Market Opportunities for Value Added Milk and Meat Products

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Market Opportunities for Value Added Milk and Meat Products

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In the agrarian economy of Ethiopia, livestock production plays significant roles, contributing about 20% to the total GDP, about 11% to the annual export earnings, and up to 70% to the livelihoods of the population. Milk and meat are the major products, with great potential for further improvements via series of value-additions from production to consumption continuum.

Hence, studying milk and meat value chains and compiling these results are very timely and fundamental, particularly at this moment when we are implementing the five-year agricultural growth and transformation plan (AGTP) and, as the country are exercising the free market economy. It is also imperative to study-to-study market situations that determine the price of milk and meat across each value chains, looking into structure and performance of market conditions that support proper flow of the supply and demand of these commodities.

Articles in this publication were presented at the workshop held at Holetta Research Center from 16 to 17 October 2011. The messages of these papers focus on proper ways exploiting the potentials existing in milk and meat sectors. The overall marketing conditions and related environmental issues of milk and meat industries were well addressed in this manuscript. The articles were well reviewed by respective professionals for their desired impacts. Various stakeholders, including policy makers, professionals, development practitioners and other actors for further improvements, compile very pertinent experiences and information for current and future uses. Thus, I believe, this manuscript will serve as a valuable source of information for advancing the Ethiopia milk and meat sectors in year to come.

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Perspectives of the Ethiopian Dairy Sector

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Introduction

In 2010, the total cattle population of the country was estimated at 50.9 million, of which 99.19% was indigenous breeds, only 0.72% with hybrids, and 0.09% with pure exotic breeds. The total estimated goat population was 22 million with indigenous breeds accounting 99.98% and hybrid and pure exotic breeds 0.02%. The male and female goats' population accounted 30.83% and 69.17%, respectively. The total camel population was estimated to be 807,581 with the proportion of male and female camels being 33.88% and 66.12%, respectively (CSA, 2010a). Despite these figures, the country's dairy sector is not developed to the expected level. The annual growth rate in milk production of 1.2% falls behind the annual human population growth estimated at 3% (GRM International BV, 2007). The traditional milk production system of Ethiopia, which is dominated by indigenous breeds with low genetic milk production potential, accounts for 97% of the total annual milk production (Feleke, 2003).

The large livestock population; the favorable climate for improved, high-yielding animal breeds; and the relatively disease-free environment for livestock in Ethiopia are all favorable factors for the development of dairy sector. In view of the sectors prospective for smallholder income and employment generation from high-value dairy products, development of the dairy sector can contribute significantly to poverty alleviation and nutrition in the country. With the present trend characterized by transition towards market-oriented economy, the dairy sector appears to be moving towards a takeoff stage. Liberalized markets, involvement of the private sector and promotion of smallholder dairy are the main features of this stage (Ahmed *et al*., 2004). However, a functional quality control system is important to improve the dairy sector. Identification of formal markets that demand products of not only acceptable but also high quality helps to relate quality to market price and therefore has a potential to enhance commercialization of smallholder dairy sector. Such an approach provides an incentive for farmers to produce milk and milk products of

good quality. Availing a formal market with a price related grading system for milk has been demonstrated to be successful in many countries.

Situation of the Dairy Sector

Key players

Smallholder dairy producers dominate the dairy industry and are focal points of the extension services provided by various development partners that include extension agents, non-governmental and international partners (FAO, SNV, Land O'Lakes, Self Help Africa-Ethiopia, Hunde in the central highlands, …), cooperatives, research and higher education institutions (Yilma *et al.*, 2011). Smallholder producers, however, lack the required technological, organizational, as well as institutional capacity and as indicated by Lemma *et al*. (2008), they are less organized and distant from market outlets; lack economies of scale and institutions for risk management; and face higher transaction costs. Urban and peri-urban smallholder producers, on the other hand, are the main suppliers of raw milk to processors of different scale. One of the major commercial processors, Sebeta Agro Industry, for instance, has its own dairy farm but depends on outside sources for 99% of its raw milk intake (Haile, 2009). Based on criteria such as modality of linkages (formal or informal); frequency of contact; and budget allocation, three general types of linkages are identified with key actors. These are no or very weak linkage; one-way and moderate to weak linkage; and two way and faire linkage (Figure 1).

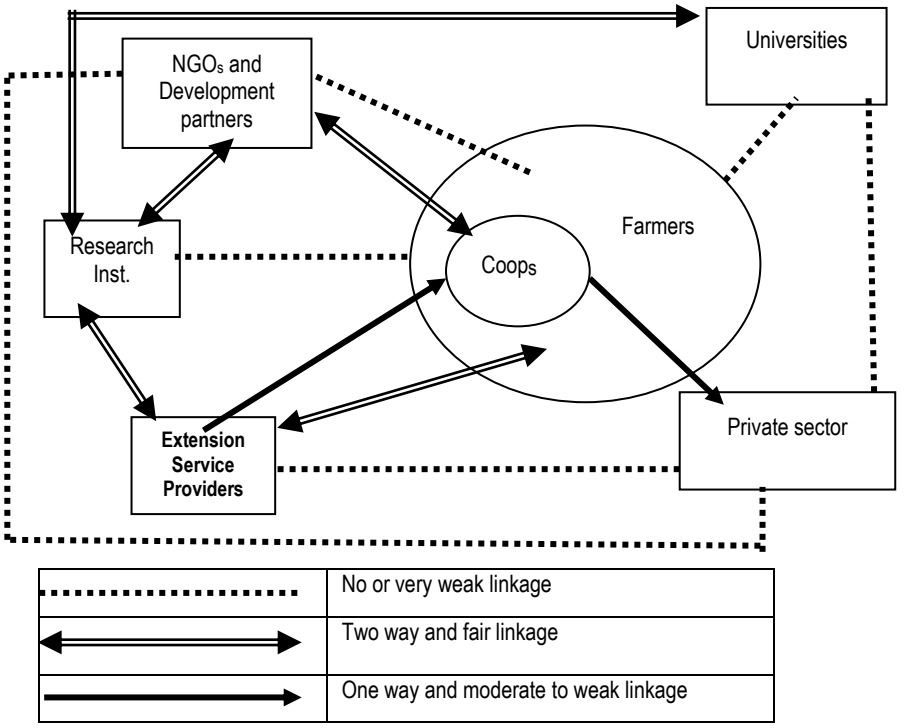


Figure 1. Linkages among the various actors in the Ethiopian dairy value chain
Source: *Yilma et al. (2010)*

Cooperatives play a significant role in ensuring sustainable and stable supply of raw milk through coordinating milk flow from their members and assisting members by supplying the required dairy farm inputs. As reported by Emana (2009), there are 180 cooperatives; i.e., 2% of agri-based cooperatives) and 6 dairy cooperative unions engaged in milk production and marketing in different part of the country.

The Ministry of Agriculture is the main actor in agricultural policy-formulation; technical support provision and supervision; and coordinating national dairy development projects. It is also in charge of promoting collective action through formation of cooperatives and unions; and facilitating linkages with other national, regional, and international organizations engaged in dairy research and development for further innovations. Different national and international development partners have been involved in the development of the country's dairy sector through providing material as well as technical support to

smallholder producers; dairy cooperatives and unions; and the private sector. The recently completed Ethiopian Dairy Development Project (EDDP) of Land O'Lakes and Business Organization and their Access to Markets (BOAM) of the Netherlands Development Organization (SNV) and the on-going 'Crop Diversification and Marketing Project' of FAO all emphasized in Dairy Value Chain development are instances worth mentioning.

The private sector makes an important part of the dairy sector through providing farm inputs (feed and veterinary drugs), animal health care and milk processing and storage equipment, and serves as an important market outlet for milk and milk products. Commercial processors adopt modern technology with the majority of output being pasteurized packed milk in 500 ml container. Currently, there are over 20 dairy processing companies most of which are operating in and around Addis Ababa and a few others in other major regional cities (Table 1). Addis Livestock Production and Productivity Improvement Service (ALPPIS), a recently established Plc among others, providing AI services in different parts of the country, is worth mentioning.

Holetta Research Center (HRC) of the Ethiopian Institute of Agricultural Research (EIAR) serves as a center of excellence for dairy research. The center coordinates all dairy-improvement related research activities in the federal system as well as in different regional states including joint venture research activities with agricultural universities and colleges. Both federal and regional research institutions adopt and generate appropriate technologies for dairy development and are involved in capacity building through organizing and providing trainings. They verify and demonstrate promising technologies on farm with the participation of smallholder farmers. Some of the universities that provide long-term trainings on dairy related fields include Haramaya University, Hawassa University, Bahir Dar University, Jimma University, the veterinary faculty of Addis Ababa University, and the Assela Model Agricultural Enterprise (AMAE) of Adama University. There are also 25 Agricultural, Technical, Vocational and Educational Training (ATVET) Schools operating in different parts of the country that accept 10^{th} grade complete students and provide a three-years diploma program in one of five disciplines: Animal Science, Animal Heath, Agricultural Cooperatives Development, Natural Resources, and Plant Science. All ATVETs offer Animal Science, Natural Resources, and Plant Science. Only a few

colleges offer Animal Health and Agricultural Cooperatives (Davis *et al*., 2010).

Table 1. Major private dairy enterprises operating in different parts of Ethiopia

Dairy enterprise	Location	Year of establishment	Processing capacity (l)	Average attained capacity (l)
Sebeta Agro Industry (Mama Dairy)	Sebeta	1998	42 000	30 000
Lame Dairy Processing (former DDE)	Addis Ababa	2008	60 000	30 000
Dire Dawa Dairy Processing Enterprise	Dire Dawa	1972	20 000	20 000
MB PLC (Family Milk)	Addis Ababa	2003	15 000	7 000
Yadeni Dairy Farm (Bora Milk)	Addis Ababa	2008	15 000	7 000
Ada'a Dairy Cooperative	Debre Zeit	1998	15 000	3 000
Lema Dairy	Debre Zeit	2004	10 000	3 000
Berta and Family plc.	Addis Ababa	2000	9 000	6 000
Genesis Farm	Debre Zeit	2001	4 000	4 000
Holland Dairy	Debre Zeit		4 000	4 000
Almi Tiku Wetet (Almi Fresh Milk)	Hawassa		4 000	3 000
Ruth and Hirut Dairy Farm	Addis Ababa	2008	4 000	1 500
Abay fana Awash Agro-Industry	Adama		3 500	2 000
Chuye Milk and Milk Products Processing	Addis baba		3 000	1 000
Fantu and Family Dairy Farm	Addis Ababa		2 500	2 000
Zemen Milk	Mekelle		2 000	150
Pinguin International Business plc (cheese world)	Addis Ababa		1 800	600
Life Milk Processing Enterprise	Sululuta		1 500	1 500
Semit Agro Industry/Enat Milk	Mojo			
Beral Milk	Addis Ababa	1991		
Harmonius Agro Industry	Adama			
Jantekel Dairy Union (Facil Milk)	Gonder		1 200	300

The National Artificial Insemination Centre (NAIC) imports semen of pure exotic breeds; produces semen from selected crossbred bulls from its Holetta Bull Dam Farm and liquid nitrogen; and distributes to nine sub-centers (Liquid Nitrogen Plants) located in five regions. NAIC also provides trainings on AI service provision for AI technicians as trainees and trainers. The major functions of the sub-centers include supplying AI inputs (semen, liquid nitrogen and artificial insemination equipment), and providing and coordinating AI services in their respective regions. Established in 2008, the Ethiopian Meat and Dairy Technology Institute (EMDTI), provides tailor made trainings on different aspects of dairy development. Banks and microfinance institutions are also important partners. Colleges and universities, hospitals, and cafes and restaurants of

big enterprises can be categorized as institutional buyers of milk with most of them sourcing from collectors (Haile, 2009).

Policy and regulatory environment

The policy and regulatory environment that influence the country's dairy sector can be categorized into three distinct periods:

- **1960-1974** - a free market economic system and the emergence of modern commercial dairying;
- **1974-1991**- the socialist (Derg) regime that emphasized a centralized economic system and state farms; and
- **1991 to present**- the current phase of free market and market liberalization

The major distinct policies and regulatory environments that correspond to the aforementioned distinct periods and influenced the Ethiopian dairy sector include land tenure and macroeconomic and orientation of development endeavors. The overall objective of the various policies and regulations of these periods correspond to three successive political regimes have been to improve commercial dairy production through the introduction of exotic and crossbreed dairy cattle; AI and feed and husbandry technologies and development of a milk processing industry to supply the consumers of Addis Ababa. The policy instruments and operational procedures employed to achieve these goals varied over time based on the politico-economic philosophy of the respective political regimes (SNV, 2008).

Population, distribution and milk production

In 2010, Oromia, Amhara, and SNNP accounted for 89.94% of the total cattle population and 89.55% of the total number of milking cows in the country. Although, the number of goats used for milk is highest in the Oromia region, their proportion from the total number of goats is highest in Afar Region (20.92%) (Table 2). The total number of camel used for milk accounts to 27.67% of the total camel population and are exclusively present in Afar, Somalia, and Oromia regions and the Dire Dawa special administration.

Although in 2010 an estimated 660, 000 milking goats were reported to exist in Ethiopia distributed in eight regions (Table 2), unlike for cows and camels, the corresponding annual milk production is not estimated; if estimated not reported. Considering the total cow and camel milk

produced in the country in year 2009/10, cows accounted for about 95.1% (Table 3). So far, the increase in milk production has usually been a function of an increase in the number of milking cows. The regional differences in the distribution of the population of milk animals are also reflected in milk production. Accordingly, Oromia, Amhara, and SNNP accounted for about 88.8% of the total annual milk produced from cows at national level (Table 3).

The total number of milk cows varied during the reference 15 years (1996 - 2010) as indicated by Figure 2. Generally, it tended to increase from about 8.8 million in 1996 to about 11 million in 2001 and sharply decreased to about 7.9 million in 2003 then increased to 9.6 million in 2010. Milk production, on the other hand, increased steadily from about 927 million liters in 1996 to about 2.9 billion liters in 2010 (a 31.5% increase) (Figure 2). According to FAO (2010), world milk production has increased by 150 million tons per year (2002 to 2007 analysis). China, India and Pakistan alone accounted for about two third of all volume growth; most of the remaining growth was in Brazil, Egypt, New Zealand, Turkey and the USA. These eight countries together accounted for approximately 85 % of all milk volume growth in 2002 to 2007. Africa contributed for only 5 % of the world's milk production and Ethiopia, in spite of its largest cattle population in the continent, was not among the four largest milk producing countries in Africa (Egypt, Kenya, South Africa and Sudan) (FAO, 2010).

Table 2. Number of milk animals by region ('000) (2009/10)

Region	Total cattle	Milking cows	% share	Total goats	Milking goats	% milking goats	Total camel	Milking camel	% share
Tigray	3243	593	18,3	2621	5	0,19	32,3	-	-
Afar	500	128	25,6	961	201	20,92	218	73	33,49
Amhara	12747	2151	16,9	4878	6	0,12	34,6	-	-
Oromia	22475	4395	19,6	7346	319	4,34	257,3	100	38,87
Somali	591	139	23,5	1509	73	4,84	254,8	65	25,51
Benishangul Gumuz	422	*86*	20,4	336	-	-	-	-	-
SNNP	10543	2076	19,7	4057	52	1,28	-	-	-
Gambella	221	38	17,2	37,8	0.7	1,85	-	-	-
Harari	45,4	11	24,2	41,3	-	-	-	-	-
Dire Dawa	46,7	10,7	22,9	172,9	3	1,74	7,8	1	12,82
Total	**50884**	**9628**	**20,83**	**21961**	**660**	**4,41**	**808**	**240**	**27,67**

***Source**: Extracted from CSA (2010a)*

Table 3. Number of milk animals and, daily and total annual milk yield by region '000 (2009/10)

Region	Cows			Camel		
	Number of milking cows	Av. daily yield (l)	Total yield (l)	Number of milking camels	Av. daily yield (l)	Total yield (l)
Tigray	592,8	1,29	155,429	-	-	-
Afar	128,0	2,64	79739	34,0	4,66	49276
Amhara	2150,8	2,13	634109	-	-	-
Oromia	4395,3	1,50	1308958	64,7	-	55297
Somali	138,6	1,60	41318	40,4	3,66	44116
Benishangul Gumuz	85,5	1,25	24220	-	-	-
SNNP	2076,5	1,65	667562	-	-	-
Gambella	38,4	2,11	21616	-	-	-
Harari	11,1	2,09	4622	-	-	-
Dire Dawa	11,1	1,48	2643	1,1	2,89	949
Ethiopia	**9,627,7**	**1,69**	**2940216**	**143,1**	**5,10**	**150315**

***Source**: Extracted from CSA (2010a)*

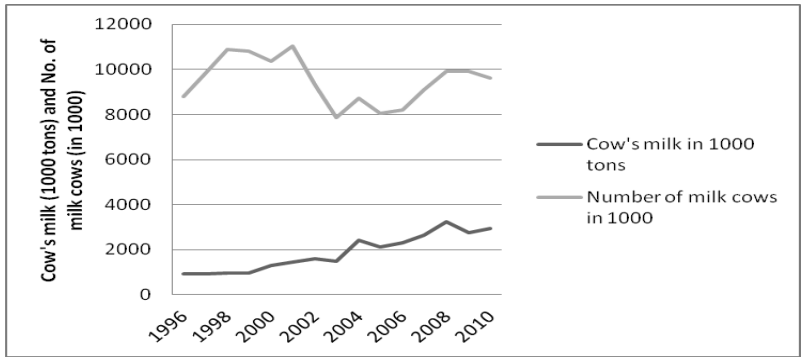


Figure 2. Number of milking cows and cows' milk production trend over 15 reference years
Source: Extracted from CSA (1996-2010) reports

CSA annual reports on livestock characteristics do not include urban areas and regional capitals. During this study, an attempt was made to collect relevant data from Addis Ababa and regional capitals. Data were collected on the number of milk cows and milk production from Addis Ababa and 9 regional capitals. In these 10 cities, a total of 214, 879 milk cows existed in 2010 with the total number of local and crossbreed cows being 104, 969 (80.8%) and 24, 923 (19.2%), respectively (Hawassa excluded as only data on the total number of cows were available). The total annual milk yield for the 10 cities was estimated to be 86.9 million liters with the contribution of local and crossbreed cows being 67.1 and 32.9 %, respectively (Table 4).

Table 4. Number of dairy animals, daily and total annual milk yield by regional capitals and Addis Ababa (2009/10)

City	Indigenous cows			Crossbred and exotic cows		Total			
	No. of milking cows	DMY/cow (l)	TMY '000'	No. of cows	DMY/cow (l)	TMY '000'	No. of cows	DMY/cow (l)	TMY '000'
Mekelle	2 702	1.5	5 952	5 312	3	1 012	8 014	2.18	6 964
Asaita*	17 846	1.75	7 495	22	2.5	13	17868	1.75	7 508
Bahir Dar	1 172	1.5	348	803	7.1	2 081	1 975	4.91	2 430
Adama	NA	NA	NA	2 400	19	9 576	2 400	19	9 576
Jijiga	NA	NA	NA	NA	NA	NA	NA	NA	NA
Asosa	7 568	1.76	1 924	NA	NA	NA	7 568	1.76	1 924
Hawassa	NA	NA	NA	NA	NA	NA	84987	1.52	31 553
Gambella	3 438	2.29	1 559	NA	NA	NA	3 438	2.29	1 559
Harar	11 833	2	4 261	365	7.5	575	12198	2.16	4 836
Dire Dawa	37 129	2	8 911	730	15	1 643	37859	2.25	10 554
AA	23 281	NA	NA	15 291	NA	NA	38572	2.62	12 175
Total	104 969	1.61	30450	24 923	9.02	14900	214879	4.04	86

Cattle genetic diversity and breeding

The Institute of Biodiversity Conservation (IBC) reported 27 cattle breeds, while Domestic Animal Diversity Information System (DADIS) managed by FAO reported 31 and Domestic Animal Genetic Resource Information System (DAGRIS) managed by ILRI reported 32. Exotic breeds like Jersey and crossbreds are not reported, while pure Jersey cows are found in Wolaita Zone managed by the Southern Agricultural Research Institute (SARI) and Ada Berga Research Station of the Holetta Agricultural Research Center.

