are in the lowest expenditure group consumed only 23% of the milk. Based on 2005 data, workers in the lowest income class would have to work 2.71 hours for one kg of milk, 27 hours for one kg of butter, and five hours for 1 kg of ayib (MOA, 2005). In the Addis Ababa market, 5,000 commercial producers (estimate in 2002) sold 73% of their production, 10% went to household consumption, 10% to calves, and 8% was processed (Azage, et al, 2002). The other source of milk serving Addis Ababa is primarily dairy enterprises processing and selling milk. Addis Ababa is the dominant market with other towns like Bahir Dar, Jimma, Hawassa and Dire Dawa offering opportunities for milk marketing.

Pastoral communities are acutely aware of the nutritional value of milk. Women in Somali Region perceive milk from camels and goats to be the most beneficial for children's overall health, strength, and growth. In the wet season, milk consumed by pastoral children can account for 67% of the mean daily energy they require and 100 % of their protein requirements (Sadler and Catley 2009). Lack of availability and access to milk in the dry season decreased daily consumption amounts by almost 25% with milk contributing only 16% and 50% of energy and protein requirements respectively. In drought years, children's milk consumption will drop an average of 50% in surveyed communities due to primarily to lack of feed and fodder resources and general decline in the nutritional health of lactating animals.

Table 14 Amount of milk produced & consumed by regions

Regions	Cows pop. in '000	Annual production in million	% Milk used at home	% Milk Sold	% wage spent on milk	% Milk other use
Afar	176.1	63.5	77.8	7.5	0.22	14.5
Amhara	1018.1	466.7	42.8	2.4	0.65	54.1
Benishangul	65.9	20.1	50.4	5.8	0.55	43.3
Dire Dawa	18.8	4.5	53.2	42.7	0.02	4.1
Harar	8.2	3.1	54.9	40.0	0.01	5.1
Gambella	47.6	15.9	62.3	14.2	0.36	23.2
Oromiya	3988.3	1145.3	52.1	5.7	0.14	42.1
SNNP	2817.1	723.8	40.9	5.0	0.28	53.8
Somali	107.3	49.9	68.6	26.2	0.18	5.0
Tigray	284.0	130.3	44.4	4.8	0.59	50.2
Total 2	8531.4	2623.1				
Average			54.7	15.4	0.3	29.5

Source: CSA, 2005

7. Constraints of milk production and marketing in Ethiopia

Challenges and problems for dairying vary from one production system to another and/or from one location to another. The structure and performance of livestock and its products marketing both for domestic consumption and for export is generally perceived poor in Ethiopia (Sintayehu et al.,2008).Underdevelopment and lack of market-oriented production, lack of adequate information on livestock resources, inadequate permanent trade routes and other facilities like feeds, water, holding grounds, lack or non-provision of transport, ineffectiveness and inadequate infrastructural and institutional set-ups, prevalence of diseases, illegal trade and inadequate market information (internal and external) are generally mentioned as some of the major reasons for the poor performance of this sector (Belachew and Jemberu 2003). In addition to that dairy farmers in dairying were lack of land. Other problems were feed shortage, lack of improved dairy animals, and lack of artificial insemination respectively. Moreover, lacks of extension service, diseases and lack of credit facilities were also mentioned (Belay D.et al., 2011).

8. Theories of value chain analysis

Value chain is the sequence of activities required to make a product or provide a service (Vermeulen *et al.,* 2008). A value chain can be defined as the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final customers, and final disposal after use(Jon Hellin and Madelon Meijer,2006). A value chain is a supply chain – a series of activities to transform natural resources, raw materials and components into a finished product - where the actors actively seek to support each other so they can increase their efficiency and competitiveness. They invest time, effort and money, and build relationships with other actors to reach a common goal of satisfying consumer needs – so they can increase their profits (KIT, 2006).

Value chain can be analyzed through mapping value chain which describes the full set of activities required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), and delivery to final consumers (Kaplinsky and Morris, 2001). It enables to highlight constraints that control the chain and to clarify the possibilities for change. It incorporates product transformation and value addition at each stage of the chain. It has common objectives such as poverty alleviation, employment creation, food security, agricultural and rural development and economic growth (Vermeulen *et al.,* 2008).

