

## The Ethiopian Dairy Value Chain with a Particular Focus on Cattle and Camel Milk: Current Scenarios and Investment Opportunities

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**Abstract:** Cattle and camel represent important cultural, social, nutritional as well as economic values to a substantial proportion of the livestock keeping communities dwelling in various agro-ecologies of Ethiopia. The country has a substantial potential for dairy development considering the large livestock populations found in the country with other productivity enhancing factors. However, despite large population, the productivity is by far low; that the country to be a net importer of dairy products with import values significantly exceeding export values. Among others; limited market outlets for milk and milk products, inefficient and untimely artificial insemination service delivery, lack of crossbreed heifers, shortage and increasing price of feeds especially agro-industrial by-products and poor linkages among key value-chain actors are the frequently cited factors deemed guilty. It is therefore, with this breathing situation that this review report made an effort to highlight the prevailing situation of the Ethiopian cattle and camel milk value chains as well as the missing link. Based on the current scenario, it also suggests appropriate improvement interventions to take and when taken right then producers in particular and the country at general could make use of optimum if not maximum benefits that can be tapped from the sector.

**Keywords:** Actors Linkage; Livestock; Marketing; Productivity

### 1. Introduction

The livestock sector in Ethiopia contributes to 12 and 33% of the total and Agricultural Gross Domestic Product (GDP), respectively, and provides livelihood for 65% of the population. The livestock sector accounts for 12-15% of the total export earnings, the second in order of importance (Ayele *et al.*, 2003). The total annual milk production from about 10.7 million milk cows was estimated at about 3.8 billion liters, with 180 days' average lactation period, and 1.32-liter milk yield per cow per day (CSA, 2013). With an estimated population of 1.16 million, camels produce about 170,000 tons of milk per year (FAOSTAT, 2015). The annual growth in milk production in the country is estimated to have increased by 3% (Ahmed *et al.*, 2004). However, the per capita milk consumption in the country is by far lower (16 kg per year) compared with that of other neighboring African countries such as Kenya (102 kg) or world average (27 kg) (FAOSTAT, 2009).

Livestock and livestock products contributed to about 9.1% of the country's total export earnings (Ethiopian Revenue and Customs Authority report of 2009/2010) with a value of about 182 million US Dollars (Access Capital Research, 2010). Among the 20 major agricultural commodities ranked by value in 2005, whole fresh cow milk ranked third (FAOSTAT 2007). Milk production in 2005 was estimated at 1.5 million tons, which was equivalent to 398.9 million US Dollars (FAOSTAT, 2007). Milk and milk products are highly esteemed commodities among Ethiopians with an ever-increasing demand both in rural and urban areas (Holloway *et al.*, 2000; Mohammed *et al.*, 2003). Postharvest loss of milk and milk products in the

country is estimated at 20-35% due mainly to spillage and spoilage (SNV, 2012).

In Ethiopia, the various development interventions that have been carried out in the dairy sector focused mainly on bovine milk. However, notwithstanding the valuable food security camel and camel milk provide not only to the rural arid community but also to those in the nearby urban areas, no attention has been paid to these camel products. Currently, the Ethiopian government provides various incentives to those investing in agro-industries including the dairy sector. Such advancement in the country's market economy created private investment opportunities in urban and peri-urban dairy potential areas (Ahme *et al.*, 2004). Though the aforementioned scenario depicts the prevailing situation in brief, comprehensive information on the country's current dairy sector landscape is limited or not available or not accessible. This paper presents key information on the existing scenario of the Ethiopian dairy sector with a value chain approach focusing on resource base, productivity, value chain analysis, key value chain actors and their linkages, with implications on investment opportunities in the country's dairy sector.

### 2. Ethiopian Cattle and Camel Resource base: Overview

With the intention of providing a snapshot of the Ethiopian cattle and camel resource base, population characteristics and distribution of cattle and camel, number of holdings of both species in relation to herd size and milk production are briefly summarized in this section under separate sub sections.

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## 2.1. Population Characteristics and Distribution

Of the total 56.7 million estimated cattle population as reported for the year 2014/15 at national level, 86.15% were counted in three of ten regions (Addis Ababa excluded) - about 40% in Oromia, 26% in Amhara and 20% in Southern Nations, Nationalities, and Peoples' (SNNP) Region. The remaining 13.85% existed in the other 7 regions with the smallest number being 49,880 (0.09%) recorded for Dire Dawa preceded by Harari region with an estimated cattle population of 62,402 (0.49%) (Table 1).

Table1. Cattle Population and Distribution (CSA, 2014/15).

Region	Cattle population ('000)	%from total	Rank
Oromia	22,926	40.43	1 <sup>st</sup>
Amhara	14,711	25.94	2 <sup>nd</sup>
SNNP	11,216	19.78	3 <sup>rd</sup>
Tigray	4,578	8.07	4 <sup>th</sup>
Afar	1,580	2.79	5 <sup>th</sup>
Benshangul-Gumuz	660	1.16	6 <sup>th</sup>
Somali	645	1.14	7 <sup>th</sup>
Gambella	279	0.49	8 <sup>th</sup>
Harari	62	0.11	9 <sup>th</sup>
Dire Dawa	50	0.09	10 <sup>th</sup>
Total (National)	56,706	100.00	

In 2014/15, an estimated 16.5 million rural holdings were reported, of which about 12.8 million (77%) kept cattle with the difference, about 3.7 million holdings (23%), with no cattle. Looking at herd size per holding, it can be observed that the majority (93%) kept less than or equal to 9 heads of cattle with only 1% of holdings keeping greater than or equal to 20 cattle heads (CSA, 2014/15) (Table 2). The total rural holdings was estimated at 16.5 million with about 3.7 million holding keeping no cattle, while cattle keeping holdings were estimated at 12.8 million (CSA report 2014/15).