Dairy cattle breed-improvement through artificial insemination started in the late 1960's through Non-Governmental development projects. In 1966, the Ethiopian Institute of Agricultural Research started experimentation on genetic/environment interaction of exotic sire breeds (Friesian, Jersey, and Simmental) and indigenous dam breeds (Horo, Fogera, Boran, and Barca). With the main objective of achieving an efficient and reliable artificial insemination service, the National Artificial Insemination Center (NAIC) was then established in 1981 in Kaliti. The liquid nitrogen plant with a well-equipped semen-processing laboratory was installed in 1984 sourcing frozen semen from 25 Holstein and 10 Brahman bulls donated by the Cuban Government and 44,800 and 2,000 doses of Friesian and Jersey imported semen, respectively (Felleke and Gedda, 2001). Most of the semen is produced from Friesian bulls (75.3%) followed by Jersey bulls (10.5%). The Holetta bull/dam farm serves as the base for nucleus bull producing, testing, and rearing.

Currently, NAIC distributes semen to nine sub-centers: 2 in Oromia (Nekemte and Assela), 2 in SNNPR (Wolaita and Wolkite), 2 in Amhara (Bahir Dar and Dessie), two in Tigray (both in Mekelle) and 1 in Harar (Harari). These places are selected for their strategic locations and all the semen is sent to the Regional Agricultural Bureaus (up on request), which are responsible of distributing liquid nitrogen and semen to sub-centers in their respective regions. Number of inseminations, pregnancies, and calves borne are presented in Figure 3.

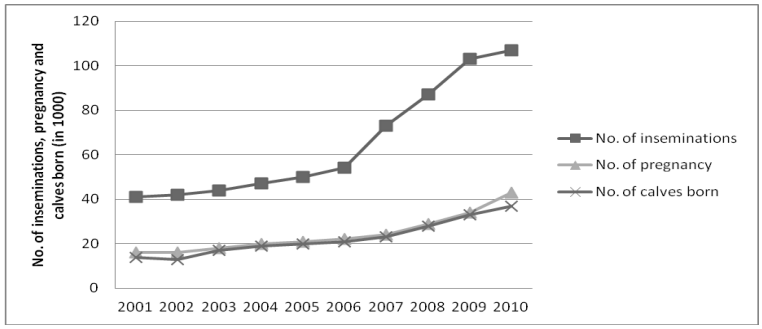


Figure 3. Number of inseminations, pregnancy and calves born (cattle) for ten references years (2001–2010)

***Source**: NAIC (2011, personal communication)*

Recently, the private sector is increasingly getting involved in the genetic improvement of dairy cows. Addis Livestock Production and Productivity Improvement Service (ALPPIS) established in April 2009 by a group of experienced professionals in various disciplines of livestock development is an instance worth mentioning. The main objective of ALPPIS is to contribute to an increased income of commercial and smallholder dairy producers through improving the production and reproduction performance of their cattle. In order to bring this into effect, ALPPIS is availing superior semen from reputed sources and provide up-to-date information on proper management of dairy farms. ALPPIS is currently operational in, around Addis Ababa (Debre Zeit, Chancho, Holetta, and Sebeta), and in other dairy potential areas of the country (Jima, Assela, Debre Markos, Bahirdar, Gonder, Mekelle, and Axum). Since 2010, NAIC is also sourcing semen from ALPPIS.

Information on services per conception (NSPC), non-return rate (NRR) and conception rate (CR) were obtained for Tigray, Amhara, Oromia, and SNNRP for the fiscal year 2008/9 from NAIC through personal communication. Accordingly, services per conception ranged from the minimum 1.5 in Tigray to the maximum 3.3 in SNNPR with the average being 2.25 (Table 5). Non-return rate and conception rate for the four regions in question averaged 86 and 42%, respectively (Table 5). Based on the information obtained from NAIC through personal communication, a mean on-station NSPC of 1.93 was obtained with an average minimum of 1.75 at Holetta Research Center and an average maximum of 2.23 at Assela farm over a period of four years (2002/3 to 2005/6) (Table 6).

Table 5. Regional AI service efficiency (2008/09)

Region	Variable		
	Services per conception, NSPC	Non Return Rate, NRR (%)	Conception Rate, CR (%)
Tigray	1.5	89.3	65.6
Amhara	2.5	77	39.4
Oromia	2.8	NA	34.5
SNNP	3.3	91.7	29.5
Average	**2.52**	**86**	**42,25**

***Note**: NSPC: total number of inseminations per cows conceived; NRR: Proportion of cows not returned for 2nd insemination from total number of 1st inseminated cows; CR: Proportion of number of pregnant cows from total number of inseminations.*
***Source**: NAIC (2011, personal communication)*

Table 6. Number of Services per Conception (SPC) on three stations

Station	NSPC				Average
	2002/03	2003/04	2004/05	2005/06	
Holetta Research Center	NA	1.5	1.85	1.9	1,75
Assela Farm	2	2.2	2.5	NA	2,23
Holetta Cattle Genetic Improvement Farm	1.7	1.8	2.18	1.83	1,88
Average	**1,85**	**1,83**	**2,18**	**1,86**	**1,93**

***Source**: NAIC (2011, Personal communication)*

Feeding

In Ethiopia, livestock feeding mainly depends on grazing and browsing. In the highland grazing, which in most of the cases is practiced on communal lands, is supplemented with natural grass hay, crop residues such as straws and chaffs of cereals and pulses and agro-industrial by-products mostly that from flour and oil industries and brewery residues. Dairy producers that keep improved dairy cows also cultivate improved forage crops such as elephant grass, oats, vetch, and alfalfa to supplement grazing (CSA, 2010a).

According to Felleke (2001), 73% of the feed is provided from natural grazing; 14% from crop residues, and only 0.2% from improved forages. In Ethiopia, mainly due to poor soil-fertility and markedly seasonal rainfall, feed supplies fluctuate widely in terms of both quantity and quality. Periodic shortfalls in feed availability, especially during the dry season, are the major constraints to livestock productivity. Although animals may have relatively abundant and good quality forage at their

disposal during the rainy period (3-5 months), the situation can rapidly reverse itself in the dry season. In many parts of the highlands, feed deficits start in December-January, as natural pastures are at their lowest quantity with respect to dry matter, nutrients, and digestibility, and the supply of stored crop-residues is beginning to diminish. There is usually a gap of 4 to 5 months of dry season before the start of the short-rains. The gap in the availability of forage between the short and long rains is not as serious as the one between the long and short rains. The second dry season which lasts for about 150 days between October and March is therefore the critical period in a feeding system, that is largely based on natural grazing pasture.

In a study on feed resources and nutritional management of dairy herds in urban and peri-urban dairy-production systems, Mekasha *et al*. (2000) reported that roadside grazing is practiced by 6.7% of the intra-urban dairies, while grazing pastureland is practiced by 33% of the large peri-urban dairy farmers. Hay is utilized by all production systems except 40% of the secondary town dairy farms. There are a number of feed mills most of them around Addis Ababa and also in different regions of the country that are engaged in preparing and supplying balanced, dairy-cattle concentrate-feeds. However, they are not affordable by most small-scale rural and peri-urban dairy farmers. As reported by SNV (2006) they are mainly used by urban dairies. Among the non-conventional feeds, *Atella* (a traditional home-brewery residue) and pulse hulls are utilized by 80% and 47% of the farmers respectively. *Atella* has high crude protein (20%) and organic matter (97%) content (Mekasha *et al*., 2000).

A 'good' supply of water (both quantity and quality) is required for an animal to maximize feed intake and production. In Ethiopia, the main livestock drinking water sources are rivers and streams. A substantial number of producers also use water tanks to collect and conserve rainwater from iron-roofed houses.

Quality of milk and milk products

The Quality and Standards Authority of Ethiopia (QSAE) is the National Standards Body that has undergone several restructuring, of which the latest being that made in February 1998, based on 'Proclamation No. 102/1998', organizing the Authority to effectively promote quality management practices as one of its central objectives in addition to Standards Development, Certification, Metrology and Testing. The

policy maker and governing organ of QSAE is the Standards and Certification Council whose members are appointed by the Prime Minister's Office. The members of the Council are selected from various science and technology organizations. QSAE has published the first group of 108 Ethiopian Standards (ESs) back in 1973 following the consensus-based committee procedure. In 2009, QSAE has issued 7,417 Ethiopian Standards of which 6,504 were active. These standards are used in trade and commerce, quality assurance, testing and verification of measuring instruments (QSAE, 2009). The enforcement of some Ethiopian Standards carried out by QSAE is made mandatory by the Government in view of health, safety, fair trade, and related considerations. The current collection of ESs is mostly adopted international standards. However, in the agriculture and food fields, nationally developed/ indigenous standards exist or are under development.

Implementation of or compliance with Ethiopian Standards is normally voluntary, but for standards that have direct influence on health, safety and related considerations, compliance is often made compulsory. In general, implementation of standards is done by regulatory bodies, consumers, and most importantly, by industry. It is also enforced by QSAE through certification of selected products and services for which QSAE has the competence and mandate to carry out http://www.qsae.org/web_en/About%20Us/en_aboutQSAE.htm.

According to 2009 Catalogue of Ethiopian Standards, there were a total of 129 standards for milk and milk products of which 34 standards on specifications; 86 standards on determinations and tests; and 9 standards on code of practices, guidelines, maximum limits, general standards, and requirements (QSAE, 2009). Ethiopian standards (requirements) for pasteurized liquid milk are presented in Tables 7 and 8.

Table 7. Ethiopian standards for pasteurized liquid milk–requirements

Characteristics	Requirements	Method of test
Fat content, whole milk, min, % by mass	3.5	ES ISO 1211, ES ISO 2442
Fat content, Fat reduced milk, % by mass	1.5-3.5	ES ISO 1211, ES ISO 2442
Fat content, low fat milk, % by mass	0.5-1.5	ES ISO 1211, ES ISO 2442
Protein, min, % by mass	3.20	ES ISO 5542, ES ISO 8968-5, ES ISO 8968-1
Total solids, min, % by mass	12.80	ES ISO 6731
Phosphatase test	Negative	ES ISO 3356
Antibiotics	None	ES3473
Pesticide residues	See 13557	ES ISO 3890-1, ES ISO 3890-2
Salmonella	Nil	ES ISO 6785
Freezing point	0.525-0.550	ES ISO 5764

Table 8. Ethiopian standards for pasteurized liquid milk-microbial limits

Microorganisms/groups of microorganisms	Requirement
Total plate count	
Very good quality	<50000 per ml
Good quality	50,000–100,000 per ml
Fecal coliforms	Nil per ml
Non fecal coliforms	<10 per ml

From earlier research efforts conducted in Ethiopia, it can be observed that the microbial counts of milk and milk products produced and marketed in Ethiopia are generally much higher than acceptable limits. Yilma (2010) in his study on the microbial properties of marketed milk and milk products sampled from 10 dairy potential areas in the country reported a similar observation and indicated that microbial counts in samples of whole milk, *ergo* and skim milk to be particularly higher (Table 9 and 10). According to the same author, counts of *Enterobacteriaceae* and coliform were higher than acceptable limits: *Enterobacteriaceae* <1 and coliform <10 cfu/ml for pasteurized milk, and coliform <100 cfu/ml for raw milk intended for direct consumption (Council Directives 92/46/EEC, 1992). The higher count in milk could be attributed to the substandard hygienic conditions practiced during production and subsequent handling, while the high count in fermented milk products can also be partly explained by lactic acid bacteria.

Table 9. Overall bacterial and yeast and mold counts (log_{10}) per ml/g of milk and milk products samples collected from different sources (sites and producer groups)

Source	No of Obs.	TBC	Enterobacteriaceae	Coliform	YMC
Overall mean	630	8.35	5.10	4.53	8.32
Whole milk	135	9.10	5.49	4.58	-
Ergo	105	9.49	4.95	4.51	8.38
Butter	105	6.67	4.95	4.58	8.32
Arera	75	9.35	4.94	4.65	-
Ayib	105	7.01	4.84	4.42	8.26
Skim milk	105	9.37	5.34	4.44	-

Note: TBC means Total Bacterial Count; YMC means Yeast and Mold Count

Table 10. Microbial count (log_{10}) per ml/g of milk and milk products categorized by sample source (producer type)

Producer	Whole milk	Ergo*	Butter	Arera	Ayib	Skim milk
Total bacteria						
Smallholder farmers	8.87	9.48	6.86	9.35	7.16	-
Cooperatives	9.49	9.54	6.14	-	6.51	9.25
Overall mean	9.10	9.49	6.67	9.35	7.00	9.25
Enterobacteria						
Smallholder farmers	5.51	4.94	4.97	4.94	4.85	-
Cooperatives	5.45	4.98	4.90	-	4.82	5.30
Overall mean	5.48	4.95	4.95	4.94	4.84	5.30
Coliforms						
Smallholder farmers	5.59	4.48	4.60	4.65	4.44	-
Cooperatives	4.54	4.61	4.53	-	4.37	4.37
Overall mean	4.58	4.51	4.58	4.65	4.42	4.37
Yeast and mould						
Smallholder farmers	-	8.39	8.34	-	8.26	-
Cooperatives	-	8.34	8.27	-	8.27	-
Overall mean	-	8.38	8.32	-	8.26	-

***Note**: *Ergo refers to fermented whole milk for smallholder farmers, while it refers to fermented skim milk for cooperatives.*

Farm-level milk uses and losses

Milk is used for rearing calves and children, and the surplus is soured for *Ergo* (Ethiopian naturally fermented milk) and/or butter and *Ayib* (Ethiopian cottage cheese)-making. *Arrera* (defatted sour milk) is used for human consumption or for *Ayib-making*. Generally, milk consumption in rural areas can be considered as a function of wealth or availability to a given household, while in urban areas it can be determined by the purchasing power of the household, the level of awareness on its nutritive value and availability. Ethiopians consume milk in its natural state and/or in the form of fermented (sour) milk and

fermented milk products. In most households in the central highlands of Ethiopia where there are only local cows, the milk is just enough for the calves and there is very small amount of milk left for family consumption and sale.

In rural areas, only small volumes of milk are available daily at household level and allowing the milk to sour means that it can be collected over a few days until a sufficient amount is available for further processing. Most people in rural areas have therefore developed a palate for sour milk and its products over generations.

According to CSA (2010b), of the total annual milk production at national level in year 2009/10, about 85% was used for household consumption, 7% sold, 0.3% used to pay wages in kind and the remaining about 8% was used for other purposes such as the production of butter and *Ayib* (Table 11).

Table 11. Utilization of milk at regional level (2009/10)

Region	Utilization (%)			
	Household consumption	Sale	Wage in kind	Others
Tigray	91.8	1.34	0.42	6.43
Afar	87.29	4.69	0.3	7.72
Amhara	92.62	0.38	0.24	6.76
Oromia	86.36	6.31	0.29	7.05
Somali	67.79	29.68	0.17	2.36
Benishangul-Gumuz	63.89	0.89	0.12	35.1
SNNP	88.63	2.29	0.36	8.73
Gambella	85.13	11.15	0.44	3.28
Harari	47.47	47.21	-	5.32
Dire Dawa	63.65	35.65	0.29	0.24
Total	**85.23**	**6.86**	**0.29**	**7.62**

In Ethiopia, estimated post-harvest losses of up to 40% of milk and its derivatives have been reported from milking to consumption (Felleke, 2003). Post-harvest losses and quality deterioration are mainly attributed to mishandling in the dairy chain from farm to fork. These include: contamination during milking and further handling coupled with storage time and temperature before consumption; deliberate adulteration of milk; substandard handling, transportation, and distribution systems; inefficient processing technologies; inadequate fresh milk outlet; and spillage losses during milking. According to Food and Agricultural Organization of the United Nations (FAO) (reported by ENA, 2004), the

value of annual milk and dairy product losses due mainly to mishandling across five African and the Middle East countries (Kenya, Tanzania, Uganda, Ethiopia and Syria) is over 90 million USD. Reducing such losses and improving quality are effective ways of making more and safer milk available. This helps improve the welfare of resource-poor dairy producers and low-income consumers through increased supply in terms of volume and geographical distribution and marketing of safe and better quality milk and milk products.

Demand and supply for milk and milk products

The demand for milk and milk products is a function of several factors that include population growth, seasonality of demand and supply, low per capita consumption and high transaction costs. Generally, the demand for milk and milk products is higher in urban areas where there is high population pressure and the increasing trend of urbanization and population growth leads to the appearance and expansion of specialized medium- to large-scale dairy enterprises that collect, pasteurize, pack and distribute milk to consumers in different parts of the country.

Followers of the Ethiopian Orthodox Church that account for over 43% of the country's population abstain from consuming animal products including milk and milk products for about 200 days a year and the faithful do not eat anything at all until the daily service is finished at around 3:00 p.m. The longest continuous fasting period is the one right before the Ethiopian Easter that lasts for 55 days. Demand for animal products in general and that of milk and milk products in particular generally declines during fasting periods particularly in areas where Orthodox Church followers dominate.

The per capita milk consumption (17kg) for Ethiopia is much lower as compared to that for Africa (25kg), that recommended by World Health Organization (WHO) (200 liters), the 62.5 kg recommended by FAO (1990) as a minimum level to be kept for a balanced diet and the world per capita average of about 100 liters/year (FAO, 2010). The low demand and low prices and/or the high transaction costs reduce the actual price received by producers and their incentive to generate surpluses (SNV, 2008). Although milk and milk products form part of the diet of many Ethiopians, liquid milk, as such, is not part of most Ethiopians' diet. Most people use the bulk of their milk in tea/coffee and for feeding infants or

the elderly and/or those in poor health. Milk products such as butter, *Ayib*, and *Ergo* are regularly consumed.

Milk production generally tended to increase over the last 10 years from about 1.5 billion in 2001 to about 2.2 billion in 2005 and around 2.9 billion in 2010. This increasing trend is mostly associated with an increase in the number of cows. However, the per capita milk consumption has declined from 26 liters per annum in 1980, to 22 liters in 1993, 19 liters in 2000, and 16 liters in 2009. This is likely to be attributed to the mismatch in the growth rate of milk production and human population.

In rural areas, consumption of milk and milk-products is heavily influenced by livestock ownership/herding, but in urban areas, in particular, the principal determinant of consumption-levels is income. Generally, the growth in demand for milk and milk products will be a function of rapidly rising human population, urbanization, and increases in per capita income. An attempt is made to project the additional milk required to supply to the growing consumer in Ethiopia in the coming 9-10 years. In the projection, the human population annual growth rate of 2.72% calculated based on the report of the 2007 population census and the estimated figure of 82,101,998 for 2011 (CSA, 2011) was used. For the estimation of milk production, cows' milk production growth rate of 4.1% calculated based on the figures in the annual reports of the Central Statistical Agency for years 2004 to 2010 was used. Milk available for consumption is estimated based on the report of Felleke (2001) who indicated 68% of the total annual milk production to be consumed. The value recommended by the Food and Agriculture Organization of the United Nations (FAO) (62.5 kg/year/person) to be maintained for a balanced diet is considered as a target to achieve (Table 12). Based on the above estimations and assumptions, if Ethiopia needs to be self-sufficient in milk during the reference years, then milk production should increase at a rate of 54–60% per year.