Value addition is simply the act of adding value to a product, whether you have grown the initial product or not. It involves taking any product from one level to the next (Fleming, 2005). It is an innovation that enhances or improves (in the opinion of the consumer) an existing product or introduces new products or new product uses. The farmer is not only involved in production of a raw commodity but also takes part in value addition and distribution. This allows the farmer to create new markets or differentiate a product from others and thus gain advantage over competitors (MSU, 2005) as sited by Berhanu kuma, 2012. Value addition activities are essentially meant to add such utilities as form utility, time utility, place utility, information utility, among others.

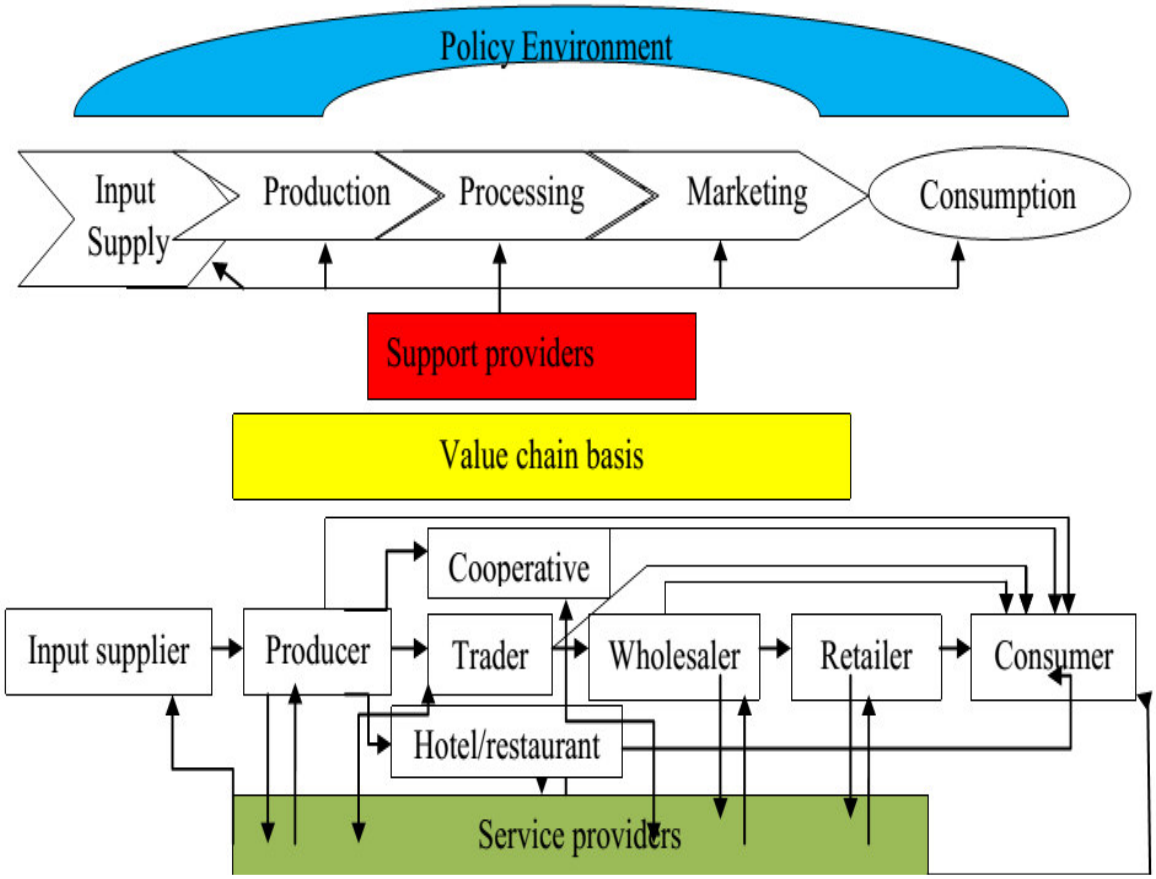
Value chain analysis has a long tradition in industrial production, organizational and global export commodities but its application in international development and agriculture has gained popularity only in the last decade (Rich *et al*., 2008). Value chain analysis examines the full range of activities required to bring a product or service from its conception to its end use, actors that perform those activities in a vertical chain and final consumers for the product or service (Berhanu Kuma, 2012). Value chain analysis involves collecting information about firms and market connections to identify strengths or weaknesses in the coordination of these activities and to examine the power and position of firms in relationship to other actors in the chain (Deborah Rubin and Cristina Manfre, 2012).