Table 2. Cattle holdings by herd size (CSA, 2014/15).

Herd size	No. of cattle holdings (in 1000)
1-2 heads	4,325
3-4 heads	4,137
5-9 heads	3,401
10-19 heads	786
≥ 20 heads	148

Though crossbreeding started as early as 1940's and the National Artificial Insemination Centre (NAIC), which is located at Kaliti some 20 km Southeast of Addis Ababa, was established as early as 1981, the proportion of improved cattle breeds was less than 2% in 2014/15

(Figure 1). The comparable cattle population sex ratio, 55.45 (Female): 44.55 (Male) indicates the importance of draft power particularly in the dominant crop/livestock production system where oxen can almost be considered as the sole source of power related to crop cultivation activities such as crop land preparation, threshing, and transportation for crop harvests.

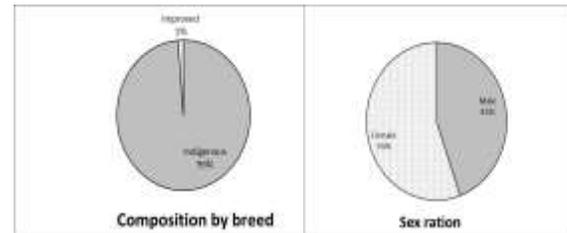


Figure 1. Breed composition and sex ratio of the national cattle population (CSA, 2014/15).

With the exception of Gambella and Addis Ababa, camel is reported to be kept in all regions. However, three regions combined, where pastoral type of production is the norm mainly related to the prevailing agro-climatic conditions, account for about 88% of the camel population of about 1.16 million estimated at a national level. The Afar regional state registered the highest proportion (37.31 %) of the country's camel population followed by Somali and then Oromia regions (Table 3). Pastoral livestock population approximately accounts for 42 % of the national population with camel, cattle, sheep and goats being the dominant species.

Unlike cattle, the country's camel population is kept by a very small proportion (1.57%) of the total rural holdings with the majority (about 88%) of the camel keeping holdings having less than or equal to 9 heads of camel.

Table 3. Camel population and distribution (CSA, 2014/15).

Region	Number	% of total	Rank
Afar	434,291	37.31	1 <sup>st</sup>
Somali	353,124	30.33	2 <sup>nd</sup>
Oromia	239,357	20.56	3 <sup>rd</sup>
Amhara	66,364	5.70	4 <sup>th</sup>
Tigray	55,921	4.80	5 <sup>th</sup>
Dire Dawa	6,670	0.57	6 <sup>th</sup>
Harari	4,363	0.37	7 <sup>th</sup>
SNNP	2,865	0.25	8 <sup>th</sup>
Benshangul-Gumuz	1,151	0.10	9 <sup>th</sup>
Gambella	0	0.00	-
Addis Ababa	0	0.00	-
Ethiopia	1,164,106	100.00	

Table 4. Camel holdings by herd size (CSA, 2014/15).

Herd size	No. of camel holdings
1-2 heads	155,705
3-4 heads	35,994
5-9 heads	36,355
10-19 heads	30,973
Total camel holdings	259,027

## 2.2. Dairy Herd Size and Milk Production

Although the proportion of the dairy cow herd is more than double compared with that of dairy camel herd within their respective total population (Table 5), the average daily milk production of camel is about triple compared with that of cows (Table 6). However, due to their relatively very small number, camels' contribution to the national annual milk production is very small (Table 6). Although certain communities also produce milk from goats, total milk produced at the national level is not considered here due to unavailability of data.

Table 5. The dairy herd within the cattle and camel population (CSA, 2014/15).

Livestock species	Total population ('000)	Dairy herd	Dairy herd proportion (%)
Cattle	56,706	6,497	11.46
Camel	1,164	307	26.37

Table 6. Annual and average daily milk production by cows and camels.

Livestock species	Annual Milk Yield (10 <sup>3</sup> L)	Contribution in %	ADMY**/ head in Liters	Lactation Length in Months
Cattle	3,071,977	92.93	1.35	6
Camel	233,846	7.07	4.08	9
Total	3,305,823	100		

Note: ADMY: Average Daily Milk Yield

## 3. Value Chain Analyses

Value chain is “the full range of activities, which are required to bring a product or service from conception, through the intermediary phases of design, production, delivery to the final consumers, and final disposal after use (Kaplinsky, 2000). There are a number of elements that need to be considered in the value chain analysis of a given commodity. The major ones include actors along the chain and their functions and linkages among themselves, governance mechanisms for the chain and roles of actors e.g. power relations and principal drivers of the chain functions, impact of upgrading products, services and processes within the chain and distribution of benefits among actors within the chain (Kaplinsky, 2000; Rich *et al.*, 2009). The analysis of a value chain encompasses wider issues than supply chain, which only shows the physical flow of goods or services from production to consumption through intermediate stages of value addition.

As illustrated in Figure 2 (cattle) and Figure 3 (camel), the Ethiopian dairy value chain consists of many key actors that can generally be categorized as Input Providers, Direct Actors, Service Providers, and the Enabling Environment with each actor consisting of several sub-actors.

### 3.1. Key Dairy Value Chain Actors and their Linkages

Key dairy value chain actors that contribute to the country's dairy development through playing a number of varied significant roles at various stages of the dairy value chain are summarized in Table 7.