Table 12. Projected demand for milk in Ethiopia

Year	Population in 1000s based on current growth rate (2,72%)	Milk production, in million liters based on current growth rate (4.1%)	Milk available for consumption (68% of the produce) in million liters	Demand for milk, in million liters based on FAO recommendation (62,5kg/year/person)	Gap between projected milk available for consumption and demand based on FAO's recommendation, in million liters
2011	82102	3061	2081	5131	3050
2012	84335	3186	2166	5271	3105
2013	86629	3317	2256	5414	3158
2014	88985	3453	2348	5562	3214
2015	91406	3594	2444	5713	3269
2016	93892	3742	2545	5868	3323
2017	96446	3895	2649	6028	3379
2018	99069	4055	2757	6192	3435
2019	101764	4221	2870	6360	3490
2020	104532	4394	2988	6533	3545

The Dairy Value Chain

Collection, bulking, and transportation

In Ethiopia, organized milk-collection and processing started in the 1960's, mainly in Addis Ababa. In 1960, only one milk-processing plant was operating. At that time, milk processing and distribution in Addis Ababa was operated by a Government agency- Sholla Dairy then renamed as Dairy Development Agency (DDA) and later as Dairy Development Enterprise (DDE), and currently it is privatized and named Sholla or Lame (Amharic for my cow). Lame (Sholla) currently operates with 25 collection centers located around Addis Ababa; 13 of them near Selale, 5 near Holetta, and 7 around Debre Birhan. At collection points, milk is subjected to a field-acidity (alcohol) test for freshness and a lactometer reading (for possible adulteration). All the accepted milk is transported to the nearest chilling-center, where it is cooled to temperatures below 6°C. At collection centers, milk delivered by producers and milk cooperatives. Most producers bring their milk on foot or by donkey to the collecting center.

Perhaps the most important step that contributed to milk collection has been the promotion of collective action through establishment of village, milk-marketing groups and small-scale dairy-associations and cooperatives that have been set up in many of the milk-shed areas with the assistance of a number of Governmental and, local and international development partners. Although the number of farmers and the amount of milk received at each group is not a large proportion of regional totals, the formation of milk cooperative groups has created a new outlet for sales of liquid milk by producers. Before the formation of the groups, the households processed nearly all locally produced milk into butter and *ayib*. However, most milk produced in these areas is marketed as home-processed dairy-products and sold to traders or other households in local markets. In most of the cases where there are operational milk cooperatives, milk produced in the morning is sold to the milk units and afternoon milk is used for home consumption and processing.

Informal milk trade

Milk and milk products in Ethiopia are channeled to consumers through both formal and informal marketing systems. In Ethiopia, about 95% of the milk produced at national level is marketed through the informal channel. In this marketing system, milk and milk products may pass from

producers to consumers directly or through one or more market agents. In the informal system, producers supply their surplus production to their neighbors and/or in local markets, either as liquid milk or in the form of butter and/or *Ayib* (O'Connor, 1992). This system is characterized by no license to operate, low cost of operation, high producer price as compared to formal market and no regulation of operation (SNV, 2008). The hygienic condition of milk and milk products channeled through this system is also poor. This is mainly due to the prevailing situation where producers have limited knowledge of dairy product handling coupled with the inadequacy of dairy infrastructure such as cooling facility and clean water in the production areas.

Formal milk trade

In the formal system, milk is collected at cooperative or private milk collection centers and transported to processing plants. In this system, there are somehow milk quality tests (principally acidity using alcohol and clot-on-boiling test, and density) up on delivery, and therefore the quality of milk is fairly secured. Since milk is rejected upon delivery because of poor hygienic condition, producers pay a due emphasis in the production, storage, and transportation of milk if their milk has to be accepted. The formal milk-market appears to be expanding during the last decade with the private sector entering the dairy-processing industry in Addis Ababa and other major regional towns. However, the share of milk sold in the formal market in Ethiopia (2%) is much less that in neighboring countries 15% in Kenya and 5% in Uganda (Muriuki and Thorpe, 2001).

Although the price of different inputs for dairy production varies and grows increasingly, milk producers are getting very low amount as compared to their production costs. Moreover, their bargaining power is very limited. It is therefore important to put a functional controlling mechanism in place so that producers can get what they deserve. Most farmers in Ethiopia live in areas not accessible to all-weather roads, which are essential to transport agricultural products including milk and milk products to places with storage facilities and selling points. Many dairy farmers located even in high-potential fluid milk-producing areas are hours travel away from any market for fresh milk. As reported in the Livestock Development Master Plan, only a few farmers live close to main roads, which give them basic access between farm and village and from village to market (GRM International BV, 2007). The relatively

high marketing-costs for liquid milk and the risk attached to marketing perishable products play a central role in dairy-production and marketing. Lack of cooling facilities, inadequate means of transport, and poor communication considerably aggravate the difficulties of collecting and preserving locally produced milk.

Employment generation

Employment and income from dairy will vary between and within production systems because of differences such as feed sources, management systems, herd size, form of milk disposal patters, and access to or use of technology. In Ethiopia, traditional smallholder mixed farming systems generate several times more employment but low income per unit of milk produced compared to urban and peri-urban dairy systems because of low productivity of animals in the former. In both systems, over two third of the labor requirement is provided by children as they usually do the herding.

Considering the figure 224.5 persons per 1000 liter of daily milk produced proposed by Haile (2009), and the 2940 million liters of milk produced at national level in 2010, it can be extrapolated that dairy industry created about 1.8 million jobs. Staal *et al*. (2008), on the other hand, estimated that the peri-urban system creates annually 4.4 million person days of work or 16,400 full-time jobs, while the small-scale mixed farming systems creates 166 million person days of work, equivalent to 553,500 full-time jobs. Based on the estimation given by FAO (2010), the production of 1 million liters of milk per year on small-scale dairy farms creates 200 on-farm jobs, in 2010 dairying in Ethiopia created about 588,000 on-farm jobs.

Development Interventions

Since introduction of dairy cows to Ethiopia in 1947, a number of interventions have been made to develop the Ethiopian dairy sector. With smallholder producers being the major actors at production level and the MoA and regional bureaus of agriculture, being regular technical support provider, the private sector as well as a number of public; and domestic and international projects and development partners have been making substantial development interventions in the Ethiopian dairy sector. Major past, recently completed, existing, and upcoming interventions are summarized in Table 13.

Table 13. Summary of major past, recently completed, current and pending key interventions in the Ethiopian dairy sector

Key Actor/project	Intervention
Past	
United Nations Relief and Rehabilitation Administration (UNRRA)	Introduction of 300 Friesian and Brown Swiss dairy cattle in 1947
The Ethiopian Government Government of Finland The United Nations Capital Development Fund	Increasing the processing capacity of the Shola plant to 60,000 liters per day, introduction of butter oil recombination capacity, establishment of 30 collection and 16 chilling centers, and expansion of milk collection routes to 150 km around Addis Ababa.
The Ethiopian Government/MoA	Establishment of a milk processing plant at Shola Establishment of the Dairy Development Agency (DDA) in 1971 to provide guidance and assistance (extension and credit services, establishment of commercial dairy farms, improve quality and increase quantity of milk and milk products, cooperative formation for commercial agri. Production) Establishment of the Dairy Development Enterprise (DDE)
Swedish International Development Agency (SIDA) supported Chilalo Agricultural Development Unit (CADU) initiated in 1967	One cow unit dairy development package, production of frozen cattle semen and crossbreed dairy heifers, introduction of small-scale milk processing units, introduction of AI and bull station services, popularization of improved forage crops cultivation
Wolaita Agricultural Development Unit (WADU) funded by the Int. Development Association (IDA)	Establishment of a farm with 290 dairy cattle (Jersey) at Wolaita Sodo
FINNIDA implemented 'Smallholder Dairy Development Pilot Project (SDDP)' with additional funding from FAO and WFP	Organization of small milk processing and marketing units Formation of 30 cooperatives in the peri-urban areas of Addis Ababa Improved veterinary and breeding services, promotion of forage and feed production
Recently completed	
Land O'Lakes (Lo'L) - Ethiopian Dairy Development Project (EDDP)	Milk Value Chain
Netherlands Development Organization (SNV)	Milk Value Chain through its 'Support to Business Organizations and their Access to Markets (BOAM) program
Improving Productivity and Market Success (IPMS)	Milk Value Chain
Existing (with their past and current intervention)	
The Ethiopian Government/MoA	Provision of structured extension services

Ethiopian Meat and Dairy Technology Institute (EMDTI) (MoA)	Provision of tailor-made short trainings on different aspects of dairy development
National Artificial Insemination Center (NAIC) (MoA)	Importation, production and distribution of semen to its nine sub centers Capacity building (training)
Federal and Regional Agricultural Research Institutions with the Holetta Agricultural Research Center (HARC) of the Ethiopian Institute of Agricultural Research (EIAR) being the center of excellence for dairy research	Adoption and generation of appropriate technologies for dairy development Capacity building by organizing and providing trainings Verification and demonstration of promising technologies on farms with the participation of smallholder farmers
Agricultural Universities, Colleges and Schools	Provision of long to medium term trainings on a regular basis to high level agricultural professionals Capacity building – tailor made short term trainings
National Veterinary Institute (NVI)	Production and distribution of veterinary vaccines and drugs
Medium- to large-scale private milk processors with the Sebeta Agro-Industry (Mama) being the pioneer	Production, collection, processing and distribution Offered producers a better milk price as compared to that paid by DDE, thereby stimulating competition and helping the expansion of the formal market
FAO Sub Regional Office for Eastern Africa and Country Office	Milk Value chain through the 'Crop Diversification and Marketing Development' Project Need assessment studies
Primary Dairy Cooperatives and Dairy Cooperative Unions	Access to milk market outlet and dairy farm inputs to smallholder producers Link producers with processors
Addis Livestock Production and Productivity Improvement Service (ALPPIS)	Importation of unsexed and female sexed semen, distribution, follow-up, capacity building (training)
Upcoming	
Livestock Growth Program (AGP)	Dairy Value Chain
East Africa Dairy Development (EADD) Program	Dairy Value Chain
Market-led Innovation and Learning for Dairy Development (MIDD)	Dairy Value Chain
Livestock and Irrigation Value-Chains for Ethiopian Smallholders (LIVES)	Dairy Value Chain
The Private Sector	Dairy Value Chain

Ethiopia in the Dairy World?

The global scenario

As reported by the International Farm Comparison Network, in 2005 around 149 million farm households throughout the world were engaged in milk production. On average, these households kept two milking cows (or buffaloes) yielding about 11 liters/day. Assuming a mean household size of five to six, some 750 to 900 million people (or 12-14 % of the world population) rely on dairy farming to some extent (IFCN, 2010). In year 2010, the global milk production from cows and buffaloes reared in about 145 million dairy farms amounted to 685 million tons (ECM) (IFCN, 2011). South Asia and EU-25 are the most important dairy regions, accounting for 44 % of the global milk production. Africa's contribution is estimated at 5 % with the largest milk producing countries being Egypt, Kenya, South Africa, and Sudan. In the period 2002 to 2007, world milk production grew by 13 %, or by an average of 15 million tons of energy-corrected milk (ECM) per year–mainly driven by production increases in China, India and Pakistan. Most of the remaining growth was in Brazil, Egypt, New Zealand, Turkey, and the USA (FAO, 2010).

The majority of the world's population lives in developing countries, particularly in Asia. Population growth was the main driver of the increased demand for dairy products over the period analyzed. However, per capita consumption increased significantly in a few but highly populated countries, among them China, Indonesia, and Viet Nam. Based on milk equivalent (ME), average per capita global consumption amounts to about 100 kg of milk/year, with very significant differences between countries/regions. Per capita consumption in Western Europe is in excess of 300 kg of milk/year compared with less than 30 kg in some African and Asian countries. Based on country-specific estimates of per capita milk consumption, the International Farm Comparison Network (IFCN) established three categories: High: more than 150 kg per capita/year; Medium: 30-150 kg per capita/year and Low: less than 30 kg per capita/year. Based on such category, China, Ethiopia, Yemen, and most countries of Central Africa and East and Southeast Asia are under the Low category.

In past years, milk consumption has risen by 10 to 20 million tons per year; one driver is human population growth. A global population growth

rate of 1.2 to 1.3 % per year means 75 to 80 million more people each year. Using the world average per capita milk consumption, this would mean that population growth accounts for an increase in milk consumption of 7 to 9 million tons per year. The second driver of milk consumption is increasing per capita consumption. However, this driver in turn depends largely on per capita income developments, especially in developing countries. In addition, it may be expected that increasing income levels will stimulate the demand for milk and dairy products, meaning that future milk production will need to increase by more than 1.8 % per annum. Should this not be the case, dairy prices will rise significantly over the past levels (FAO, 2010).

Few countries are self-sufficient in milk, which means they import more dairy products than they export. Based on the analysis 2004, excluding Intra-EU trade, about 7.1 % of the world milk production is traded internationally (FAO, 2010). The largest net milk exporting and importing countries in year 2003-2004 are listed in Table 14. In its press release of 2011 Annual Conference held in Kiel, Germany, the International Farm Comparison Network (IFCN) reported the Top-21 milk processors that together collected about 164 million tons of milk with 24% market share in % of the total world milk production (IFCN, 2011) (Table 15).

Table 14. The largest net milk exporters and importers in 2003-2004 (FAO, 2010)

Net export exporters	Net importers
New Zealand	China
EU-15	Mexico
Australia	Japan
EU-10 New members	Algeria
USA	Russian federation
Argentina	Philippines
Ukraine	Saudi Arabia
Belarus	Indonesia
Uruguay	Nigeria
Switzerland	Vietnam

Table 15. International Farm Comparison Network (IFCN) Top-21 milk processors list 2011 measured by milk intake (IFCN, 2011)

Rank	Company	Country	Dairy processing plant main location	Milk intake in mill. t	Market share (% of world milk production)
1	Fonterra	New Zealand	International	20.5	3.0%
2	Dairy Farmers of America	USA	USA	17.1	2.5%
3	Nestle	Switzerland	International	14.9	2.2%
4	Dean Foods	USA	USA	11.8	1.7%
5	Royal Friesland Campina	The Netherlands	The Netherlands	10.3	1.5%
6	Lactalis	France	International	10.2	1.5%
7	Arla Foods	Demark/Sweden	Denmark/Sweden	8.7	1.3%%
8	Danone	France	International	8.0	1.2%
9	California Dairies Inc.	USA	USA	7.7	1.1%
10	Kraft Foods	USA	International	7.5	1.1%
11	Nordmilch and Humana (DMK)	Germany	Germany	6.7	1.0%
12	Saputo	Canada/USA	Canada/USA	6.2	0.9%
13	Land O'Lakes Inc.	USA	USA	5.8	0.9%
14	Sodiaal and Entremont Alliance	France	France	4.2	0.6%
15	Mengnui Group	China	China	3.8	0.6%
16	Parmalat	Italy	International	3.7	0.6%
17	Yili Group	China	China	3.7	0.5%
18	Amul	India	India	3.4	0.5%
19	Northwest Dairy Association	USA	USA	3.3	0.5%
20	Schreiber Foods Inc.	USA	USA	3.3	0.5%
21	Murray Goulburn	Australia	Australia	3.2	0.5%
	Sum top 21			**163.9**	**24%**

***Source**: IFCN (2011)–IFCN analysis is based on the IFCN Dairy Report 2010 and additional analysis and estimates. Data represent in most cases the year 2009 or 2010. Explanation: Milk intake represents milk volume collected, commodity purchase (in milk equivalents) and subsidiaries in other countries. Milk intake figures in milk tons. In some cases recalculated from liter (1 liter = 1.033 kg). Comments: Amul (India): milk with high fat content. Nordmilch and Humana merged in 2010 and created new company Deutsches Milchkontor (DMK). Sodiaal and Ehtremont alliance merged in 2011. Fonterra and Nestle incl.50% of milk intake of Dairy Partners America (DPA) each. In some cases: double-counting of milk intake possible (companies purchase milk/dairy ingredients from each other).*

Comparison with others

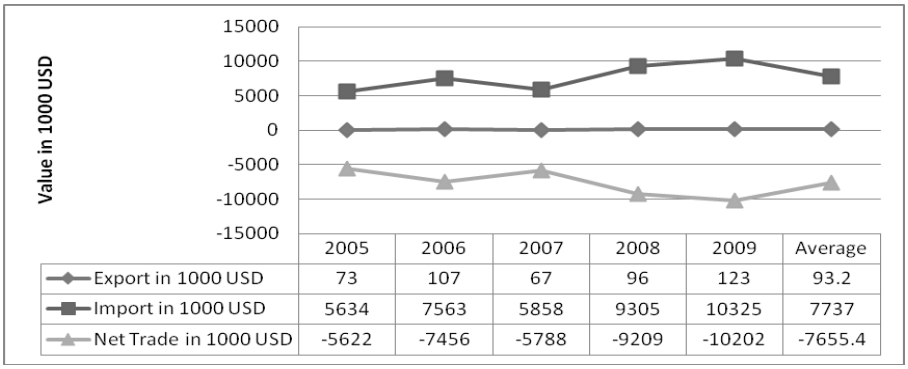
A simple comparison with a couple of countries well illustrates where the Ethiopian dairy industry is situated. As it is presented in Table 16, in year 2010, Kenya with a slightly more than one-third of milking cows' population produced milk close to double that of Ethiopia. The per capita milk consumption of Ethiopia is not only below the world and below SSA average but also much lower than that of the neighboring Kenya and

Uganda. The value is also lower than the 62.5 kg recommended by FAO (1990) to be maintained for a balanced diet.

Table 16. Some key parameters for comparing the Ethiopian dairy sector situation with others

Country	No. of cows ('1000)	Milk production (mill. Kg)	Import ('1000 USD)	Export ('1000 USD)	NTV (USD)	PCC (kg)
Kenya	3494	5505	11933	30566	18633	100
Uganda	1520	1300	9904	915	-8989	50
Ethiopia	9628	2940	10325	123	-10202	19
Israel	120	1200				165
SSA						26
World						115
FAO's recommendation						62.5

Ethiopia is not much known for the export of dairy products. However, though in insignificant quantities, milk and butter are exported to few countries. Butter is mainly exported to Djibouti and South Africa, targeting the Ethiopian Diaspora, while milk is solely exported to Somalia from the South Eastern region of the country. As indicated by SNV (2006), small quantities of cream are also exported to Djibouti from Dire Dawa.



	2005	2006	2007	2008	2009	Average
Export in 1000 USD	73	107	67	96	123	93.2
Import in 1000 USD	5634	7563	5858	9305	10325	7737
Net Trade in 1000 USD	-5622	-7456	-5788	-9209	-10202	-7655.4

Figure 7. Milk and milk products–Export and Import (2005-2009)

According to the International Trade Center (ITC), although Ethiopia's export values generally increased from about 73,000 USD in 2005 to 123,000 USD in 2009, the country spent much more currency for importing milk and milk products from different countries as compared to export values. The import value, which was more than 5.6 million USD in year 2005 increased to a little above 10.3 million USD in 2009 (Figure 7). 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 the dairy sector at least to satisfy the domestic demand with domestic supply. The neighboring Kenya is not only self-sufficient in milk production but a net importer (Table 16).

Strengths, Weaknesses, Opportunities, and Threats

The Ethiopian dairy sector is complex. This stems from the diverse agro-climatic conditions, production systems, and socio-economic situation. The agro-climatic conditions range from arid to highland areas. The production system is dominantly subsistent with a substantial role of the urban, peri-urban, and commercial production systems. The actors are from rural smallholder subsistence producers to commercial large-scale dairy enterprises. Milk utilization is also under the influence of the diverse socio-cultural situation. The SWOT analysis is not specific to the aforementioned diversities neither exhaustive. It focuses on key general issues of the country's dairy sector.