Value chain actors are those involved in supplying inputs, producing, processing, marketing, and consuming agricultural products (Getnet, 2009). The chain actors who actually transact a particular product as it moves through the value chain include input (e.g. seed suppliers), farmers, traders, processors, transporters, wholesalers, retailers and final consumers(Jon Hellin and Madelon Meijer,2006).

8.1 Value Chain Map of Dairy in Ethiopia

The study done by Berhanu (2012) in Wolaita zone identified that the major actors in milk and value added products value chain are input suppliers, producers, milk processing cooperatives, hotels, traders (wholesalers and retailers), and consumers. Based on the functions, potential value chain actors were identified; their roles, functions, value adding processes, marketing and relationship were sorted out (look the figure below).

Figure 2value chain map of dairy



Source: Berhanu Kuma (2012)

According to the same source value chain function starts from inputs use to produce milk and value added products. Inputs such as AI (semen and bulls), veterinary services, and improved forage and pasture seeds, and credit services, value addition technologies, among others have been obtained from many sources. The largest share of milk and value added products are produced by smallholder dairy farmers (64%). In addition, dairy products are produced by specialized dairy producers (landless dairy farmers with none or 0.25ha grazing land) (34%), and farmers who rely heavily on livestock production (2%). There are a few emerging dairy enterprises such as milking cow development at Wolaita Sodo, improved milk packaging at Areka and milking cow developing at Boditi. Processing is the act of converting milk into milk products such as butter, cottage cheese, ghee, skimmed milk, among others. Dairy farmers are the main actors who process milk into value added products which they either consume or sales to chain actors. Besides to farmers, milk processing cooperatives process milk into butter, cottage cheese and skimmed milk. Most of the processing function in the value chain is carried out by traditional technologies made from clay soil. There are no actors who provide improved processing and packaging technologies to ensure safe and quality products to the consumers. milk and value added products are traded products of the study area. Milk and cottage cheese are traded within the zone whereas butter trading crosses the zonal boundary. It is traded in Addis Ababa, Hawassa, Shashemane, Nazareth, among other towns. There are specialized traders engaged in the transaction of butter. Butter is collected at local markets by farmer traders and then passed onto wholesaler who in turn sell to zonal consumers, retailers or transport to other towns. Retailers in turn sell to zonal level consumers. dairy products are consumed by the people of the zone or transported to other parts of the country and be consumed by others. They are either taken alone or taken with other food stuffs. Children are prioritized in consumption allocation of milk followed by husband in the study area. Since butter and cottage cheese are taken with other food stuffs, they are not prioritized among household members. Policy environment: includes policy regards quality and standard assurance, good environment for chain actors to work together for common benefits. It is observed that chain actors do not get many opportunities to talk with each other about issues affecting the entire value chain. Moreover, there is no public or private body to assure quality and standards of dairy products in the course of production, processing, marketing and consumption. In general, there is no formulated policy regarding dairy product marketing, processing, and quality assurance at the national as well as at the zonal level.

9. Conclusion and Recommendation

The review was undertaken with the objective of value chain analysis of dairy in Ethiopia. I have review about the emergency of dairy sector, dairy production pattern and marketing channels of dairy and its value chain. Ethiopia possesses the largest livestock population in Africa. Estimates for farmer holding in rural areas indicate that the country has about 50.9 million heads of cattle, 22 million goats, 26.0 million sheep and 2.3 million camels (CSA 2011). Dairy production depends mainly on indigenous livestock genetic resources. Despite its potential for dairy development, productivity of indigenous livestock genetic resources in general is low, and the direct contribution it makes to the national economy is limited. The exchange between market oriented and subsistence dairy production is, in the sense that production can respond to external demands from the market or intra-household consumption needs. Dairy farmers‟ competitiveness depends also on the transaction between productivity (milk from improved cows) and production quality (butter from local cows). Crossbred cows produce more milk than local cows but are more susceptible to diseases compared to local cows. Local cows produce less milk but quality butter than crossbred cows. Therefore, research should revisit its breeding and development strategy in line with exploiting the potential of local cows for butter production and the potential of improved cows for milk production.

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