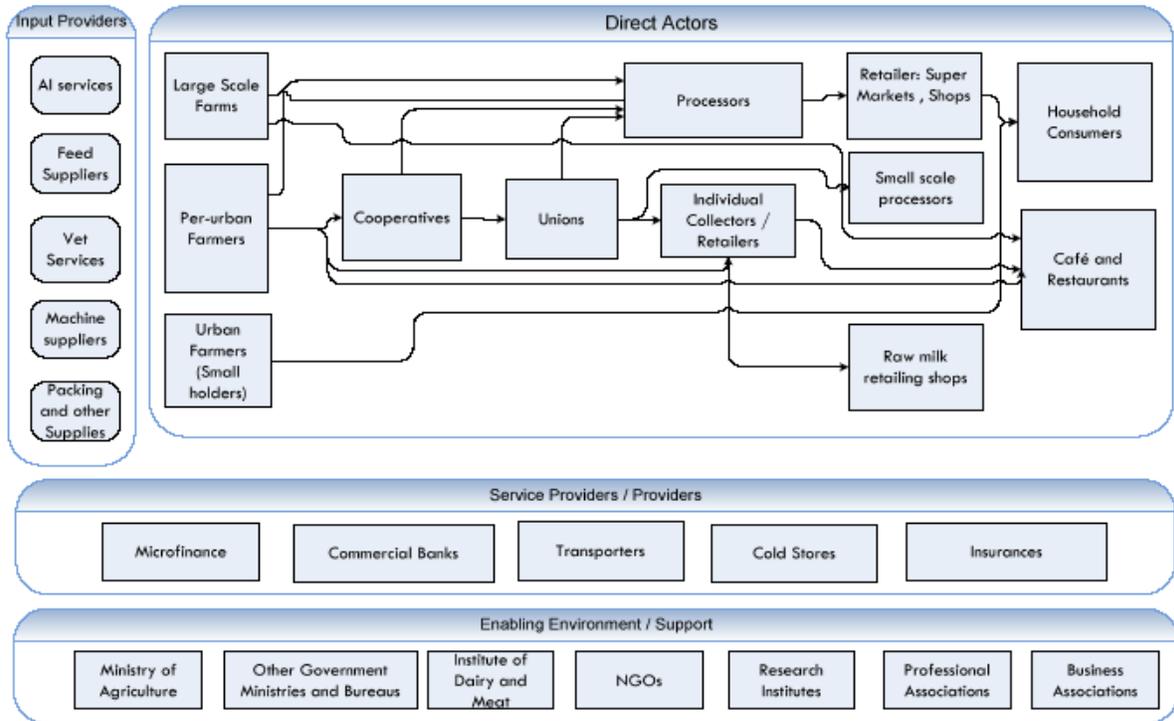


Figure 2. Illustration of the Ethiopian dairy (cattle) value chain (Haile, 2009).

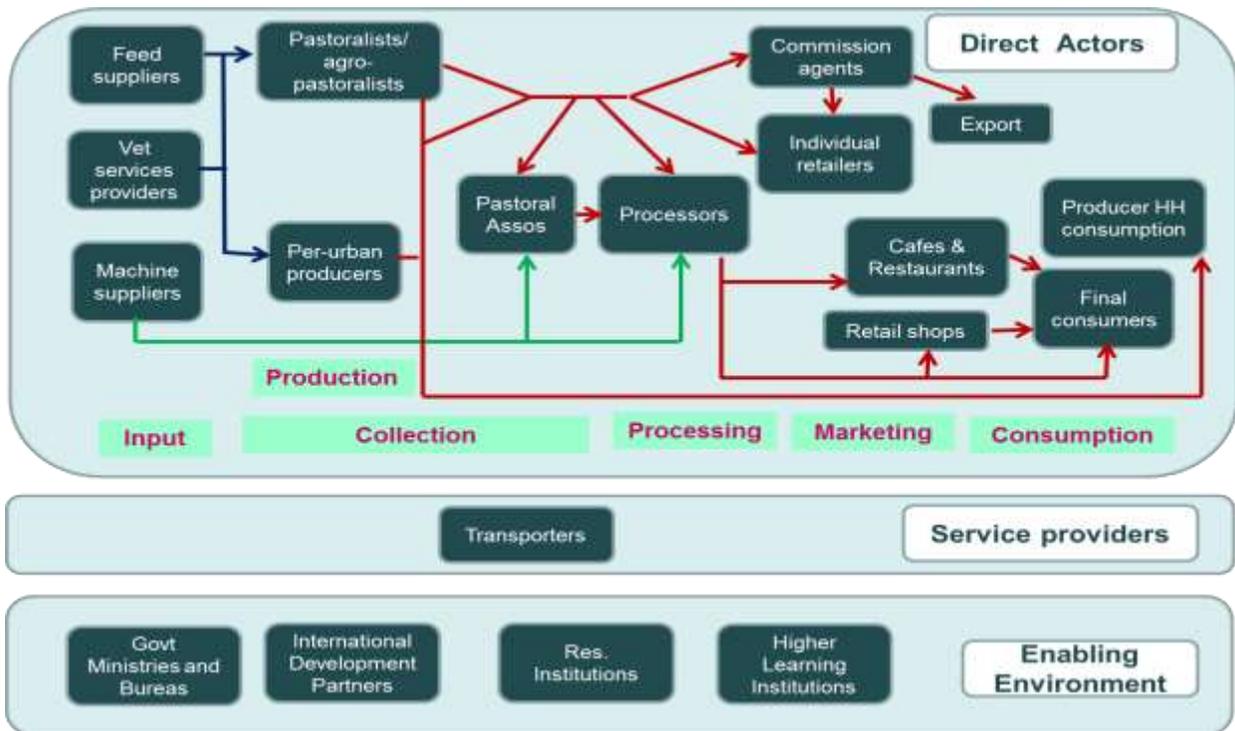


Figure 3. Camel milk value chain.

Table 7. Major actors and their involvement in the dairy value chain.