Strengths

Current situation	Appropriate measures to build on
Milk production and consumption culture	Development interventions can build on the existing experiences
Employment creation	Improve policy enabling environment and technical capacity; access to the required resources and services

Weaknesses

Current situation	Appropriate measures to correct
Low milk production	Efficient extension service provision on dairy husbandry practices
Lack of capital	Access to credit
Poor quality milk	Efficient and functional quality control system; the required technical skill and dairy infrastructure; quality based payment system
Shortage of skilled/trained manpower	Capacity building of existing teaching and training centers; producing sufficient professionals at different levels and streams of dairying
Difficulty to get land for dairy operation	Conducive policy enabling environment
Feed shortage (quality and quantity)	Improved feed production, conservation and utilization; use of adapted improved forage crops
Dominant rain based agricultural	Alternative use of water sources (harvesting rain water, ground water, irrigation)
Incidence of diseases of economic importance	Efficient dairy cattle disease prevention and control system
Small proportion of marketed milk and dominance of the informal market	Promote cooperative action; improve dairy infrastructure; improve linkage among the key actors; reliable, up-to-date and consistent market information system
Low level of per capita milk consumption	Promotional work on the benefits of quality milk and milk products; increase distribution; pricing system

Opportunities

Current situation	Appropriate measures to exploit
Large diversity and population of cattle	Selection of cows of better productivity and improve productivity through crossbreeding
Existence of conducive environmental conditions for dairy development	Maximize the use of conducive mid altitude and highland areas for keeping specialized dairy cows and cultivation of improved forage crops
Relatively cheap farm labor	Improve technical knowledge
Increasing interest in investing in the sector	Conducive policy environment
Increasing population, urbanization and income and trend towards consuming more animal products	Increase diversity, improve quantity , quality and distribution of dairy products

Threats

Current situation	Appropriate measures to avert
Supply and demand mismatch due to seasonal, spatial and cultural factors	Shelf-stable products such as powder milk to transfer the excess from time and place of high production to that of low production
Unreliable climatic condition	Alternative use of water sources (harvesting rain water, ground water, irrigation); early warning system; climate change adaptation and mitigation mechanism
Illegally imported milk products	Policy support to domestic products; efficient import controlling system
Urban dairy farm organic waste	Efficient urban dairy farm organic waste disposal system; alternative use of urban dairy farm organic waste; moving large urban farms to appropriate places in peri-urban areas

Challenges and Recommendations

Challenges

Genetic limitation*:* The main problem of milk production in Ethiopia is low milk production per cow of the indigenous cattle, which is related to their low genetic potential for milk-production. The average production is as low as 0.5-2 liters per day over a lactation period of 160-200 days.

Inadequate animal feed-resources*:* Inadequate feed-resources, poor pasture-development, high stocking rates, and the ever-increasing feed price are important constraints to dairy development in Ethiopia. In the dominating crop/livestock production system, producers supplement their dairy cows with crop residues and farm by-products from their own farms. In some cases during the dry season, these feedstuffs can be the only feeds available to the animals.

Limited access and high price heifers/cows*:* Shortage, high prices of crossbred, grade, and pure exotic cattle are a major problem.

Absence of an operational breeding strategy and policy*:* The artificial insemination service has been inefficient among other factors, due to inappropriate infrastructure; managerial and financial constraints; inefficient heat detection and improper timing of insemination; embryonic death (Shiferaw *et al*., 2003); and very small number of AI technicians compared to the number of cows and their keepers in a given area. In spite of its substantial livestock resources and the accompanied benefits that the country is supposed to make use of, so far Ethiopia does not have a functional breeding policy and most of cattle breeding works have been undertaken by strategies set by individual concerned organizations/institutions.

Inadequate veterinary service provision*:* The animal health services provided are inadequate; drug and acaricide costs are very high; and the diagnostic services are not readily available to the dairy farmer. This is partly attributed to insufficient budge allocated to veterinary services (GRM International BV, 2007).

Weak linkages between research, extension service providers and technology users*:* Weak linkages between research, extension, and technology users are one of the critical factors that have hindered dairy development in Ethiopia. This weakness stems partially from the absence of sound linkage polices in the agricultural knowledge generation and transfer systems.

Inadequate extension and training service*:* Effective and adequate extension-service and advice on animal nutrition and feeding management, reproduction, hygiene, farm management, and dairy production efficiency are not always available to the dairy farmer. A shift towards a developed dairy industry requires more advisory and research services.

Milk market related constraints*:* There is no promotional works being made by concerned governmental bodies for milk as a highly nutritious and essential strategic-food for the health of the nation. There are no price-regulation mechanisms. In addition, as indicated earlier, in Ethiopia there is no functional quality control system and payment system based on quality.

Limited availability of credit to the dairy farmer*:* Many farmers are aware of the existence of improved technologies that can offer them higher returns as compared to their conventional practices. However, most if not all resource poor farmers do not have the financial means required to make the initial investment and acquire the associated technological inputs.

Unavailability of land*:* In the traditional sector, land becomes a constraint to milk-production because of overstocking. In urban and peri-urban dairying, lack of grazing-land is often a limiting factor. If land-degradation is not properly managed in some areas, it could be difficult to expand dairy-production. Intensification of the dairy industry through using less number of improved dairy cows with increased productivity per cow should be a strategy to be followed.

Recommendations

Research issues

- Improving the use of pasture through appropriate grazing land management systems;
- Testing and using technologies to speed up genetic progress such as Multiple Ovulation and Embryo Transfer (MOET);
- Developing milk processing and preservation technologies appropriate to the various major agro-ecological zones of the country; and
- Promoting HACCP program at farm-level to assure dairy farm safety. Realization of HACCP requires a critical multidisciplinary review of the existing management processes, the establishment of limits through identification of critical control points, the use of routine surveillance procedures, effective record keeping, and documentation of standard procedures.

Development issues

- Cultivation of improved forage crops suitable for the different agro-ecological zones and farming systems with accompanied technologies should be encouraged. Such forages that are nutritionally superior and yield more biomass per unit area as compared to tropical natural pasture can increase dairy farm income through increased milk yield. Smallholder farmers can reduce wastage and cost of feed and increase its intake by livestock using electric or petrol driven choppers where appropriate. Promotion of efficient use of alternative feed sources such as silage, hay, crop and vegetable by-products and local beverage by-products is also essential;
- Training selected farmers as Trained Farmer Artificial Inseminators (TFAIs) will reduce the critical shortage of AI technicians;

- Information on innovations can be transferred through the production and distribution of extension bulletins and leaflets; and
- Encouraging and supporting an efficient and operational public and private dairy extension and advisory service provision such as: dairy farm input provision, technology transfer and producer-research-private sector linkage.

Policy issues

- Policies on dairy should be comprehensive and focused on ensuring increased milk production. These should include appropriate strategies on breeding (selection and crossbreeding), improved feed utilization systems, and adequate veterinary services. The policies should establish an appropriate marketing infrastructure to ensure milk collection, processing, storage, and distribution, the quality of products. A functional payment system based on quality should be implemented. The introduction of this system of payment in other countries showed an improvement in both quality and quantity produced and supplied to milk collection centres and dairies. The pricing should aim at motivating milk producers to increase their efforts in hygienic milking practices and handling of raw milk;
- There is need to establish dairy advisory services at national level, which is important to make improvements on the various components of the dairy value chain. Institutions and Organizations such as the MoA, EIAR, QSAE, and EMDTI are vital in providing services;
- The establishment of central laboratories will determine the quality of milk supplied by various producers. Central Laboratories should supply data on milk quality to milk collection centres and dairy factories who should accordingly adjust their purchasing prices of raw milk based on quality. It is important to establish standard quality control laboratories for mandatory provision of quality certification and inspection services;
- Policies on land usage should take livestock development into account (land for grazing, cultivation of improved forage crops and agro-forestry). Institutional control system is needed to limit herd size (stock) as a preventive measure of land degradation through overgrazing and overstocking. This can be achieved through breed improvement to increase productivity per unit animal that allows keeping fewer numbers of high producing animals;
- There is need to create conducive environments for the establishment of feed processing plants, provide assistance and put a functional feed quality control system in place. Promotion of the establishment of forage banks in areas where rainfall and feed availability are not reliable is necessary;
- Putting in place appropriate and operational control and prevention strategies for dairy cattle diseases of economic importance. The private sector should be motivated to get involved in the manufacturing and distribution of veterinary drugs.
- The provision of credit facilities and insurance for dairy farms should be encouraged and promoted;
- Incorporate synchronized breeding in the breeding strategy to make use of the comparative advantage of seasonal feed availability. Public and/or private crossbreed heifer multiplication centers should be expanded throughout the country. Access to such centers should be promoted by putting in place local market structures and credit facilities for use by farmers, community based breeding

schemes should be promoted. Establish and promote bull breeding schemes and facilitate the involvement of the private sector in AI service provision;

- Increasing milk consumption through creating awareness on the nutritional value of milk and milk products and promoting school milk feeding scheme especially at kindergarten and primary school levels; and
- The development of infrastructure such as roads and cooling facilities is important for the dairy industry.

Crosscutting issues

- There is a need to reinforce early warning systems on the scarcity of feeds on rangelands (surveillance and monitoring) and to give owners of livestock timely advice on mitigating the impact of drought; and
- Organizing smallholder milk producers into dairy cooperative groups and subsequently into dairy unions is an appropriate strategy worth up scaling to increase milk production, the volume of milk consumed and marketed, and commercializing the subsistent type of smallholder milk production system. It has been proven in many countries collective actions facilitates dairy farm inputs and easily links producers to processors and distributors. It also creates "Business Hubs" at the levels union will help to provide all the required services and inputs (animal feed storage and formulation unit, AI and animal health services, milk chilling and processing facilities, mini milk quality control laboratory and credit facilities) in one place. Cooperatives and Unions need to be better organized and work together so that they can optimize their potentials and be able to exploit the available market outlets.

Taking the aforementioned recommendations, the government, and the related development partners should work with the population to overcome the constraints and commercialize the sector to internationally recognized standards.

Conclusion

Dairying constitutes an important part of the Ethiopian smallholder crop/livestock mixed farming system. The country is known to have the highest number of cattle in Africa, making it one of the biggest potential producers of milk and milk products in the continent. Despite this advantage, the industry is plagued with a number of constraints and the country remains a net importer of milk and milk products. The farmers are poorly organized into cooperatives and unions, while their products are sold at sub optimal prices.

The poor infrastructure network, inadequate provision of veterinary services and lack of continuous supply of animal feeds throughout the year are among some of the challenges faced by farmers in the field.

There is need for the government and its international development partners to invest in the dairy industry and transform the activity into a lucrative business, which will contribute to the GDP of the country through exportation of processed milk and milk products. Locally, the livelihoods of households will increase through increased consumption of milk and milk products under good hygienic conditions and appropriate value for their products, which will enable the farmers to purchase farm inputs and other household needs.

References

Ahmed MAM, S Ehui. and Yemesrach Assefa, 2004. Dairy development in Ethiopia. EPTD Discussion paper No. 123. International Food Policy Research Institute. Washington, U.S.A.

Council Directives 92/46 EEC, 1992. Laying down the health rules for the production and placing on the market of raw milk, heat-treated milk and milk-based products. Official Journal of the European Communities, No L 268/1.

CSA. 2010a. Agricultural Sample Survey. Livestock, Poultry and Beehives population (private peasant holdings). Federal Democratic Republic of Ethiopia Central Statistical Authority (CSA), Addis Ababa, Ethiopia.

CSA. 2010b. Agricultural sample survey. Report on crop and livestock product utilization. The Federal Democratic republic of Ethiopia, Central Statistical Agency (CSA). Private Peasant Holdings. Statistical Bulletin 468, Addis Ababa, Ethiopia.

Davis K, B Swanson, D Amudavi. 2010. In-depth Assessment of the Public Agricultural Extension System of Ethiopia and Recommendations for Improvement. IFPRI Discussion Paper 01041, December 2010. Eastern and Southern Africa Regional Office, Addis Ababa, Ethiopia. http://www.ifpri.org/sites/default/files/publications/ifpridp01041.pdf

Emana B. 2009. Cooperatives: a path to economic and social empowerment in Ethiopia. Coop Africa Working Paper No. 9. International Labor Office (ILO), Dare Salaam, Tanzania, 44p.

ENA. 2004. Milk, Dairy Products Loss Of Five African, Middle East Countries Stands At 90 Mln. USD, Ethiopian News Agency (ENA), Addis Ababa, 10/22/2004.

FAO. 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. 333 pp.

FAO. 2010. Status and prospects for smallholder milk production – A global perspective. *In:* Hemme T and J. Otte (eds).. ISBN 978-92-5-106545-7. Rome, Italy.

FAO. 2011. Dairy development in Kenya, by H.G. Muriuki, Rome.

Feleke G. 2003. Milk and Dairy Products, Post-harvest Losses and Food Safety in Sub-Saharan Africa and the Near East. A Review of the Small Scale Dairy Sector – Ethiopia. FAO Prevention of Food Losses Programme. FAO, Rome, Italy.

Felleke G and G Geda. 2001. The Ethiopian dairy development policy: a draft policy document. Ministry of agriculture (MoA), Addis Ababa, Ethiopia.

GRM International BV. 2007. Livestock Development Master Plan Study. Phase I Report – Data Collection and Analysis. Volume 1 – Dairy.

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-OHRLLS, 3-4 December 2009, Vienna International Center, Austria.

IFCN. 2011. Key findings of the 12th IFCN Dairy Conference 2011 in Kiel, Press release. Kiel, Germany. International Trade Center (http://www.intracen.org/exporters/trade-statistics/)

Lemma T, Tegegne A, R Puskur, P Ranjitha and D Hoekstra. 2008. Moving Ethiopian smallholder dairy along a sustainable commercialization path: missing links in the innovation systems: Improving Productivity and Market Success (IPMS) Project, ILRI, Addis Ababa, Ethiopia.

Mekasha Y. 2000. Impact of feed resources on productive and reproductive performance of dairy cows in the Addis Ababa milk shed. MSc thesis. School of Graduate Studies, Alemaya University of Agriculture, Ethiopia.

Muriuki HG and W Thorpe. 2001. Regional synthesis: Smallholder Dairy Production and Marketing in East and South Africa. In: Proceeding of the South-South Workshop on Smallholder Dairy Production and Marketing – Constraints and Opportunities. March 12th-16th, 2001, Anand, India. NDDB (National Dairy Development Board) and ILRI (International Livestock Research Institute).

O'Connor CB. 1992. Rural smallholder milk production and utilization and the future for dairy development in Ethiopia. *In:* Dairy marketing in Sub-Saharan Africa. Proceeding of a symposium held at ILCA, Addis Ababa, Ethiopia. 26-30 November 1990. International Livestock Center for Africa, Addis Ababa, Ethiopia. pp. 123-130.

QSAE, 2009. Ethiopian Standards, 2009 Catalogue. Quality Standards Authority of Ethiopia (QSAE), Addis Ababa, Ethiopia. 678 p.

QSAE. http://www.qsae.org/web_en/About%20Us/en_aboutQSAE.htm

SNV. 2006. Developing a Market Led Strategy for the Ethiopian Dairy Industry, by Technoserve Kenya, Nairobi, Kenya, 43 pp.

SNV. 2008. Dairy Investment Opportunities in Ethiopia. by TAM Consult, Netherlands Development Organization (SNV), Addis Ababa, Ethiopia, 59 pp.

Zelalem Yilma, E GuerneBleich, Desta H. and A Mugisha. 2011. Innovations, Actors and Linkages in the Ethiopian Dairy Value Chain. Proceedings of a National Workshop on Research-Farmer-Extension Linkage in the Dairy Value Chain of Ethiopia held on 29th May 2010. Food and Agriculture Organization of the United Nations, Sub-Regional Office for Eastern Africa., Addis Ababa, Ethiopia, pp. 34-56.

Zelalem Yilma. 2010. Quality Factors that Affect Ethiopian Milk Business: Experiences from selected dairy potential areas. Netherlands Development Organization, Addis Ababa, Ethiopia.

Improving Dairy Market through Products Diversification

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Introduction

Despite having 53.4 million cattle population that yield 4.1 billion liter of milk annually, and 1.1 million camels with 262.8 million liter average annual milk yield, (CSA, 2011a), Ethiopia has low per capita consumption of 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).

Milk is produced in all agro-ecologies in the country under pastoralist, mixed crop-livestock, peri-urban and urban production systems. Market oriented dairying is observed in the latter two production systems. Modern dairying in Ethiopia, as compared to neighboring countries, is young but growing in the past decade compared from its half-a-century history.

Addis Abeba is the largest city and seat for many national and international organizations and home for nearly 3 million people, which grows at 2.1% annually (CSA, 2011b). It is the largest dairy consumption area in the country. The pressing population growth and improved livelihood in urban centers calls for more supply of milk and other animal products for quality protein and other nutrients supplies. Many reports indicate that there is a seasonal gap between milk and milk products supply and demand in Addis Abeba. Most reports focus in either of the production or marketing aspects of the dairy sector in Addis Abeba and the lack information on market opportunities. This survey research was made with the objective of describing the milk value chain and exploring market opportunities available in Addis Abeba milk shed for the prevailing and prospective value chain actors.

Methodology

The study was conducted in Sululta and Degem districts from peri-urban setups and in Addis Ababa City for urban setup. Sululta and Degem districts are located in north of Addis Ababa at 40 km and 115 km, respectively. Selale areas including Sululta and Degem districts have altitude ranges of 2500 to 3000 meters above sea level. Annual rainfall of Selale averages at 1200 mm with minimum and maximum average temperatures of 6^{o}C and 21^{o}C, respectively. Both of the districts are known for their potential of milk supply to the central market in Addis Ababa.

Both primary and secondary data were used during this study. A value chain approach was followed and a cross-sectional survey was made to collect primary data using pretested semi-structured questionnaires following a rapid market appraisal along the milk value chain in Addis Abeba milk shed. Value chain actors interviewed include urban, peri-urban, and rural dairy producers, milk collectors, processors, retailers, and consumers. Structure questionnaires were developed to interview producers, collectors, retailers, and consumers while checklists were used for input suppliers (feed suppliers, veterinary service providers and AI service providers) and processors.

Stratified random sampling technique was followed to select various value chain actors for formal interview as outlined by NCSU (2008). Location was used to stratify producers into urban (40 households), peri urban (62) and rural (68). Simple random sampling was used to select thirty milk collectors in Selale area and 138 retailers (60 kiosks, 32 supermarkets, 31 milk shops, and 15 butter shops). Multi-stage purposive sampling was made to select consumers in Addis Abeba. First, five out of the ten sub-cities in Addis Abeba were selected purposely to include high, medium, and low living standard areas and peri-urban and urban areas. Secondly, forty households were randomly selected from each purposively selected sub-city to gather information on dairy products consumption behaviors and preferences. Milk value chain in Addis Abeba milk shed was described using simple descriptive and inferential statistical tools of SPSS 13 software to analyze quantitative data collected using structured questionnaires.

Results

Addis Ababa milk shed encompasses 150 km radius of milk collection mainly along the northern gates to Selale and Debre Birhan where more than half of the milk supplied to the city comes from. The milk value chain in this milk shed is presented in Figure 1. The milk value chain in Addis Abeba milk shed that stretches from input supply to consumption is described as follows.