No.	Actor category	Actors	Involvement in the dairy value chain
1	Input suppliers	Improved breeds, breeding bull and semen producers and providers	The Holeta Dairy Bull Dam Center produces elite crossbreed bulls and sends to NAIC, which in turn uses them to produce semen. National Artificial Insemination Center (NAIC) distributes selected crossbred and local (Borana, Begait and Fogera) bulls to bull stations managed by individual farmers. NAIC supplies semen to its 16 (currently 9 are functional) sub centers distributed in five regions.
		Feed processors and suppliers	There are over 30 animal feed (pre-mix and formulated) importers, producers and distributors most of them being located in the Addis Ababa milk shed. Most of these feed industries are privately owned, while a few are producer cooperative unions.
		Vet. drug and vaccine producers and suppliers	At present, there is one private veterinary drug producer ' <i>East African Pharmaceuticals plc</i> ' and one public National Veterinary Institute (NVI) livestock vaccine producer in Ethiopia.
		Knowledge and skill providers	A number of institutions such as agricultural universities and colleagues, international research institutions such as International Livestock Research Institute(ILRI), the MoA, Ministry of Livestock and Fisheries (MoLF), Ethiopian Meat and Dairy Industry Development Institute (EMDIDI) provide long and short term technical, theoretical and practical trainings to various actors (producers, processors, development agents,...).
2	Service providers	Financial institutions (MFIs, Banks, Insurances)	Finance advancers (banks & MFIs) provide cash loan services to individual & group investors in dairy business, while insurances such as the public 'Ethiopian Insurance Company' & the private 'Nyala Insurance' ensure live animals provided that owners provide veterinary health certificate for their animals.
		Bull and AI service providers	Bull breeding service is provided by individuals; and AI service by NAIC sub centers, Addis Livestock Production and Productivity Improvement Service (ALPPIS) and AI technicians.
		Vet. service providers	Primarily veterinary service is provided by the ministry and bureaus of agriculture via their veterinary professionals, private veterinarians, and veterinary assistants also provide veterinary services to rural and urban individual and group dairy producers.
3	Direct actors	Milk producers	Small-scale producers (pastoralists, agro-pastoralists and crop/livestock producers) account for about 97% of the country's annual milk production with the difference being produced by medium and large-scale urban and peri-urban dairy producers.
		Dairy cooperatives and Unions	There are about 180 primary dairy cooperatives some 96 of them are federated under six dairy cooperative unions. These dairy cooperatives and unions create milk market outlet to their member producers and also provide dairy farm inputs to their members.
		Processors	A few processors have their own dairy herd; however, they source most of their milk intake from smallholder milk producers, while processors with no dairy herd totally depend on smallholder milk producers for their milk intake. Processors, therefore, play a key role in creating milk market out let to smallholder milk producers and also link producers with consumers.
		Collectors and distributors	These are individual collectors of milk (milk hawkers) from producers, primary dairy cooperatives and dairy cooperative unions and distribute to various consumers/retailers (cafés, restaurants, hotels,...).
		Retailers	Retailers being towards the end of the dairy value chain play the role of linking producers with consumers. These include milk shops, cafés, restaurants, Hotels, supermarkets, milk product traders...

		Consumers	These are final consumers sourcing dairy products from different actors from producer to retailer.
4	Enabling environment and development support	MoLF and other Ministries and Bureaus	These are the Govt.'s main arm in agricultural policy formulation, establishing required agricultural infrastructure and facilities. They are also in charge of capacity building and provision of regular technical backstopping and follow-ups to individual producers and producer organizations.
		EMDIDI	Provision of knowledge and skills through organizing and offering tailor-made trainings at different levels.
		Local and International development partners	Various national and international development partners are playing a significant role in dairy sector development through providing material and technical support to smallholder producers, dairy cooperatives and unions, the private sector, and relevant governmental institutions such as Land O'Lakes International Development Fund, Netherlands Development Organization (SNV) and ILRI.
		Research and education Institutes and centers	Federal and regional research institutions adopt and generate appropriate technologies for dairy development. They verify and demonstrate promising technologies on farms with the participation of smallholder farmers. They are also involved in capacity building by organizing and providing trainings. The Holeta Agricultural Research Center is the center of excellence for dairy research at national level.
		Professional associations	Professional associations such as Ethiopian Society of Animal Production (ESAP) and Ethiopian Veterinary Association (EVA) create a platform where professionals from various streams of the livestock industry from different institutions gather annually to share their respective experiences. They also play a significant role in information dissemination through publishing proceedings, and research and policy recommendations as an outcome of annual conferences. In addition, they publish periodicals such as peer reviewed journals and newsletters; manuals. Many of their products are available on-line on their respective websites.
		Business Association	Business associations such as 'Ethiopian Cattle Breeders Association, 'Ethiopian Milk Producers and Processors Association', 'Ethiopian Animal Feed Industry Association' are established to solve problems related with dairy farm input supply and market outlet for their products.
		Other Macro level actors	These are public bodies (organizations/institutions) that develop and provide appropriate dairy development environment such as rules, regulations, procedures and guidelines.

In their study to understand the dairy value chain and the role of the major value chain actors in the central Ethiopian highland milkshed, Yilma *et al.* (2010) identified three levels of linkages among the major actors (Figure 4). The key linkage indicators they used include modality of contact, formality of contact, frequency of contact, and resource allocation.

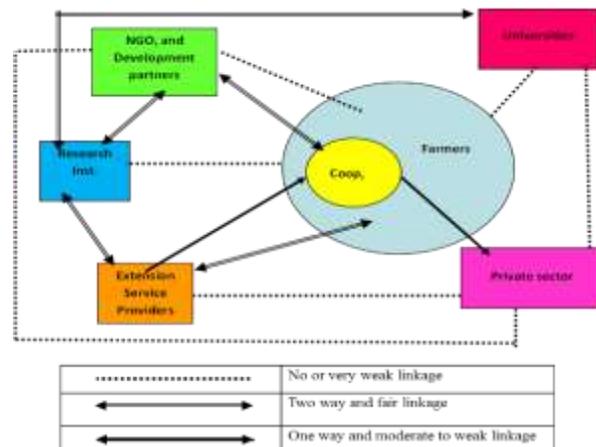


Figure 4. Linkages among key actors in the Ethiopian dairy value chain (Yilma *et al.*, 2010). coop= cooperatives Dairy Cooperatives such as Ada'a Dairy Cooperative located at Debre-Zeit (Bishoftu town) some 45 km Southeast of Addis; Dairy Cooperative Unions like Selale

### 3.2. What happens to the milk after production?

In Ethiopia, organized milk collection and processing was started in Addis Ababa in the 1960s following the establishment of Sholla Dairy, which was then renamed as Dairy Development Agency (DDA) and later Dairy Development Enterprise (DDE), and now Sholla or 'Lame' (Amharic for 'my cow'). Currently, Primary Dairy Cooperatives, Dairy Cooperative Unions and Individual and Collective Private Dairy Enterprises collect milk from their supplier producers at their respective milk collection centers established in major dairy potential areas, most of them in the central Ethiopia surrounding Addis Ababa.

Dairy Cooperative Union located at Sululta some 20km Northwest of Addis; and a number of individual and collective private dairy enterprises (most of them located in and around Addis Ababa) have processing facilities with varying daily milk intake capacities (from less than 5000 to 60000 liters per day). These milk collectors and/or processors are key players in linking producers to consumers. They create an important milk market outlet to smallholder producers and provide a few value-added milk products such as pasteurized milk and a few varieties of semi hard type cheeses to consumers.

#### 3.2.1. Milk and milk products market channels and marketing

##### *Milk and milk products market channels:*

In Ethiopia, market channels of milk and milk products vary based on production system and type of value added milk products. Milk and milk products in Ethiopia are channeled to consumers through both formal and informal marketing systems. As it is the case with other commodities, in dairy marketing system, various actors are involved at one or more of the functions along the dairy value chain that include production, collection, processing, retailing and consumption. The actors include traditional and commercial farmers, milk collectors including cooperatives, cooperative union, individual collectors, processors, and distributors such as supermarkets, kiosks, cafes and restaurants (Haile, 2010).

In the informal system, milk and milk products may pass from producers to consumers directly or through one or more market agents. This system is characterized

by absence of license to operate, low cost of operation, high producer prices as compared with formal market and no regulation of operation (SNV, 2008). For instance, this system in the urban dairy production system of Hawassa, Shashemene and Yirgalem can involve 2-3 sub-channels (Woldemichael, 2008). Producers sell the surplus milk produced either to their neighbors, milk collectors (hawkers) and/or at local markets, either as liquid milk or in the form of butter and/or *Ayib* (Ethiopian acid-heat treated cottage cheese). The traditional butter market is part of the informal market. The formal raw milk marketing system is limited in and around Addis Ababa as well as in few other major regional cities and the informal market channel in Addis Ababa accounts for 70% of the milk marketed (Jabbar and Benin, 2005). Francesconi *et al.* (2010) also reported that over 80% of the milk marketed passed through the unregulated informal market channels with only about 11% of the total dairy product sales in Addis Ababa to have passed through supermarkets.

In the formal marketing system, milk is collected at primary dairy cooperatives/unions and individual or collective private milk collection centers, and transported to processing plants. In this system, milk quality tests (principally acidity using alcohol and clot-on-boiling tests, and density test) are performed on delivery, thereby assuring the quality of the milk delivered.

Based on average of four years' data (2008/9 – 2011/12) reported by CSA, about 16% of the milk available for consumption at national level is marketed (CSA, 2008/-2011/12). In this estimation, butter marketed is also taken into account in milk equivalent. Most of the marketed milk (87.3%) is channelled through the informal market, of which milk sold as traditional butter accounted for 54.82%, while milk marketed as whole milk accounted for 32.47%. Milk marketed via the formal marketing system accounted for the remaining only 12.71%. This is calculated based on estimates of the annual milk intake of the major processors in the country. An instance of camel milk marketing channel in Gurusum and Babile districts, East Hararghe Zone is illustrated in Figure 5

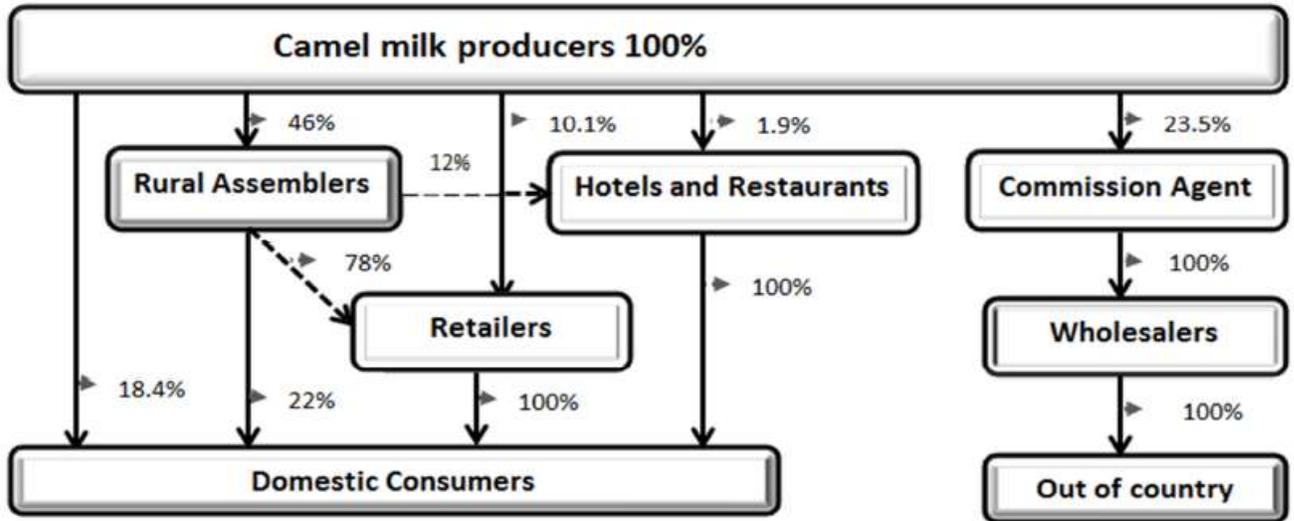


Figure 5. Camel milk marketing flow diagram in Gurusum and Babile districts (Demissie *et al.*, 2014).