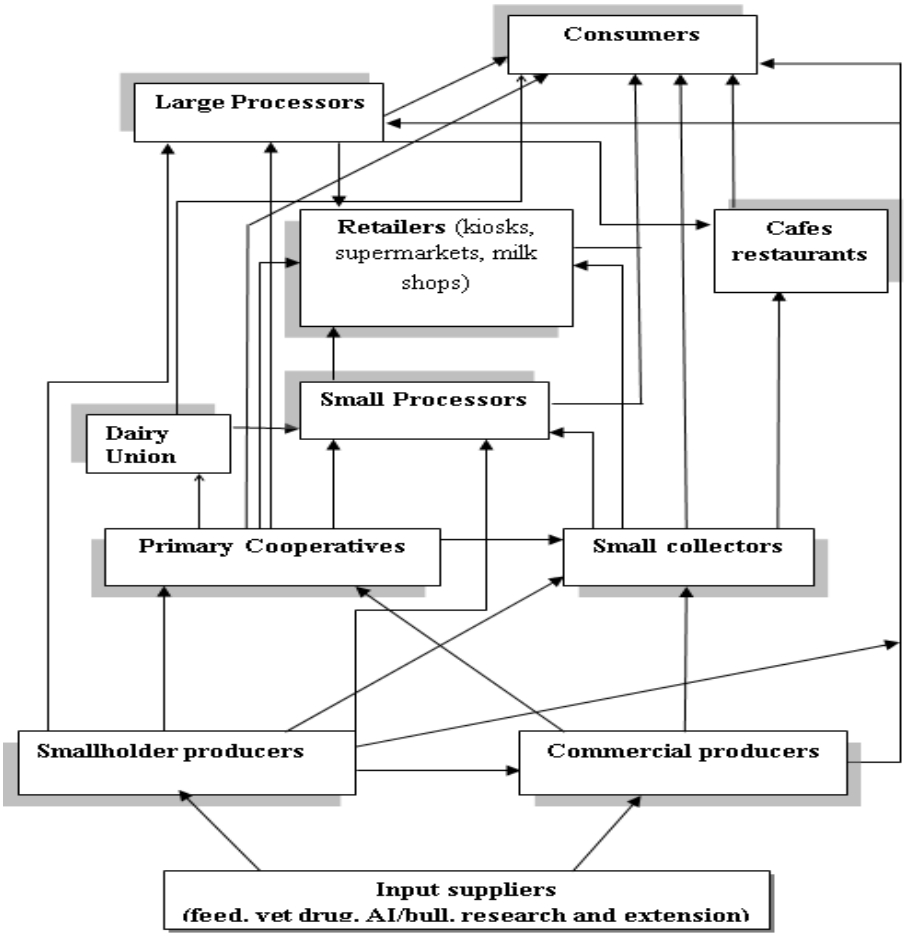

Figure 1. Milk value chain map of Addis Ababa milk shed

Input supply

Major inputs to small or large dairy farmers include feeds, veterinary services, and AI. The input supply system can be described as dominantly provided by the government. Commercialized input supplies are very few and mostly operating under small-scale targeting niche markets.

Major feed sources to dairy cattle in peri-urban and rural farms are grazing, crop residues and agro-industrial by-products, the former constituting 82% (Felleke and Gedda, 2008). Most of producers in the current study, however, use hay (90%, N=153), crop (71%, N=121) residues and grazing (34.1%, N=58) as basal diets for their dairy cattle based on the availability of the feed resources. Among the producers, 83.5% (N=142) supplement their dairy cows with agro-industrial by-products. Inaccessibility of feed for most producers (54.1%), high prices, and consequent un-affordability (56.5%) along with instable and ever increasing price is making the business of dairying a difficult venture. There are a handful of feed processors, not more than 20, (EDDP, 2011) with capacities ranging from 5 tons per day to 30 tons per hour most of which have limited radius of distribution for the shortage of raw materials demand. Feed distribution agents are concentrated in urban and peri-urban areas. Some primary cooperatives distribute concentrate feeds to their members to be later deducted from payments for milk supplied to recover costs of feed and its transportation from areas of production. Feed costs comprise of up to three quarters of cost of milk production in the area studied.

Veterinary services are solely supplied by the government extension service in rural areas. Private veterinary service providers are in control of most of the peri-urban and urban commercial dairy farms. Veterinary service is the least commercialized among inputs of dairying with provisions limited to drug vending. Government veterinary services are constrained by inadequate budgets; thus, services are limited to vaccinations provided free and diagnosis to diseases that can be handled without laboratory tests. Most producers rate the service delivered by the government as inadequate and that of private sector as with expensive and with limited outreach.

AI service is also delivered primarily by the government, even though its quality and efficiency is questionable for the farms located at longer distances from district towns. Private AI service provision is emerging in

recent years to supply to the unmet demand by dairy producers. The National Artificial Insemination Center (NAIC), governmental, and Addis Livestock Production and Productivity Improvement Service (ALPPIS), private venture, the available registered suppliers of semen for government, non-government and private inseminators and breeding institutions. Following the privatization of state ranches that used to supply crossbred and grade heifers there is an acute shortage of breeding stock for dairy farmers leaving AI the only affordable option for breed improvement. Strengthening AI service supply, in line with the above-mentioned inputs, is of paramount importance to improve milk supply to market.

Milk production

Milk is produced under four dairy production systems in the country, namely pastoralist, mixed crop-livestock, peri-urban and intra-urban production systems. The latter two are engaged in formal milk market chains (Van der Valk and Tessema, 2010). Addis Abeba milk shed is a characteristically beneficiary of all production systems even though pastoralist production system comprises of insignificant amounts. Milk from cows dominates in Addis milk markets. The small surge of camel milk to Somali refugees in Bole sub-city comes from the rift valley camel herders, again, informally. In rural, peri-urban, and urban areas sampled in the current study, cows are the only animals kept for milk production. The same author characterized milk production in Addis Abeba milk shed as small, which is in agreement with the current study, in which close to 70% of the respondents keep less than three crossbred cows.

Most of the respondents' (77%) production suffers from seasonal fluctuations following dry and wet seasons' availability of feed. This is explained by the abundant feed resources utilized by producers in the current survey, which are hay, crop residues and grazing, all products of rainfall. No experience of silage making was observed in the current study, a technology that could solve seasonality in feed supply and consequently milk supply. Market outlets for producers in the current study include collection centers or cooperatives (31.2%), neighbors (20%), hotels and restaurants (12.9%) and processors (10.6%) indicating the dominance of the informal market chain in the current study area. Farm gate prices range between US$ 0.27 in rural to US$ 0.59[1] in peri-urban and urban areas.

[1] *US$:Birr = 1:17.5 on average during the study period that extended from September 2010 to June 2011.*

Milk collection

There appear to be three types of milk collectors in Addis Abeba milk shed, namely dairy cooperatives, processors, and private collectors. In Selale a dairy cooperatives union exists, being an umbrella for some 27 primary dairy cooperatives located along the road from Addis Abeba to GohaTsion, commonly known as Gojam road. Milk is collected twice a day and quality controls during collection are limited to plat-form tests of lactometer reading and alcohol tests. Cooperatives face seasonal market shortage for the collected milk. Milk surges reach peak during the main rainy season, which extends from mid-June to early-October. During this time, milk is surplus and farmers are subject to stricter plat form tests and delivery time. Milk price setting takes place at this node of the Addis Abeba milk shed. Farmers are told what their produce is worth to the collectors and there is apparently no negotiation and no written agreement in most, if not all, cases. Price differentiation based on quality of milk is a recent idea practiced by only one processor, whereas the rest of the collectors use similar rate for milk of varying quality. There is an unhealthy competition for raw milk among processors, which is based on quality preferences. In this case, for example, one accepts what the other rejected for inferior quality.

Processing

Only 2% of the total national milk production reaches the formal market according to Van der Valk and Tessema (2010). Table 1 below presents top ten of the milk processors that are responsible for the above mentioned formal milk market share. Collectively, there is more than 40 % gap between installed and attained capacities of these processors. Processors face problems of inferior quality milk supply, time mismatch between production surplus and market demand, high tax rates for value added products and shortage of local input suppliers. Their technology usage is limited to non-concentrated not sweetened milk products with relatively short shelf lives, such as pasteurized milk and yoghurt, as compared to the imported diversity of concentrated and highly quality products like powder milk and hard cheeses.

Table 1. Top 10 milk processors in and around Addis Abeba, products range and operational capacity

Dairy enterprise	Product range*	Installed capacity (liters/day)	Attained capacity (liters/day)
Lame Dairy Processing (former DDE)	PM, Cr, B, Ch,	60,000	30,000
Sebeta Agro Industry (Mama Dairy)	PM, U, Y, Ch, Cr, B	35,000	30,000
MB PLC (Family Milk)	PM, Y, Cr, B, Ch,	15,000	7,000
Yadeni Dairy Farm (Bora Milk)	PM, Cr, B, Ch,	15,000	7,000
Ada'a Dairy Cooperative	PM, Cr, B, Ch,	15,000	3,000
Lema Dairy	PM, Cr, B, Ch,	10,000	3,000
Berta and Family plc	Cr, Ch	9,000	6,000
Genesis Farms	PM, Cr, B, Ch, Y	4,000	4,000
Holland Dairy	PM, Cr, B, Ch, Y	4,000	4,000
Ruth and Hirut Dairy Farm	Cr, B, Ch, Y	4,000	4,000
Total		**171,000**	**98,000**

***Note:** *PM = pasteurized milk, U = UHT milk, Y = yoghurt, Cr = Cream, B = butter, Ch = cheese*

Retails

There are 644 supermarkets, registered by the municipal office, of which only 98 have dairy corners. Specialized milk shops and butter shops registered amount to 188 and 326, respectively (personal communication)[2]. There are more than 2,500 kiosks who also take part in selling pasteurized milk in pouches of 500 ml. Majority of the retailers interviewed, 96% of milk shops, 93% of supermarkets and 72% of the kiosks, have cooling facilities to maintain keeping qualities of milk products they sell. The figure is only 23% for butter shops that sell traditional cooking butter. Supermarkets sell a wide range of dairy products including, infant formulae, powder milk, flavored and plain yoghurt, ice cream, cream, table butter, hard cheeses and UHT milk most, which are imported and targeted for upper class consumers. Milk shops sell raw milk, *Ergo* (traditional sour milk), cooking butter, and *Ayib* at affordable prices to medium and low-income group consumers.

Consumption

Utilization pattern of milk and milk products by sampled consumers in Addis Ababa is given in Figure 2. Fluid milk is mostly consumed followed by butter in Addis Abeba. Raw milk is purchased more than pasteurized milk for its lower cost and availability on contractual basis. Consumption of raw whole milk dominates in Addis Abeba milk shed signifying the abundance of the informal market chain. Considering

[2] *Personal communication with Addis Abeba City Administration's Modern Trade Promotion Office in December 2011. The figures represent only nine of the ten sub-cities.*

health issues associated with the consumption of untreated milk, the situation in Addis Abeba milk shed urges the attention of stakeholders. Pasteurized milk is currently sold for US$ 0.8 -1.02 in Addis Ababa which, according to interviewed consumers is not affordable to purchase in a regular basis and forces them to choose raw milk from the informal sector. Another characteristic feature of milk consumption in Addis Abeba is seasonal fluctuation between fasting and non-fasting months of Christians especially the Ethiopian Orthodox religion followers. Collectively there are 210 days of fasting in a given Orthodox Christian calendar every year (EOTC, 2011). However, of all these days those that are strictly fasted are 170, according to EOTC (personal communication).

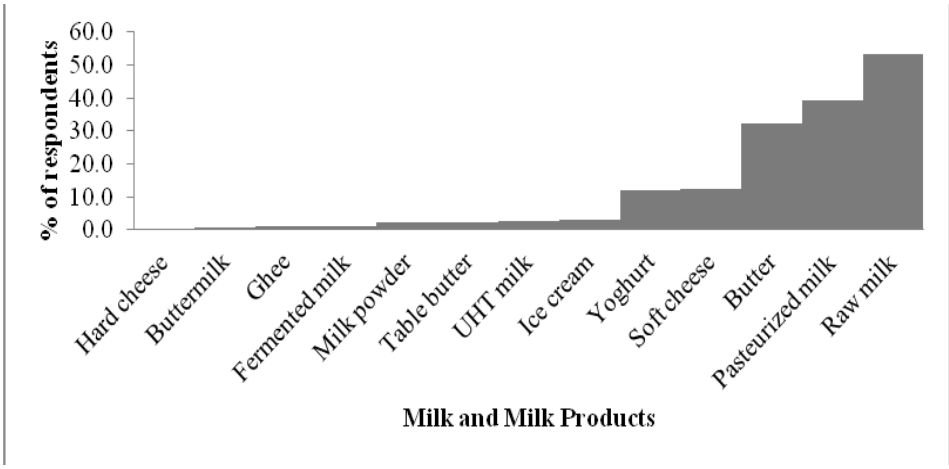

Figure 2. Milk and milk products utilization of responding households in Addis Ababa

Imports

Ethiopia has been increasingly in negative milk and milk export balance in the past few years (Yilma *et al*, 2011). Regardless of tax rates as high as 30 to 55% on imported dairy products in the form of duty rate, sur tax and VAT, (SNV, 2008), dairy imports amounted to US$ 10.33 million in 2009 (FAOSTAT, 2009). Main types of milk products that inflated import expenses are milk concentrates in the form of powdered milk that constitute 92%. The fact that there is no milk powder line in the milk processing plants coupled with the ever increasing demands for child formula and ordinary milk powder in the city increased dairy imports to respond to the demand.

Discussion

Severe shortages, low quality and seasonal unavailability of feed are the major constraints to livestock production in general and dairying in particular in Ethiopia (Ahmed *et al*, 2003). Rural-urban feed market route is observed to be unorganized and informal. Soaring feed prices destabilize milk price along the value chain even though the role of whole milk price fixing is played by the large processors and collectors. Emerging private input supply ventures need to be supported technically by deserve policy back for the dairy sector to be fully exploited.

More than 82% of milk produced in rural areas is consumed at home (Wouters and Van der Lee, 2010). This calls for institutional and policy focus in the dairy sector to formalize milk market chains in order for the benefits from the sector to be maximized. Addis Abeba milk shed has the longest history of modern dairying and formal market chain in the country, yet most of milk purchased by consumers in the current study is in its raw form posing health risks.

Long fasting periods pose great challenge to all actors of the milk value chain considering the drop in demand and the perishable nature of milk and milk products locally processed. There is a peak in demand after fasting periods while supply suffers a dip during the dry periods (Van der Valk and Tessema, 2010). Provided there are long-life milk products processing lines, like UHT and powder milk, these fasting periods offer an opportunity for bridging gap in demand and supply during such slack dry periods and exporting surplus. Ethiopia is a member of Common Market for Eastern and Southern Africa (COMESA) and East African Community (EAC) countries that offers the opportunity for regional trade with taxes ranging between 0–10% (SNV, 2008). This opportunity has regional connotation and deserves due consideration from the dairy stakeholders of the country as well as the region.

Large amounts of dairy imports (FAOSTAT, 2009) are observed indicating unmet quality and quantity demands of consumers in Addis Abeba. Diversity of imported products in supermarkets shows promising market for local processors if they are produced with competent quality. Of course, this entails quality milk production and handling throughout the value chain for no quality product is produced from inferior quality raw material. The local availability of processing technology inputs is

also one factor that needs to be considered by stakeholders of the sector, both public, NGOs and private.

Conclusion

There seems to be an unmet and growing demand for fresh milk in urban centers whereas processing plants operate at under-capacity and smallholder farmers far from the urban centers are challenged with market shortage for their surplus production. From the results of this study and similar studies apparent market opportunities in the dairy sector with due focus on post-collection end of the chain are as follows

- Specialization in input supply system to favor market off-take and solve problems of scale. This encompasses input suppliers to the producers, collectors, processors and retailors in the form of feed, vet supplies, AI, equipment and consumables;
- Initiation of quality based payment to enhance quality of milk supplied to processors at the same time as encouraging smallholder producers to produce more and quality milk;
- Products with longer shelf-life like powder milk and UHT to bridge the slack in demand during fasting periods, even to export to regional markets;
- Development of new products with more benefits, such as yoghurts of different flavors and milk snacks in suitable packages for out-of-home consumption. This will stimulate payment differentiation according to quality and the development of voluntary industry standards reducing food safety risks;
- Upgrading of traditional products such as *Ergo (*fermented milk), *Ayib* (cottage cheese) and *Nitir-qibe* (ghee) with new brands to improve alternative for market incursion by artisanal processors and dairy cooperatives; and
- Advancement of modern products made by small and large processors to the standards of imported products. Conducive packaging sizes that consider family size and price affordability offer wider perspective of market segments.

Through exploiting the market opportunities outlined above, all actors of the value chain in consideration are expected to change the current underdeveloped dairy sector to a modern and market-led one. For this to take place stakeholders should join their current dispersed efforts and orient them in a value chain perspective so as to bring about a coherent set of activities all for the objective of creating a win-win sustainable value addition and marketing of milk. Further periodic researches should be conducted to monitor changes in any aspect of the Addis Abeba milk shed in particular and all other developed and emerging milk sheds in the country is recommended to better understand prevailing situations,

forecast trends and plan sustainable dairy development policies and implementation activities.

References

Ahmed MM, S Ehui, Yemesrach Assefa, 2004. Dairy Development in Ethiopia, EPTD Discussion paper no 123, IFPRI. Washington D.C., USA.

CSA. 2007. Central Statistics Authority. Summary and Statistical Report of the 2007 Population and Housing Census Results. Addis Abeba, Ethiopia. pp 113.

CSA. 2011a. Central Statistics Authority. Statistical Bulletin. Agricultural Sample Survey (2010/2011). Part II. Report on Livestock and Livestock Characteristics. Addis Ababa, Ethiopia. pp 190.

CSA. 2011b. Central Statistics Authority. Statistical Bulletin. Population and Housing Sample Survey. Addis Abeba, Ethiopia. pp.70.

EDDP. 2011. Ethiopia Dairy Development Project. Dairy Business Directory. EDDP-Land O'Lakes-Ethiopia. Addis Abeba, Ethiopia.

EOTC. 2011. Bahre Hasab. Ethiopian Orthodox Tewahdo Church Official Website. http://www.eotcmk.org/site-en/index.php?option=com_frontpageandItemid=1 last accessed in September 2011.

FAOSTAT, 2009. Livestock and Fisheries Equivalents. Food and Agriculture Organization of the United Nations. http://faostat.fao.org/site/610/default.aspx#ancor last accessed in September 2011.

Felleke G and G Geda, 2008. A draft dairy policy paper. http://www.fao.org/fileadmin/templates/ags/docs/dairy/P1assessmentmainethiopia.pdf Last accessed in July 2011.

NCSU. 2008. Survey Research. North Carolina State University Library. last accessed in July 2008 http://www2.chass.ncsu.edu/garson/pa765/links.htm

SNV. 2008. Study on dairy investment opportunities in Ethiopia. SNV-Ethiopia, (Netherland Development Organization. Addis Abeba, Ethiopia.

Van der Valk O and Tessema A. 2010. The formal dairy chain of Addis Abeba; an analysis of the integration of small-scale farmers. Wageningen UR. Hague, the Netherlands. pp 78.

Wouters B and J Van der Lee. 2010. Pathways to growth: Outlook for dairy development in Ethiopia. Background paper for national workshop on "Enhancing Dairy Development in Ethiopia". Wageningen UR, The Netherlands.

Zelalem Yilma, GB Emannuelle and S Ameha, 2011. A Review of the Ethiopian Dairy Sector. *In:* Rudolf Fombad (ed) Food and Agriculture Organization of the United Nations, Sub Regional Office for Eastern Africa (FAO/SFE), Addis Ababa, Ethiopia, pp 81.

Marketing Milk and Value Added Dairy Products

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Introduction

Livestock production is an integral part of Ethiopian agricultural system contributing for 12-16% of the total GDP, 30-35% of total agricultural GDP and 60-70% livelihoods of the Ethiopian population (SNV 2008, Getnet 2009). Livestock products are also among the most important commodities used for export and foreign currency earnings of the country in addition to the local consumption. For instance, skin and hides are famous export commodities of animal origin among others.

Owning the largest cattle population in Africa estimated at 53.4 million (CSA 2011), Ethiopia ranks tenth largest cattle owning country in the world. Hence, Ethiopians have older tradition of production and consumption of milk and various dairy products. The issue of livestock development in Ethiopia is therefore, highly important not only for its contribution of the livelihood improvement of numerous Ethiopians but also as it has a significant role for economic development of the country. Because of continued effort to increase production and productivity of the livestock sector, therefore, the number of cattle in the country is increasing from time to time and production of milk and other dairy products is increasing in the last consecutive years. For instance, the amount of cattle milk production in 2010/11 alone was estimated at 4.06 billion liters (CSA, 2011).