### ***Milk and milk product marketing***

Dairy marketing is a key constraint to dairy development throughout Sub-Saharan Africa (SSA). Marketing problems must be addressed if dairying is to realize its full potential to provide food and stimulate broad-based agricultural and economic development (Brokken and Senait, 1992). Milk marketing involves direct delivery of fresh milk by producers to consumers in the immediate neighbourhood and sales to itinerant traders or individuals in nearby towns. The major traditional dairy products commonly marketed in Ethiopia are fresh milk, butter, fermented or sour milk (*ergo*), cottage cheese (*ayib*), and buttermilk. However, the dominantly marketed milk product can vary from place to place among others based on demand and tradition. For instance, in urban areas such as Hawasa and Debre Zeit, peri-urban areas and some pastoral areas (e.g. Miesso), fluid milk has high demand thus the most marketed product; whereas in most rural highland areas of the country such as Fogera and Bure, and lowlands such as Metema, traditional butter is the major marketed milk product (Adebabay, 2009; Tesfaye *et al.*, 2010; Azage *et al.*, 2013).

The main milk suppliers to Addis Ababa are small and medium-scale urban dairy farmers of the city itself and peri-urban dairy producers located around the city in Oromia and Amhara Regions. These dairy farms are involved in the production, processing, and marketing of whole milk and processed products to traders and retailers as well as direct consumers (Staal and Shapiro, 1996).

Demand and consumption patterns are critical for the success of market-led dairy development. Consumers express their demand through the price they are willing and able to pay; while market transmits the price signal to producers to respond accordingly. However, price of milk and milk products are

increasing consistently throughout the country. Various factors affect their price, demand and supply in various areas in the country. For instance, Differences in distance between farm gates to market places in the Harar milk-shed were observed to affect milk price (Mohammad, 2003). When farm gate and market are apart, then milk is transported to towns on foot, on the back of animals such as donkeys, mules, and horses or by public road transport, thus fetching higher prices as opposed to when the milk is sold in the neighbourhoods.

### ***3.2.2. Utilization of Milk and Milk Products***

Although both cow and camel milk is consumed in Ethiopia, camel milk production and consumption is common among the pastoral community in the lowlands. Fresh whole milk is primarily used for rearing calves and to feed children, while the surplus is processed into several shelf-stable fermented milk products with *Ergo* (naturally fermented milk); traditional butter; *Ayib* (Ethiopian acidified-heat treated cottage cheese; *Arera* (defatted sour milk); and *Nitir Kibie* (clarified/melted butter or ghee) being the most common ones.

Based on four-year (2008/09 – 2011/12) average figures of CSA annual reports on crop and livestock product consumption, of the total annual milk produced at the national level, which is available for consumption, 65.81% was consumed within the producing households; 6.18% was sold; 0.37% was paid as wage in kind; and 27.65% was used for other purposes mainly for the production of butter and *Ayib*.

The per capita milk consumption in Ethiopia is estimated by considering the annual milk produced that is made available for consumption and the corresponding human population for ten reference years (2003 to 2012) (imported milk and milk products are not considered). Based on the estimates, although

per capita milk consumption fluctuated year after year indicating the mismatch between growth rate in milk production and human population; it generally increased from 32.8 liters in 2003 to 36.5 liters (11.3% increase) in 2012 (Table 7). These values are much lower when compared to the 2010 world's average per capita consumption of 100 kg/year (FAO, 2010) as well as the 62.5kg recommended by FAO (FAO, 1990) to be maintained as the minimum level for a balanced diet. In the neighboring Kenya, per capita milk consumption increased from about 90 kg in 1960 to about 110kg in 2010, while in Ethiopia the per capita milk consumption was around 20 kg in 2010 (AGP-LMD, 2013).

Table 7. Per capita milk consumption for ten reference years (2003 – 2012) (Source: Estimated based on CSA annual reports).

Year	Annual Milk Production (10 <sup>6</sup> L)	Human population, (10 <sup>6</sup> )	Per capita milk consumption (L)
2003	2184	66.6	32.8
2004	2431	67.9	35.8
2005	2138	73.1	29.3
2006	2318	74.7	31.0
2007	2630	76.6	34.4
2008	3222	82.5	39.0
2009	2765	85.2	32.4
2010	2940	88.0	33.4
2011	4058	90.9	44.7
2012	3330	91.2	36.5

### 3.3. Ethiopia in the International Dairy Trade

Ethiopia exports small quantities of milk and milk products to a few African countries (mostly to neighbouring countries and mainly targeting Ethiopians in the diaspora) but imports much more from a number of countries. Although export values generally increased from about \$73 000 in 2005 to \$123 000 in 2009, the country spent much more currency for importing milk and milk products from different countries as compared with export values (ITC) (Table 8). The import value, which was more than \$5.6 million in 2005, increased to \$10.3 million in 2009 (Figure 6). In the five reference years (2005 to 2009), Ethiopia exported dairy products particularly milk and butter worth 343 000 USD and imported different dairy products worth 38 682 000 USD. This means that Ethiopia is a net importer with a net traded value worth negative 29 034 000 USD. This implies that the demand for milk and milk products is increasing and the country has a long way to go in the development of its dairy sector to satisfy the domestic demand with domestic supply.