However, the per capita consumption of milk in Ethiopia remains one of the lowest (16–19 liter) in the world. This may be related with marketing status and demand and supply gap of dairy products across the country among others. There are surplus producing localities in one side and shortages in the other parts of the country mainly in the urban centers. Some reports indicated that only 5% of the milk produced in the country is marketed (Felleke, 2003) while the remaining part is used for home consumption in different forms. Only 6.55 % of the annual milk

production was marketed at national level (CSA 2011). There is also variation of marketing practice and prices from place to place for milk and its products. Consumers living in and around urban centers in the country buy milk for variable prices from producers and processing companies around the capital.

Although there are initiatives of developing dairy cooperatives and unions, formal markets are limited to the localities of peri-urban and urban localities. These localities are relatively improved with market infrastructures and facilities to keep dairy products fresh. Milk marketing and pricing conditions, however, need to keep improving in order to keep the sector successful. This piece of work as a part of exploiting market opportunities for milk and meat products, is therefore, conducted to assess present marketing conditions, costs and pricing margins for milk and dairy products in and around Addis Ababa.

Methodology

Study area

The study was conducted in urban and peri-urban setups of Addis Ababa city and Selale areas. Two districts namely Sululta and Degem were purposively selected from Selale area of the peri-urban setups. Addis Ababa City was studied to get proper information as an urban setup and terminal market for milk products. Sululta and Degem districts are located in north of Addis Ababa at 40 km and 115 km, respectively. Selale areas including Sululta and Degem districts have altitude ranges of 2,500 to 3,000 meters above sea level. Annual rainfall of Selale averages at 1200 mm. The average of minimum and maximum temperature in the area varies between 6^{o}C and 21^{o}C, respectively. Both of the districts are known for their potential of milk supply to the central market in Addis Ababa. Addis Ababa is located in the heart of Ethiopia at an altitude of 2,400 meters above sea level. The average annual minimum and maximum temperature varies between 1^{o}C and 26^{o}C, respectively and the average annual rainfall in the capital is recorded as 1115 mm.

Data collection

The study was conducted following a value chain approach in order to collect all the desired information. Both primary and secondary data were collected and used for this study. Cross-sectional survey was made to collect primary data using pretested semi-structured questionnaires

following a rapid market appraisal along the milk value chain in Addis Abeba milk shed. The value chain actors interviewed including dairy cattle (milk) producers (170), milk collectors (29), processors (2), retailers (134), and consumers (198). Semi-structured questionnaires were developed to interview producers, collectors, retailers, and consumers while checklists were used to gather data from input suppliers and processors. Only marketing and pricing related data are used for this particular report.

Sampling and data analysis

Stratified random sampling technique was followed to select various value chain actors for formal survey. Locations were used in order to stratify producers into urban and peri-urban groups. Simple random sampling was used to select thirty milk collectors in Selale area and 134 retailers (60 kiosks, 32 supermarkets, 31 milk shops, and 15 butter shops). Multi-stage purposive sampling was made to select consumers in Addis Abeba. Five out of the ten sub-cities in Addis Abeba were selected purposely to include high, medium, and low living standard areas and peri-urban and urban areas. Milk value chain in Addis Abeba milk shed was described using simple descriptive and inferential statistical tools of SPSS software version 13 to analyze quantitative data collected using structured questionnaires.

Results and Discussion

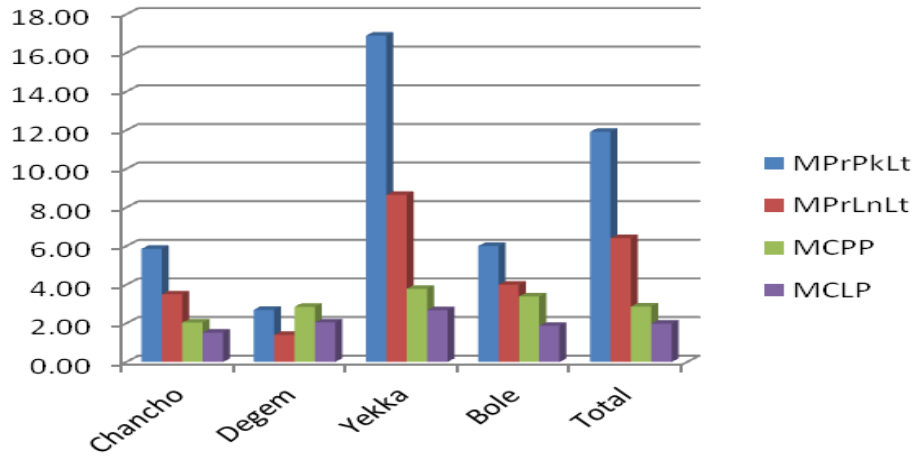
Milk Production

In peri-urban areas of Addis Ababa city, dairying is one of the most important agricultural practices favored over crop production due to the low productivity of cropland, high potential of the area for dairy cattle production and better access for marketing of milk and dairy products. Traditional milk production system, which is dominated by indigenous breeds of low genetic potential for milk production, accounts for about 97% of the country's total annual milk production (Felleke, 2003). Yet in Selale area, most of the households raise cows for dairy purpose and cattle ownership per household averages at 3.83±0.85 for local cows. Likewise, the number of crossbred dairy cows owned by households averages at 4.67±0.58, a little bit higher than local cattle per family. This indicates that more crossbred dairy cattle are kept in the peri-urban areas of Selale plains for milk production and livelihood improvement. This might also suggest that dairy cattle production is becoming important

activity for the resource poor people to earn income for their staples of daily requirements.

The average daily milk yield of local cows in Selale area was 2.24 liters while it was 10.78 liters for crossbred cows. The study also showed that bigger number of producers keeps crossbred cows for milk production and gaining substantial profits than the local cattle owners. Moreover, the average lactation length for the local cows was 6 months while it was 9 months for the crossbred cows in Selale area.

Liquid milk is mainly used for family consumption followed by selling it for fetching additional farm income. However, milk fat is the most valuable component in economic terms and butter is the most expensive dairy products marketed in Ethiopia. In addition to butter and liquid milk, cottage cheese and traditional yoghurt are commonly marketed dairy products in urban and peri-urban parts of Ethiopia; related with liberalized markets, involvement of the private sector and promotion of smallholder dairy sector (Ahmed *et al*., 2004).



MPrPkLt = Milk production in peak period in liter; MPrLnLt = Milk production in lean period in liter; MCPP = Milk consumption in liter in peak period; MCLP = Milk consumption in liter in lean period.

Figure 1. Seasonal variation in milk production and consumption in and around Addis Ababa

The result also shows that milk production in the study area varies across seasons in relation with the factors such as feed availability and favorable

climatic conditions for dairy cows. For instance, 57.6% of respondents indicated that the months starting from September to November represent the main season for peak milk production in peri-urban setups of Selale districts. In these months, there are varieties of green feeds available for dairy cows following the peak rainy season and climatic conditions also becomes favorable for dairy cattle production. About 47.6% of respondents from the urban production system and most of the peri-urban producers also indicated that months running from September to December are peak periods for milk production in their farms. However, another 52.4% of the respondents among the urban category indicated that the peak milk production season in their farms are different from previous respondents which involve months of June to September, which are peak rainy seasons. In either response, one can see that season of better moisture favors higher green feed, which in turn favors dairy cattle production and milk yield improvement since there is much green feed and water during this period.

The average milk production during peak season reaches about 12 liters per cow and in lean period, it drops as low as 6 liters (Figure 1) for crossbred dairy cows. As the production pattern varies over peak and lean period, the consumption condition also varies and the marketing and pricing condition varies accordingly. This also affects profitability of dairy cattle producers and creates reduced market demand for dairy products in peak production and fasting seasons. The survey result also shows high correlation between production and marketing pattern of milk at 0.01 levels across seasons and marketing conditions. Production and market price are inversely related where in peak production seasons, milk price goes down by 30–40% in the study areas.

Market access and marketing condition

In addition to the seasonal variation of milk production, the access to market varies from place to place. Especially market distance was one of the most important reasons contributing for the variation of milk and dairy products price in the study area. The result shows that there are many producers with substantial amount of production but with minimal market access mainly in the distant peri-urban setups including those travelling for more than 5kms. Almost all of the respondents travel either for less than 1km, 1km, or even up to 10km and more in order to sell their milk at the collection points (Figure 2).

Producers closer to the milk collection center or marketing point can easily supply their milk and earn market price as compared to the distant farmers. On the other hand, producers from distant places may not be able to supply milk with desired quality to the collection point. This could be attributed to either poor handling practice after milk production or exposure of the milk to the ambient temperature during bringing it to the collection center. Thus, the milk may occasionally be rejected due to failing to pass alcohol test used for the quality check at the point of collection. Therefore, establishing additional milk collection points in reasonable distances apart and improving cooling facilities at least at the collection centers may improve the volume of milk delivered, its quality and shelf life of dairy products.

Cooperatives and private collectors collect and supply milk directly to the processors. The later have more bargaining power to regulate and set the price based on seasonality and demand for dairy products in the market centers. Now days, however, cooperatives are also starting to sell their products directly to the consumers in Addis Ababa market. This also creates additional market opportunity for their dairy products and competitiveness in the dairy value chain.

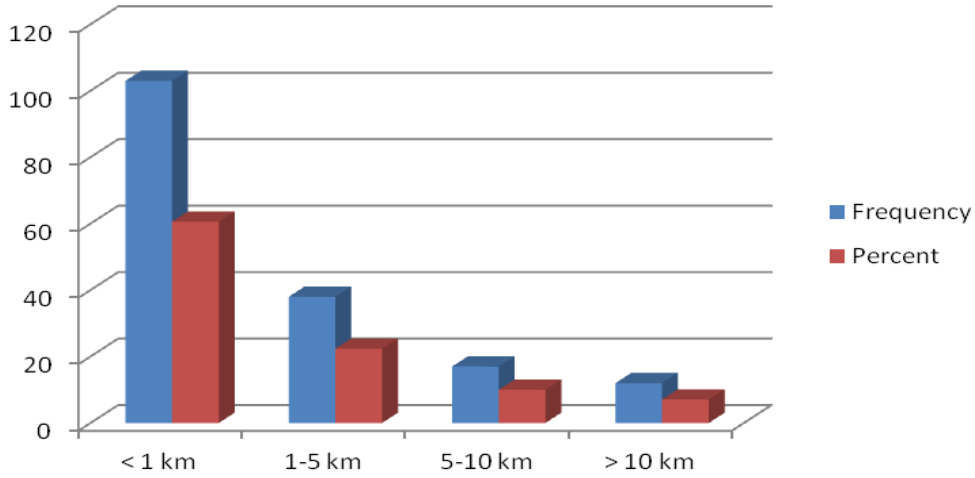


Figure 2. Distance of the collection point from the farm gate points of the producers

Market preference and mode of payment

Most of the producers (54.7%) prefer to sell milk at their farm gate (Figure 3). However mostly they travel to considerable distance and sell their product (Figure 2) for similar prices due to the lack of access to the marketing centers and collecting points. Producers get their money in the mode of contractual payment usually once in every two weeks and sometimes on a monthly basis. Producers prefer to sell in the farm gate in order to get immediate cash income and sometimes better market price when they sell to the neighborhood. On the other hand, assuming that cooperative collectors and/or processors are more sustainable than the farm gate customers, farmers prefer to sell milk in either of the market place. Therefore strengthening the cooperative collection centers in the distant localities where the road facilities are available may create not only better opportunity and market access to the farmers but also it can benefit many smallholder producers lacking access to market.

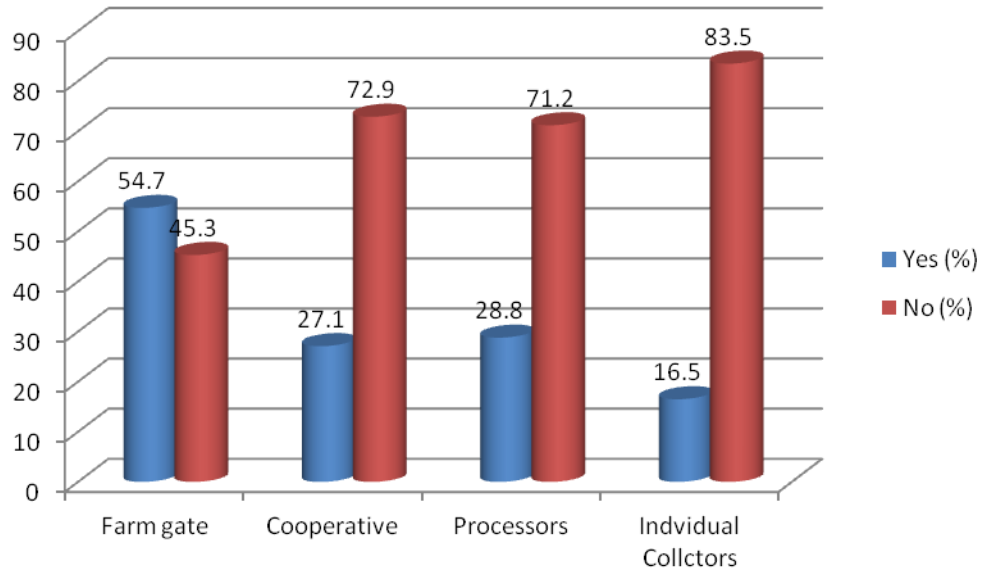


Figure 3. Market places preferred by producers

More than 75% of the respondents prefer to sell their dairy products without further processing. This is attributed to the fact that selling raw milk can fetch immediate financial requirements for their daily needs. In addition to this, comparing current prices of processed dairy products such as butter and ayib with the prices of equivalent amount of fresh milk sold, selling fresh milk can be more profitable than processing it in to further dairy products. For instance, one kg of butter can be obtained

from about 21 liter of whole milk whose fat content is 3.5% around urban and peri-urban areas of Addis Ababa. From this amount of milk, one can also get about 3kg of additional ayib, traditional Ethiopian cottage cheese. Current price of butter around Selale averages at 110 Birr/kg and ayib is 10 Birr/kg. Current price for whole milk around Selale is 7.00 Birr/liter. Thus selling fresh milk, producer can get 147.00 Birr out of 21 liter. However, processing milk in to butter and ayib, the producer gets 140.00 Birr only from 21 liter. Thus, without considering labor and time spent for processing, producers may lose about 7.00 Birr if they sell processed dairy products produced from equivalent volume of milk. Therefore, they prefer to selling fresh milk than processed products. However, this holds true as long as they think it is more profitable to them based on the prices of specific periods for dairy products. On the other hand, when the milk they supply to processors or cooperative collection center is rejected for various reasons, producers process it in to butter and ayib, which are more stable products and sell their processed products at various market points. This also creates additional market opportunities for producers.

Market options

Urban producers have options such as supermarkets, milk shops, restaurants, cafes among others to sell milk and milk products they produce. Previous report also indicates that colleges and universities, hospitals, cafes and restaurants of big enterprises are among the institutional buyers of milk (Haile, 2009). Therefore, producers in the urban set-up have comparative advantage of market options and competence to negotiate and fix the price for their dairy products and relatively get good benefits out of them. However, for peri-urban producers, these market options are either not available or if available they are too limited and not easily accessible they have little option to negotiate for the market price of milk. This is also completed without negotiating with smallholder producers in the peri-urban set-ups. Therefore, it is important to help all actors work for mutual benefits and facilitate conditions for creating fair marketing conditions for dairy products.

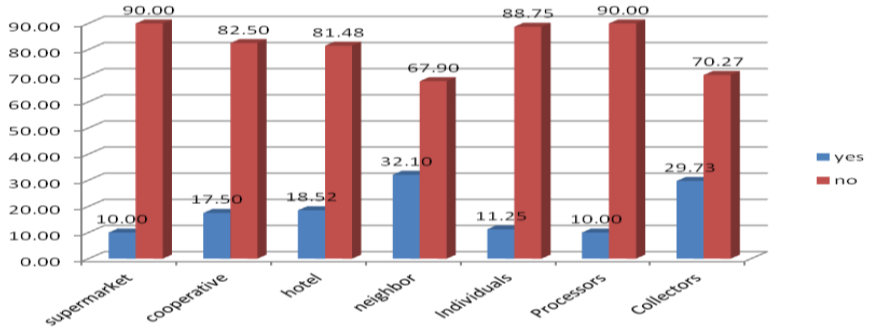


Figure 4. Proportion of butter and ayib market

The major buyers of milk products in urban producers include neighbors, collectors, cooperatives, hotels, supermarkets, and processers (Figure 7). However, for the peri-urban producers, cooperative collection centers and processors are the main buyers of their products.

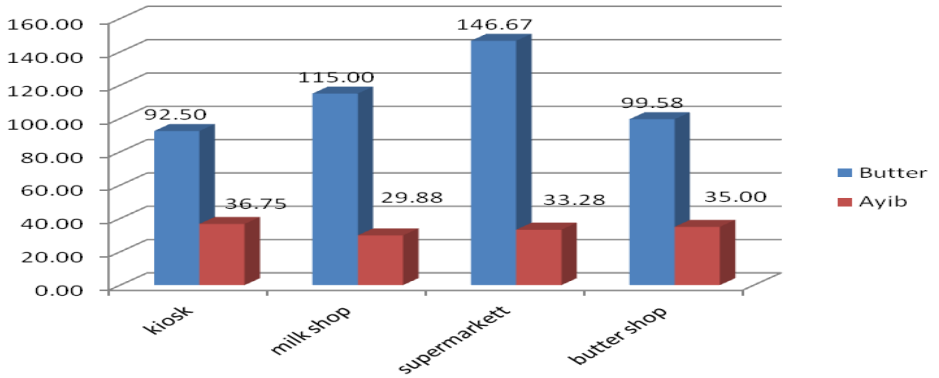


Figure 5. Selling prices of Butter and Ayib in different markets during the study time

Supermarkets, milk shops, butter shops, and kiosks in Addis Ababa market are among the main retailers of dairy products in the city. They purchase value added dairy products including milk either from urban producers, cooperative collectors, processors and/or individual collectors and sell to the final consumers. The selling prices for dairy products vary among these markets and from place to place within the city. The variation of the prices is attributed to the factors such as value addition costs, seasonal variation in milk supply from producers, cultural fasting season among Orthodox Christians and reduced demand for dairy products during that period among others.

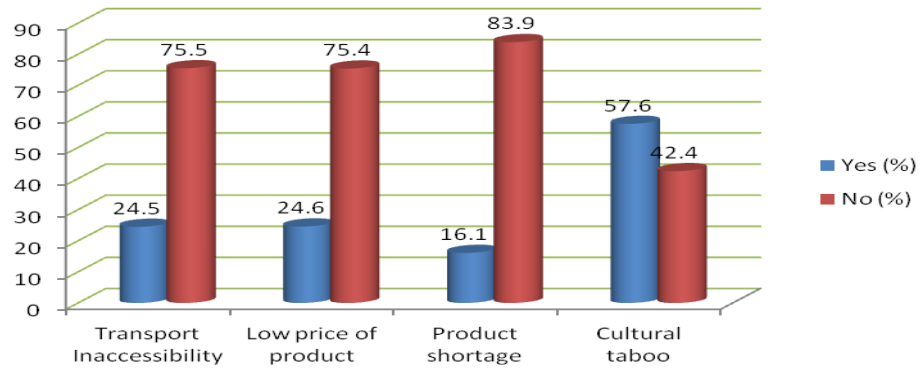


Figure 6. Some of the factors affecting market of processed dairy products

Main actors in the value chain

Processing plants, cooperative collection centers and local collectors, rural smallholder producers, peri-urban and urban dairy producers are major milk value chain actors involved in production, collection and retailing milk, and dairy products from producers. However, smallholder producers in the rural parts, lack the required technological, organizational as well as institutional capacity and they are less organized and distant from market outlets. They also lack economies of scale and institutions for risk management and face higher transaction costs (Lemma *et al*. 2008). Urban and peri-urban smallholder producers, on the other hand, are the main suppliers of raw milk to collectors and milk processors of different Scale. One of the major commercial processors, Sebeta Agro Industry, for instance, has its own dairy farm but depends on outside sources for more than 99% of its raw milk intake (Getnet, 2009).

The financial capability and power of collectors and processors for collecting and retailing dairy products differ among each other. Larger processors involved in collection and processing milk have more capabilities. However, they are not operating to their full capacity and each of them process only about 30,000 liters per day in to different dairy products.

Their main processed products include pasteurized milk, various type cheeses, table butter, and yoghurts. The daily collecting capacity for cooperative collectors averages 2000 liters. However, individual local collectors also collect on average about 500 liters per day. Collecting from the local smallholder farmers, these collectors sell the fresh milk

either to larger processors, or to the consumers at different market points such as milk shops, cafes, and restaurants. Among these collectors, processors and cooperative collectors are mainly operating in the 150 km radius from Addis Ababa.

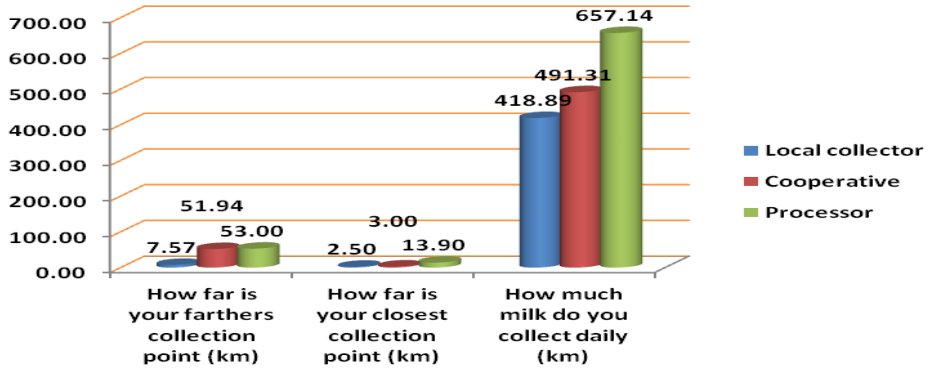


Figure 7. Collection distances and mean volumes of milk collected

Sources of milk and dairy products

Smallholder dairy producers in peri-urban areas within 150 km radius of Addis Ababa are the main source of milk for collectors and processors. According to the livestock Agency report (2009), Degem district alone for instance supplies over 11,654 liters of milk per day through different collection routes. The district produces about 25,335 liters per day and therefore over 13, 681 liters of milk is potentially available for further marketing (LA report, 2009).

All of the collectors involved in dairy value chain check for quality of milk using alcohol test and lactometer reading. The issue of quality evaluation is important not only to secure market demand for processed products but also to keep the safety of consumers. Therefore, about 93.1% of the collectors check for the quality of milk using alcohol test of varying concentration (68%, 72% and 75%) in order to estimate shelf life of milk after production and its potential heat stability for further processing. Moreover, most collectors (93.1%) use lactometers to check for milk density in order to evaluate adulteration with water or other materials. Furthermore, 75.9% of the respondents used organoleptic tests such color, odor and taste evaluation as quality check during collection of milk from smallholder producers. When they find the milk is with

inferior quality based on their requirements, collectors refuse to accept and thus 79.3% of the respondents showed that their milk has been rejected by their customers in different times during collection. Apart from rejecting the milk with inferior quality, some collectors responded that introducing quality based payment system could create positive spirit of competitiveness and improve production of good quality milk. Some experiences from Chacha area in north Shewa Zone of Amhara Region (personal communication) by private milk collector showed that quality based payment focusing on lactometer reading to estimate milk fat has improved the production of good quality milk and it can be taken as a good example and alternative opportunity for milk marketing system.

Once milk is collected, it is either processed or sold to consumers at market places including milk shops, kiosks, supermarkets, hotels, and restaurants among others. As these markets supply final products to the consumers, they also seek and check for the quality of milk using alcohol test and lactometer evaluation methods before buying from collectors. Hence, 48.3% of collectors indicate that they faced rejection of milk by their customers in different times during they supply to the retailers. This indicates that inferior quality milk might have been mixed with the bulk collected from different producers and contamination continues. On the other hand, poor cooling facilities and higher ambient temperatures also may render for reduction of milk quality by developing acidity due to continued activities of lactic acid bacteria in milk.

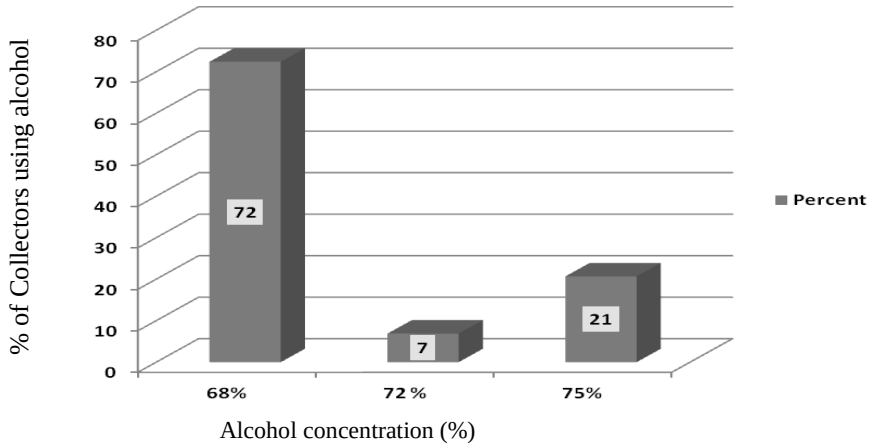


Figure 8. Concentration of alcohol used

Marketing scheme

Milk and dairy products usually marketed informally. However, as cooperative and private collectors are coming in to the business, formal marketing is also at the start around peri-urban areas. Producers sell their milk product to cooperative collection centers, processors, or individual collectors. Private collectors and processors are financially stronger actors in the dairy value chain and decide on price for milk in order to collect as much milk as they want to supply the requirements. Other collectors such as individuals and cooperative collection centers decide collection price for milk based on the price stated by processors and assuming their possible benefit margins. As processors are also the final markets for cooperative collection centers, which belong to the farmers, they set the quota and limit the number of liters collectors can supply to them. By doing so, they collect directly from farmers with better price (usually 0.25 Birr increment over other collectors). This condition creates options for producers to sell their products to either market (processors or cooperative). Nevertheless, it may also affect the competitiveness of cooperatives and ultimately may weaken the income of farmers and reduce productivity of the sector. Therefore, concerning actors should come together and work in order to get mutual and fair benefits in the dairy value chain.

On the other hand, as the cooperative collectors fail to collect and supply much milk to their bigger customers due to the quota limits, the price of milk goes down and the income of smallholder producers also drop accordingly. Consequently, dairy farmers loose the interest to continue in the business and the productivity of the sector decreases. Among several predisposing factors for reduction of seasonal demand for milk and dairy products, fasting season of Orthodox Christianity contributes much. In addition to this, lack of facilities and capacity to process surplus milk during this season in to more stable dairy products can be considered as one of the important reasons. Therefore, strengthening the capacity of cooperatives to process milk in to more stable products with superior quality and facilitating marketing centers for them in urban market may contribute to improve dairy market conditions and help to increase productivity of the sector in the sustainable manner. Moreover, it is imperative to strengthen the capacities of larger processors to process milk in to further stable products such as milk powder and UHT milk, which can be stored and used for longer time.

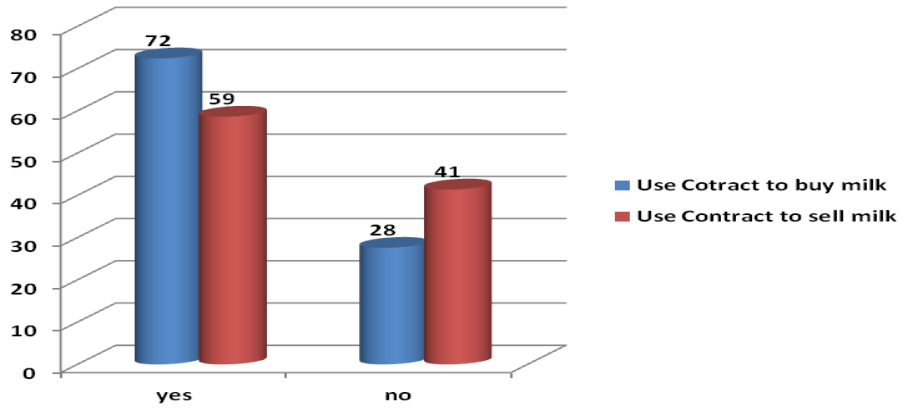


Figure 9. Modes of milk marketing

Responses of collectors

The mode of purchase during milk collection is based on either direct cash sale or on contractual basis (Figure 9). Especially processors and cooperative collection centers collect milk from producers on contractual agreement and pay to them on the basis of twice per month or sometimes once per month. However, sometimes collectors fail to pay on the right time to their customers and, according to some respondents, this condition also affect the farmers' income and interest to continue in the dairy business.

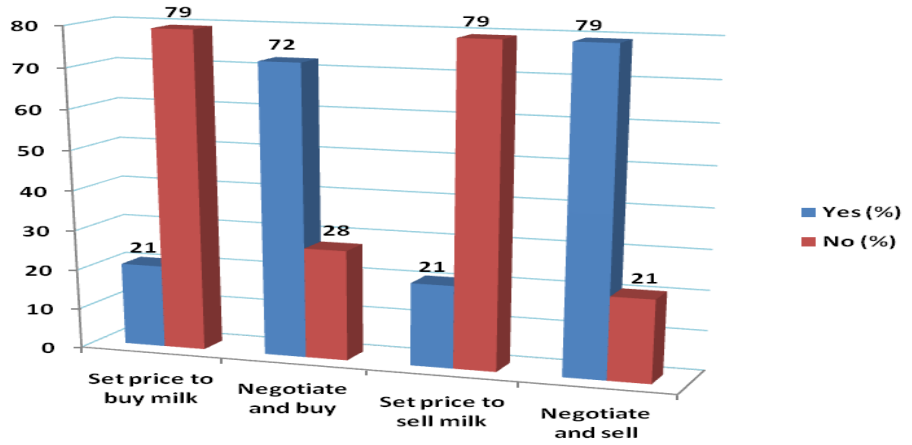


Figure 10. Setting prices for milk marketing

On the other hand, the urban producers usually decide price for the milk they produce. This is because of their access to the central market and

opportunities to sell their products to either of their customers including milk shops, individuals around their neighbors, cafes, and restaurants that are the major market options for urban producers (Table 1).

Table 1. Recent actual prices of some value added dairy products in Addis Ababa

Market	Raw milk per liter	Pasteurized Milk per 500ml pouch	Ergo per 500ml	Butter per kg	Ayib per kg
Kiosk	12.75	12.69	9.5	97.5	36.75
Milk shop	11.43	10.5	10.9	115.0	29.875
Super Maret	15.00	12.95	15.35	146.0	33.284
Butter shop				99.0	

Milk price and its changing trend

Market prices for milk and dairy products are varying from time to time and increasing in Ethiopia. However, the rate of milk price rise seems to fall behind the inflation rate as well as feed cost and other cost increases. For instance, the average milk price in 2009 was 4.3 Birr and it was 5.0 in 2010. Thus, the average rise in milk price was 0.7 Birr in a year. Concentrate feed during this time has doubled where it was sold at 2.7 Birr/kg in 2009 and it rose to over 6 per 1kg in 2010. As the survey result also shows, the price of milk has increased substantially during the last six years (Figure 6). However, there were rises and falls of milk price within each year during the last years with proportional increase across each year. Recent milk price on farm gate around peri-urban parts of Addis Ababa averages at 6.50 Birr per liter during the study period (Figure 11).

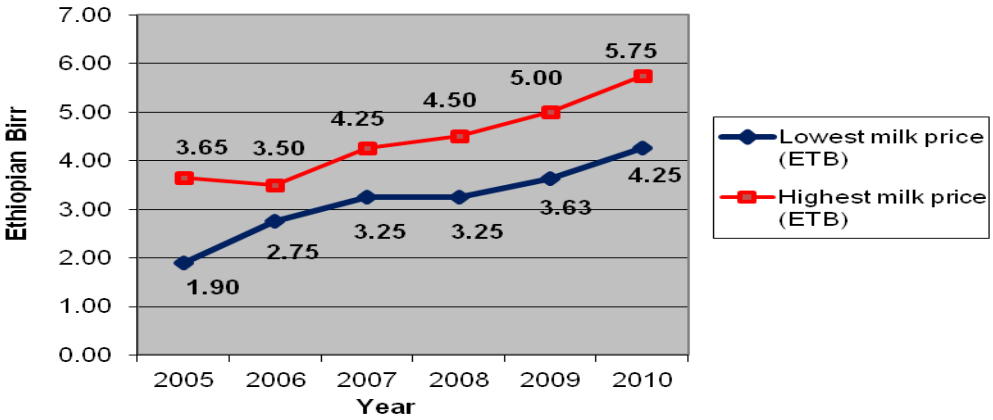


Figure 11. Average farm gate milk price (BIRR) around Sululta and Degem districts (2005 – 2010)

Price margin for milk

The price of producers for milk at the farm gate is currently between 6.50 and 7.00 Birr/ liter in Selale. When processors buy from producers, they pay on average 6.75 Birr/ liter of milk to the producers. Cooperative collection centers however pay 6.60 Birr to their member farmers and collect their share of milk in order to supply to processors for 7.00 Birr. Some cooperatives also sell to consumers for 7.60 Birr around their localities. However, the market price per liter of milk from super markets or milk shops in Addis Ababa varies between 11.45 and15.00 Birr/ liter on average (Table 1).

Price margin around Addis Ababa; the difference between retail price – farm gate price; becomes (12.75 – 7.00 = 5.75 or 15.00 – 6.50 = 8.50) 5.75 to 8.50. This indicates that consumers are paying much and producers are getting low benefit out of their product. The total gross milk price margin was 45.09%. Since the farm gate price for milk products during the study period does not exceed 7 Birr per liter, the cumulative price margin seems higher. Thus, as the cumulative margin is large, this indicates that either producers are not getting what they deserve or consumers are paying extra amount. Therefore, policy intervention is important in this spot in order to keep all value chain actors work and get appropriate benefits out of the business they are involved.

Consumers buy milk either in cash sale for single purchase (51.5%), on contractual cash sale with informal contract (32.7%) if they may keep on buying for longer time, on contractual credit sale of informal contract (13.3), or on credit sale with formal contracts (3.5%). Consumers have so limited say to decide market price for food items in general and milk products in particular. This is partly due to the scarcity of dairy products and their concern for getting relatively good quality milk from their known customers. Thus, consumers prefer to purchase milk from the customers they trusted for longer time and willing to pay better for good quality milk and dairy products.

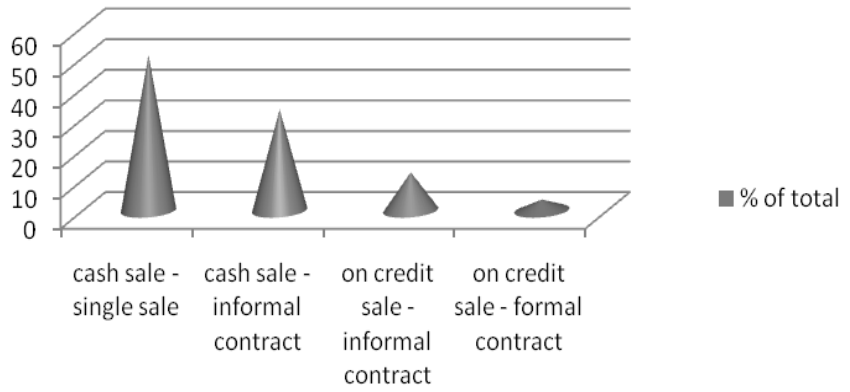


Figure 12. Mode of whole milk purchase by consumers

Other important production costs

Among others, feed cost is increasing from time to time and posing high pressure on production of milk and dairy cattle as a whole. During the period, producers were highly crabby about the abnormal increase of feed prices. Table 2 shows that the feed cost during the study period. At this reporting time after few months of the survey work, however, this price increased significantly for wheat bran and the increase was about 100% for some products such as oil seed cakes. The price for wheat bran for instance grew until 390 BIRR per 100 kg and currently it exceeds that amount substantially. The rate of rise for feed price is, therefore highly frustrating to dairy cattle producers and it needs intervention by the concerning parties.

Table 2. Average feed prices in BIRR per kg during the study periods in and around Addis Ababa

	Bran	Cake	BrewP	Premix	Salt
Mean	3.13	3.07	0.93	4.44	2.65
N*	84	84	23	14	87

***Note**: *=number of respondents buying and using feed for their cattle*

Other inputs such as artificial insemination (AI), veterinary services, and labor are among the most important cost elements for dairy producers around urban and peri-urban setups. In relation with inflation rate, these inputs are also getting costly and there should be mechanism to improve the condition for value chain system so that it can function supplementing each other.

Land issue

In Addis Ababa, there are about 5200 dairy farms. Dairy producers in the city supply over 79 % of the requirement of the capital (Azage, 2003). Due to reformation and urban development, however, most producers these days are leaving from their holdings and dairy producers complain that they are forced out of the city territory. Consequently, most of producers are selling their dairy cows and joining other businesses. Following the survey result, producers invited in consultation workshop showed that the situation is highly worrisome to them. As development of the sectors should support each other, appropriate bodies should recognize the situation and consider options for this important issue in order to support both urban dairy development and other development activities in the city.

Conclusion and Recommendation

Lack of market access to milk and dairy products related to distances from market points for dairy producers is among the factors affecting marketing conditions. Establishing cooperative collection centers and strengthening the capacities of existing ones may help producers in the distant areas and improve market accesses for smallholder producers.

Ever increasing cost of inputs, especially, cost of feed is one of the critical factors affecting milk production and marketing. Proper interventions should be considered to improve productivity, marketing of milk and safeguard smallholder dairy producers and consumers.

All actors in the value chain need to work in win/win fashion in order to promote fair competition and good marketing atmosphere in order to grow and develop together than crush and omit weaker parties out of the market.

Informal market chain for milk and its product remains important element and needs attention to keep benefiting both producers and consumers.

The issue of quality for milk and dairy products is highly important as it is directly related to the safety and health of consumers and it should be promoted through quality based payment system.

Strengthening the capacities of cooperatives is highly important to create market opportunities for the smallholder producers and capacitating processors can help to produce more stable and long shelf life dairy products such as milk powder and other products in order to reduce seasonal variation of milk prices and improve production and productivity of the dairy sector.

Strengthening and empowering consumer associations may allow them to be in a position to negotiate and purchase the products based on their preference and desired level of quality and optimize price margins to the acceptable level and benefit all the chain actors. As development of the sectors should support each other, appropriate bodies should recognize the situation of not getting rid of dairy producers from the city territory and consider options for this important issue in order to support both urban dairy development and other development activities in the city.

References

Ahmed MAM, S Ehui and Yemesrach Assefa, 2004. Dairy development in Ethiopia. EPTD Discussion paper No. 123. International Food Policy Research Institute. Washington, U.S.A.

Azage Tegegne, 2003. Urban Livestock Production and Gender in Addis Ababa, Ethiopia, International Livestock Research Institute (ILRI), in UA Magazine, Addis Ababa, Ethiopia http://www.ruaf.org/sites/default/files

CSA. 2011. Agricultural sample survey. Report on crop and livestock product utilization. The Federal Democratic republic of Ethiopia, Central Statistical Agency (CSA). Private Peasant Holdings. Statistical Bulletin 468, Addis Ababa, Ethiopia.