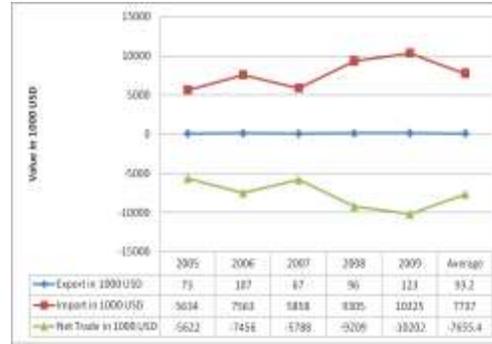


Figure 6. Milk and milk products – Export/Import (2005-2009).

### 3.4. Policy Support for Dairy Development

The policy environment includes policy regarding quality and standard assurance, enabling environment for chain actors to work in coordination for common benefits. In Ethiopia, there is no a functional platform where dairy value chain actors get together to discuss on their major challenges and look for improvement interventions accordingly (Yilma *et al.*, 2010). Moreover, though an institutional and quality standard are in place, there is no functional system that regularly monitors and assures 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.

### 3.5. Moving Forward

Tapping into the dairy sector's potential requires, planning to meet and exceed demand; produce more milk from fewer cows; channel more milk into the formal market; and process milk into more value-added products. Moreover, it is also important to target significant and positive net traded value (export more and import less or no milk products) and of course determination and work towards making use of the country's dairy industry potential. Targets can be met through market orientation of the industry that among others requires privatizing extension services; putting effective quality control system in place; and training and producing more qualified dairy value chain actors. In addition, establishing/strengthening effective and efficient cooperative action, and the required dairy infrastructure; attracting investment in post-harvest dairy business; and coordination for synchronized/harmonized development interventions are all essential elements worth considering.

### 3.6. Opportunities for Dairy Development

Based on available relevant information reviewed for this synopsis, the following areas are drawn as potential 'hotspots' for investment:

Feed represents a substantial portion of the production cost of a given dairy venture. However, increasingly higher price coupled with poor quality, and limited and seasonal availability of fodder are among the frequently sited challenges. Investment in quality fodder production targeting medium- and large-scale dairy farms should be a feasible opportunity.

In spite of the time elapsed since genetic improvement programs are launched in Ethiopia, the dairy genetic gain is still at its infant stage. This is mainly relating to limitations both in number and capacity of actors engaged in genetic improvement service delivery. Therefore, hotspots for investment in the area of dairy genetic gain include: testing and supply of improved genotypes, supply of liquid nitrogen, AI Technicians training and certification, and private AI service delivery system.

Putting a functional quality control and quality based payment system in place proved to push dairy industry development in a number of countries. However, in Ethiopia, thus far there is only one independent/private laboratory (Accredited) for milk and milk product quality tests (chemical and microbiological) that is established recently. There also no established quality based payment system. These also represent potential areas of investment.

Provision of bundle of services that include dairy farm inputs, advisory and training services could also be a workable approach to substantial number small-scale farmers.

In brief, considering the prevailing situation of the Ethiopian dairy sector landscape, areas namely feed supply, AI service delivery milk testing and quality control system, and provision of bundle of services represent investment opportunities.

#### 4. Conclusion

The study has shown that the dairy sector of the country is dominated mainly by cow milk, followed by camel milk in the pastoral and agro-pastoral areas of the country. The key indicators briefly discussed in the previous sections demonstrate that the Ethiopian dairy sector is characterized by subsistent type with low productivity, low per capita consumption, and low economic return. The major factors that account for the sector's low level of development include, among others, poor input and service provision system, poor utilization of available resources, dominant unimproved breeds, poor marketing system, poor linkages among actors, inadequate coordination, and limited involvement of the private sector.

On the other hand, there have been growing demands for milk and milk products in the country. This could be attributed to the growing population, urbanization, expanding economy, conducive policy environment that attracts private investment in the sector. Increasing foreign demands for quality products and

availability of new technologies are all drivers of investment opportunities in the sector. In addition to investment hotspots identified in the section above (opportunities for dairy development), industry development constraints such as low milk production and low per capita consumption also represent opportunities for growth of the dairy sector in the country.

#### 5. References

- Access Capital Research. 2010. Investing in Ethiopia, Ethiopia's Export Performance. Addis Ababa, Ethiopia. Pp. 16. <http://www.accesscapitalsc.com/downloads/Ethiopia-Export-Performance-Review.pdf>.
- Adebabay Kebede. 2009. Characterization of Milk Production Systems, Marketing and On-Farm Evaluation of the Effect of Feed Supplementation on Milk Yield and Milk Composition of Cows at Bure District, Ethiopia. MSc thesis, Bahir Dar University, Ethiopia. 130 pp.
- AGP-LMD. 2013. Agricultural Growth Project - Livestock Market Development. Value Chain Analysis for Ethiopia: Meat and Live Animals, Hides, Skins and Leather, Dairy. Expanding Livestock Markets for Small-holder Producers, AID-663-C-12-00009, USAID, Addis Ababa, Ethiopia.
- Ahmed, M. A. M., Ehui, S., and Assefa, Y. 2004. Dairy Development in Ethiopia. EPTD Discussion Paper No. 123, Environment and Production Technology Division International Food Policy Research Institute, 2033 K Street, NW, Washington, DC 20006 U.S.A.
- Ayele Solomon, Assegid Workalemahu, Jabbar M. A., Ahmed, M. and Belachew Hurissa. 2003. Livestock Marketing in Ethiopia: A review of structure, performance and development initiatives. Socio-economic and Policy Research Working Paper 52. ILRI (International Livestock Research Institute), Nairobi, Kenya. Pp. 35.
- Azage Tegegne, Berhanu Gebremedhin, Dirk, H., Berhanu Belay and Yosef Mekasha. 2013. Smallholder Dairy Production and Marketing Systems in Ethiopia: IPMS experiences and opportunities for market oriented development. IPMS (Improving Productivity and Market Success) of Ethiopian Farmers Project Working Paper 31. Nairobi: ILRI.
- Brokken, R. and Senait Seyoum, 1992. Dairy Marketing in sub-Saharan Africa. Proceedings of a symposium held at ILCA, Addis Ababa, Ethiopia, 26-30 November 1990. ILCA (International Livestock Centre for Africa), Addis Ababa, Ethiopia.
- CSA (Central Statistics Agency), 2008/-2011/12. Annual Reports on 'Agricultural Sample Survey -

- Livestock, Poultry and Beehives Population (private peasant holdings)' and 'Report on Crop and Livestock Product Utilization'. Addis Ababa, Ethiopia.
- CSA (Central Statistics Agency). 2013. Agricultural Sample Survey 2011/12. Report on Livestock and Livestock Characteristics. Statistical bulletin 446, Addis Ababa, Ethiopia.
- CSA. 2014/15. Agricultural Sample Survey. Livestock, Poultry and Beehives population (private peasant holdings). Federal Democratic Republic of Ethiopia Central Statistical Authority (CSA), Addis Ababa, Ethiopia.
- Demissie, B., Komicha, H. H. and Kedir, A. 2014. An Analysis of Camel and Cow Milk Marketing Chain amongst Pastorals and Agro-Pastorals in Gursum and Babile Districts, Ethiopia. *Journal of Economics and Sustainable Development*, 5 (27): 129-138.
- FAO (Food and Agriculture Organization) 1990. The technology of traditional milk products in developing countries. FAO Animal Production and Health Paper 85. Food and Agriculture Organization of the United Nations, Rome, Italy. pp. 333.
- FAOSTAT (Food and Agriculture Organization of the United Nations) 2007. Statistical Yearbook. FAO, Rome, Italy.
- FAOSTAT, 2009. World camel milk production by country. <http://.faostat.fao.org/site/339/default>.
- FAO, 2010. Pro-Poor Livestock Policy Initiative. Status and prospects for smallholder Milk production, A Global Perspective. Edition of Torsten Hemme Joachim Otte, Rome. [www.fao.org/docrep/012/i1522e/i1522e00.htm](http://www.fao.org/docrep/012/i1522e/i1522e00.htm)
- FAOSTAT, 2015. World camel milk production by country. <http://.faostat.fao.org/site/339/default>
- Francesconi, G. N., Heerink, N. and D'Haese, M. 2010. Evolution and challenges of dairy supply chain; Evidence from supermarket, Industries and consumers in Ethiopia. *Food Policy*, 35 (1): 60-68.
- Haile, G. 2009. The impact of global economic and financial crisis on the Ethiopian dairy industry. Impact of the global economic crisis on least developed countries' (LDCs) productive capacities and trade prospects: Threats and opportunities, Least Developed Countries Ministerial Conference, UNIDO, UN-OHRLS, 3-4 December 2009, Vienna International Center, Austria.
- Haile, G. 2010. Value Chain Financing: The Case of Selale area Dairy Value Chain. MSc thesis, Addis Ababa University, Addis Ababa, Ethiopia. 63 pp.
- Holloway, G., Nicholson, C., Delgado, C., Staal, CS. and Ehui, S. 2000. How to make Milk Market: A case study from the Ethiopian highlands. Socio-economic and policy research working paper 28. International Livestock Research Institute (ILRI), Nairobi, Kenya. p.28.
- ITC (International Trade Center) Available at <http://www.intracen.org/exporters/trade-statistics/>
- Jabbar, M. and Benin, S. 2005. Trade Behaviour and Transaction Costs in Live Animal Marketing in Ethiopian highland markets, in Pender, J. and Ruben, R. (Eds.).
- Kaplinsky, R. 2000. Globalization and equalization: Studies: what can learned from value chain analysis? *Journal of Development*, 37 (2): 117-146.
- Mohammed Yousuf. 2003. Certain Aspects of the Dairy System in the Harar Milk-shed, Eastern Ethiopia. PhD Thesis dissertation submitted to University of the Free State, Bloemfontein, Department of Animal, wildlife and Grassland Sciences. South Africa. p.195.
- Rich, K. M., Baker D., Negassa, A. and Ross, R. B. 2009. Concepts, applications, and extensions of value chain analysis to livestock systems in developing countries. Contributed paper prepared for presentation at the International Association of Agricultural Economics Conference, Beijing, China.
- SNV (Netherlands Development Organization), 2012. Inventory of dairy policy- Ethiopia. Target Business Consultants Plc, [www.targetethiopia.com](http://www.targetethiopia.com), Getachew Feleke, Medhin Woldearegay
- SNV. 2008. Dairy Investment Opportunities in Ethiopia. by TAM Consult, Netherlands Development Organization (SNV), Addis Ababa, Ethiopia. pp 59.
- Staal, S. J. and Shapiro, B. I. 1996. The Economic Impacts of Public Policy on Smallholder Peri-Urban Dairy Producers in and around Addis Ababa. ESAP publication No. 2.
- Tesfaye Lemma, Puskur, R., Hoekstra, D. and Azage Tegegne. 2010. Commercializing Dairy and Forage Systems in Ethiopia: An innovation systems perspective. Working Paper 17. ILRI (International Livestock Research Institute), Nairobi, Kenya. 57 pp.
- Woldemichael Somano. 2008. Dairy Marketing Chain Analysis: The case of Shashemene, Hawassa and Dale district's milk-shed, Southern Ethiopia. M.Sc. Thesis presented to Haramaya University, Haramaya, Ethiopia.
- Yilma, Z., Desta, H., and Guerne, B. E. 2010. Innovation Actors and Linkages in the Dairy value Chain of Ethiopia. In Proc of Nat. Stakeholder Workshop, FAO, Addis Ababa, Ethiopia May 28, 2010. pp. 77-104.