Getachew Felleke. 2003. Milk and Dairy Products, Post-harvest Losses and Food Safety in Sub-Saharan Africa and the Near East. A Review of the Small Scale Dairy Sector – Ethiopia. FAO Prevention of Food Losses Programme. FAO, Rome, Italy.

Getnet Haile. 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-OHRLLS, 3-4 December 2009, Vienna International Center, Austria.

SNV. 2008. Dairy Investment Opportunities in Ethiopia by TAM Consult, Netherlands Development Organization (SNV), Addis Ababa, Ethiopia, 59 pp.

Exploring Market Accesses for Dairy Products in Wolaita Zone

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Introduction

Market oriented smallholder dairy production offers significant scope for diversification and augmenting income and employment generation for smallholder farmers. The profitability of dairy production depends upon cost structure and a remunerable price for which a good market outlet is crucial. Unless smallholder dairy production is not adjusting itself to the rapidly changing modern markets, which are characterized by quality and food safety, vertical integration, standards and product traceability, reliability of supply, there will be a risk of competitiveness and inefficiency for the entire dairy value chain (Vermeulen *et al.*, 2008). In an attempt to improve dairying, dairy production needs to move out from traditional subsistence mentality and develop a more market-oriented approach. For such a radical change to happen, dairy producers need to be sure that what they will gain from the market will be more than what they will incur. Therefore, a viable market-oriented dairy production requires a wider access to markets, including local and remote markets. To access distance markets, farmers need to linkup with other value chain actors and be able to extend shelf life of supply to ensure distribution of final products. In other word, dairy products cannot be expected to flow across Ethiopia and beyond unless a value chain approach is adopted, which is believed to bridge rural supply and urban demand.

An efficient, integrated, and responsive market system that is marked with good performance is of crucial importance for optimal allocation of resources in dairy production and for stimulating producers to increase output (Acharya and Agarwal, 1999). Therefore, without having efficient market access, increment in output and incomes would not be possible. The lack of market access that many farmers face is considered a major constraint to combating poverty (Best *et al.*, 2005). This can best be

analyzed using a value chain approach which is conducted through value chain mapping, that describes the full set of activities and relationships required to bring a product or service from conception, through the different phases of production, delivery to final consumers (Kaplinsky and Morris, 2001). The importance of facilitating market access to smallholder farmers as well as developing chain competitiveness and efficiency are valuable preconditions to improve rural livelihoods (Lundy *et al.*, 2004; Padulosi *et al.*, 2004).

This requires generation of baseline information using value chain approach to improve competitiveness and efficiency of dairy value chain. The value china analysis revealed that within such kind of poorly functioning markets and poor access, there are households who produce dairy products and participate in markets. Moreover, some of the households had access to one market outlet only while others accessed combinations of them. This paper therefore explores smallholder dairy farmers' market accesses for their products. Given the zonal potential for dairy production, processing, marketing, and consumption, the results of the study become essential to provide vital and valid information for effective research, planning, and policy formulation.

Methodology

Study area

The study was conducted in *Wolaita* zone, which is located 390km southwest of Addis Ababa following tarmac road that passes through *Shashamane* to *Arbaminch*. Alternatively, it is located 330km southwest of Addis Ababa following tarmac road that passes through *Hosanna to Arbaminch*. *Wolaita Sodo* is the town of the zone. It has a total area of 4,541km^2 and is composed of 12 *weredas* and 3 registered towns. It is approximately 2000 meters above sea level and its altitude ranges from 700-2900 meters. The population of *Wolaita* zone is about 1, 527,908 million of which 49.3% are male and 51.7% are female (CSA, 2007). Out of this, 11.7% live in towns and 88.3% live in rural areas. The annual population growth rate of the zone is 2.3%. It is one of the most densely populated areas in the country with an average of 290 people per km^2. The area is divided into three ecological zones: *Kola* (lowland <1500m), *Woina Dega* (mid-altitude 1500-2300m) and *Dega* (highland > 2300m). Most of the area lies within the mid altitude zone.

Rainfall is bimodal, with an average amount of about 1000mm (lower in the lowlands and higher in the highlands). Mean monthly temperature vary from 26^{0C} in January to 11^{0C} in August. Soils (mainly Vertisols and Nitosols) vary in pH from 5 to 6. Primary occupation of the zone is farming. Mixed crop-livestock production predominates, but there are some pastoralists in the lowlands. Generally, the climatic condition is conducive to livestock production.

Livestock production in Wolaita Zone includes cattle (oxen, cow and young stock), goats and sheep, equines (horses and donkeys), poultry (mostly local chickens but some improved breeds). Cattle that are kept for milk production, draught, cash and manure, dominate livestock numerically. Veterinary services are available but constrained by shortage of drugs and remoteness of many farms. Livestock rearing methods and problems encountered differed between highlands, mid-altitudes, and lowlands. Cattle are fed in open grazing, stall-feeding and tethered (small area of open grazing left in front of a house). Natural pasture (indigenous grasses and tree leaves), crop residues, weeds and tree leaves and grazing land are sources of feeds. In addition, farmers own cattle as wealth indicator.

Sampling techniques

A multistage random sampling procedure was used to select representative households from the study area. In the first stage, Wolaita zone was selected purposively as it is one of the potential dairy production, processing, marketing and consumption areas of the country. Within the zone, four rural weredas (Sodo Zuria, Bolosso Sore, Ofa, and Damote Gale) and one town (Wolaita Sodo*)* were selected purposively based on dairy products production and market access potential. Then 33 kebeles from the *weredas* and the town were selected purposively based on dairy products production and market access potential (Table 1). Sample frame of the kebeles was updated and sample size was determined using a simplified formula provided by Yamane (1967). Out of the total 32,972 households, 398 households were selected using simple random sampling methods. However, 4 households with inappropriately filled questionnaire and missing data were dropped and the data set to 394 households were analyzed.

$$n = \frac{N}{1 + N(e)^2} \quad (1)$$

Where,
n = sample size,
N = population size,
e = level of precision. The level of precision is the range in which true value of the population is estimated to be; it is expressed in % (±5).

Table 1. Distribution of sample households included in the survey by *kebeles*

Wereda /town	*Kebele*	Sample size	*Kebele*	Sample size
Sodo town	Kidane Mihret	14	Selam	8
	Hibret	6	Dilbetigle	10
	Damota	15	Kera	24
	Wadu	8	Horbabicho	11
	Gido	6		
Sodo Zuria	Kokate	27	Ofa Gandaba	8
	Dalbo Wogena	15	Bakulo Sagno	6
	Dalbo Awutaro	15	Amacho Koda	8
	Gulgula	10	Waraza Gerera	6
	Humbo Larena	4		
Bolosso Sore	Kebele 01	20	Kebele 04	15
	Kebele 03	28	Kebele 02	6
	Dubbo	22	Taddisa	7
Damote Gale	Fate	13	Korke	2
	Gido Borditi	14	Doge	6
	Shasha Gale	2	Chawkare	22
	Gacheno	17	Hagaza	9
Ofa	Gasuba	10		
	Total	246		148

Data types and sources

Both quantitative and qualitative data types were used in the study under investigation. In order to generate these data types, both secondary and primary data sources were used. Secondary sources include reports of line ministries, journals, books, CSA and internet browsing, national

policies, zonal and wereda reports, among others. Primary data sources include zonal and weredas Agricultural and Rural Development Offices, zonal and weredas Agricultural Marketing Offices, *Wolaita Sodo* Cattle Breeding and Multiplication Center and dairy farm households.

Methods of data collection

The methods of data collection used include discussions, rapid market appraisal, observation, formal survey, and visual aids. Preliminary assessment was conducted to collect basic information about the zone that helped in selection of representative weredas and towns. This information was generated through discussions and individual expert contact at zonal Agricultural and Rural Development Office. In addition, using secondary data sources of the zone and weredas and guided visits to proposed study weredas, visualization of dairy production, processing and marketing activities was done. Rapid market appraisal technique was conducted at four major market centers. Pertinent qualitative data from these sources were collected from 20-30, June 2010. In addition, observation was done to capture the ongoing activities and performance of dairy production and marketing of households. This was complemented with visual aids that helped to capture events to support qualitative and quantitative data collection methods.

Formal survey was conducted to quantify some of the qualitative data. Survey questionnaire was prepared and pre-tested for households operating within the study area. Using the questionnaire, interviews were conducted to gather data on household characteristics, socioeconomic and demographic characteristics, farm information, input utilization, access to services such as extension, credit and information, technology use, milk and milk products production, dairy products market participation and market outlet choices, perceived constraints of dairy products market participation and market outlet choices, among others. Trained and experienced enumerators were hired to collect survey data from households during July and August 2010.

Methods of data analysis

Descriptive statistics method of data analysis, which referred to the use of ratios, percentages, means and standard deviations in the process of comparing socioeconomic, demographic, and institutional characteristics of households of the study area, was used in the course of data analysis.

Results and Discussion

Quantity of milk produced, consumed, marketed and processed

Households reported that milk yield is highest during the first four months of lactation and declines thereafter. However, it depends on the month of calving, feed availability, milking experience, etc. Milk production peaks during May to September, as feed supply is adequate. The mean milk yield per day was 8 liters, of which, 2 liters, 4 liters, and 2 liters of milk were home consumed, sold to market outlets and value added into dairy products, respectively. The mean milk yield per day in market participant and nonparticipant households was 9.52 and 3.58 liters, respectively. The mean milk yield per day in market participant households was almost 3 times higher than that of nonparticipant households. This result suggests that milk production volume was the most important variable determining milk market participation. The demand for dairy products is high but supply is far below demand. Reasons for low supply are low yield of local cows that dominate dairy cattle population, and lack of dairy enterprises. Creating conducive policy environment for dairy enterprise development, use of crossbred cows and upgrading local cow performance are options to increase milk production.

The primary objective of dairy production among households was for family consumption of dairy products. About 93.9% of households consumed their produces and 78.4% of them consumed to supplement nutrition requirement of a household. The remaining 8.6%, 3.3%, 1.8%, and 1.8% households' consumption was implicated to unrewarding prices, low demand, poor market infrastructure, and cultural taboos that prohibit selling dairy products, respectively. The mean household consumption per day was 2 liters of milk, 0.32kg butter, and 0.37kg cottage cheese. Infants were prioritized in allocation of milk consumption followed by husbands. Butter and cottage cheese were consumed along with other foods and therefore not prioritized.

Major dairy products market outlets

Households accessed three milk market outlets and combinations thereof: consumer, hotel/restaurant, and cooperative. Out of 8 liters mean milk produced per day, 41.8% was home consumed. Out of home consumed, 66.5% was consumed in the form of milk and 33.5% in the form of value

added products such as butter, cottage cheese, skim milk and fermented milk. About 58.2% of milk produced per day was accessed by milk market outlets. Out of the milk marketed, 34.8%, 25% and 6.6% were accessed by hotel/restaurant, individual consumer and cooperative market outlets, respectively. Out of the total households who sold milk, 38.7%, 13.1%, 30.9%, 15.2%, 1.05% and 1.05% had access to individual consumer, cooperative, hotel/restaurant, individual consumer and hotel/restaurant, cooperative and hotel/restaurant, and individual consumer and cooperative market outlets, respectively.

Households accessed three butter and cottage cheese market outlets: consumer, hotel/restaurant, and trader. The mean amount of butter and cottage cheese consumed and sold to market outlets per day is given in Figure 2. It also provides the share of butter and cottage cheese consumed and sold to market outlets per household per day. Out of 5.9kg of mean butter produced per day, 0.32kg was home consumed, 1.89kg were sold to trader, 2kg were sold to hotel/restaurant, and 1.69kg were sold to individual consumer market outlets. Out of 7.82kg mean cottage cheese produced per day, 0.37kg was used for home consumption, 3.5kg were sold to trader, 2kg were sold to hotel/restaurant, and 1.95kgs were sold to individual consumer market outlets. The amount of butter and cottage cheese sold to markets depends on season, household size, dependence ratio, milk yield, among others.

Cooperative market outlet

There are four milk-processing cooperatives in Wolaita Zone; one of which only Kokate and Gacheno Cooperatives are functioning. The Kokate cooperative is located 8km north of Wolaita Sodo Town on tarmac road that passes through the town to Shashamane. It was established with 15 members in 1999 EC and currently has 18 members. Gacheno cooperative is located 11km north of Boditi town in tarmac road that passes through the town to Shashamane. It was established with 16 members in 1999 EC and currently has 14 members.

Table 2. Performance of Kokate and Gacheno cooperatives (1999-2002 EC)

Location	Dairy products		Amount processed	Income from sales (Birr)
Kokate	1999	Butter	312 Kg	20,872
		Cottage cheese	597 Kg	
		Ghee	131 L	
	2000	Butter	20.6 Kg	27,128
		Cottage cheese	904 Kg	
		Ghee	1669 L	
	2002	Butter	153 Kg	28,278
		Cottage cheese	495 Kg	
Gacheno	1999	Butter	11.5 Kg	1545
		Cottage cheese	25 Kg	
		Ghee	10 L	
	2000	Butter	27.5 Kg	1943
		Cottage cheese	13 Kg	
		Ghee	16L	
	2001	Butter	26.5 Kg	2017
		Cottage cheese	13 Kg	
		Ghee	17 L	
	2002	Butter	22 Kg	1717
		Cottage cheese	11 Kg	
		Ghee	15L	

***Source**: Wolaita zone Agricultural and Rural Development Office, 2010*

The mean milk supply to cooperative per day was 1.34 liters with mean price of 4.27 Birr per liter. Once cooperatives receive milk from members and nonmembers, members process milk into butter, cottage cheese, ghee, and skim milk for selling. The amount of dairy products processed and income earned from sales of dairy products over years by cooperatives are provided in Table 2. Even though cooperative members know price being offered by cooperative is lower than other milk market outlets, households have different reasons for preferring cooperatives: no milk quality test (2.3%), capacity building (2%) and shortest distance (0.8%). Households also obtained different types of support from cooperatives: processing techniques (6.9%), processing equipments (2%), market information (1.5%), and trainings (0.5%). When milk sold to cooperatives was rejected, households used different strategies to overcome; taking back home and consume (6.9%), process (3.3%) and taking to another market on the same day (1.5%).

Hotel/restaurant market outlet

The mean supply of milk, butter, and cottage cheese to hotel/restaurant per day was 6.4 liters, 2kg, and 2kg with average price of 5.22 Birr per liter, 58.14 Birr per kg and 21 Birr per kg, respectively (Table 3). About 18.3%, 9.9%, 4.6% and 1.8% of households travelled less than 30 minutes, exactly 30 minutes, 45 minutes, and an hour to sell milk to hotel/restaurant, respectively. Largest number of households travelled less than 30 minutes implying market access as an important factor for market participation. Households have different reasons for choosing hotel/restaurant as outlet; credit payment (14.7%), cash payment (9.4%), no formal milk quality test (5.6%) and capacity building (3.8%). Payment was made as soon as sold for 5.1% of households and at the end of every month for 29.4% of households. About 21.8% of households reported no problem with hotel/restaurant. However, when milk was rejected by hotel/restaurant, households used varying strategies such as taking back home and consume (6.1%), taking to another market on the same day (4.8%), taking to another market on next day (1%) and selling at lower price (0.8%).

Table 3. Mean dairy products sales to hotel/restaurant per day

Items	Number of households	Mean	SD
Amount of milk (L)	136	6.42	2.2
Milk price per liter (Birr)	136	5.22	1.25
Amount of butter (kg)	8	2	1.02
Butter price per kg (Birr)	8	58.14	7.9
Amount of cottage cheese (kg)	2	2	1.01
Cottage cheese price per kg (Birr)	2	21	1.41

***Source**: Authors collection, July and August 2010.*

Trader market outlet

The mean butter and cottage cheese sold to trader per day was 1.89kg and 3.5kg with average price of 54.49 Birr and 16.46 Birr, respectively (Table 4). Almost all households sold milk products at markets. The entire households received payment in cash as soon as sold. When milk products were rejected by traders, households use strategies such as taking home and consume (11.2%), taking to another market on next day (5.67%) and selling at lower prices (2.8%). One problem with traders was cheating weights and adulteration of butter with Girl Ghee, *Shano lega*, banana and other industrial products. The other problem was absence of standardization and grading system for dairy products. Formulations of

standardization, grading and marketing rules by governments are options to overcome the problems.

Table 4. Mean dairy products sales to trader per day

Items	Number of households	Mean	SD
Amount of butter (kg)	99	1.89	0.07
Price of butter per kg (Birr)	99	54.49	7.57
Amount of cottage cheese (kg)	77	3.5	0.78
Price of cottage cheese per kg (Birr)	77	16.46	3.95

***Source**: Authors collection, July and August 2010.*

Individual consumer market outlet

Milk, butter, and cottage cheese were sold directly to consumers. About 40.3%, 10.4%, and 7.6% of households sold milk, butter, and cottage cheese, respectively to consumers. The mean milk, butter, and cottage cheese supply to consumers per day were 4.8 liters, 1.69kg, and 1.95kg with average price of 4.9 Birr/ liter, 53.63 Birr/kg and 17.37 Birr/kg, respectively (Table 5). About 16% and 14.7%, and 8.9% of households preferred selling to consumers because of cash payment, credit payment, and no quality test, respectively.

Table 5. Mean dairy products sales to individual consumer per day

Items	Number of households	Mean	SD
Amount of milk (liter per day)	176	4.8	1.1
Milk price per liter (Birr)	176	4.9	1.8
Amount of butter per day (kg)	40	1.69	1.2
Butter price per kg (Birr)	40	53.63	13.4
Amount of cottage cheese (kg)	30	1.95	1.1
Cottage cheese price per kg (Birr)	30	17.37	4.4

***Source**: Authors collection, July and August 2010.*

Characterization of households by dairy products and market outlet choices

The mean household characteristics by milk market outlets are provided in Table 6. The mean household size by milk market outlets was 5.9, 6.4 and 5.6 with individual consumer, cooperative and hotel/restaurant, respectively. The mean household size for households who accessed cooperative milk market outlet was higher than the mean household size (6.0 people) in the rural areas of southern Ethiopia (CSA, 2007). The mean age of household heads that had access to individual consumer,

cooperative and hotel/restaurant milk market outlets was 44, 45 and 43.5 years, respectively. The mean dairy cow ownership of households who had access to cooperative, individual consumer and hotel/restaurant milk market outlets was 1.9, 2.5, and 3.0 TLU, respectively. This indicates that households that owned large dairy cows accessed hotel/restaurant milk market outlet because of hotel/restaurants' capacity to purchase large amount of milk.

On average 10, 7.5 and 10.4 liters of milk per day was accessed by individual consumer, cooperative and hotel/restaurant market outlets, respectively. The mean dairy farming experience was highest for households who had access to cooperative (19.5 years) milk market outlet and lowest to households that had access to hotel/restaurant (7 years) market outlet. This indicates that households who had access to cooperative market outlet were engaged in crop-livestock production whereas others may be peri-urban households. The mean landholding size was highest for households that had access to cooperative (1.41 ha) milk market outlet and lowest for households who had access to hotel/restaurant (0.48ha) market outlet. The average distance travelled to the nearest urban milk market was highest to households who had access to cooperative (3.36km) market outlet and lowest to households that had access to hotel/restaurant (1.8km) market outlets. However, the average price offered by cooperative market outlet was 4.5[3] Birr, which is lower than price offered by other market outlets.

Table 6. Mean household characteristics by milk market outlets

Variables	Mean (SD) of market outlets		
	Individual consumer (N=118)	Cooperative (N=46)	Hotel/restaurant (N=118)
Age of household head (year)	44.4(10.83)	45.3(13.04)	43.51(8.96)
Household size (number)	5.86(2.11)	6.39(2.40)	5.58(1.87)
Distance to the nearest urban market (km)	2.27(1.61)	3.36(2.16)	1.78(1.39)
Dairy cow in TLU	2.47(1.36)	1.91(1.31)	2.97(1.81)
Milk yield per day (liter)	10.02(3.03)	7.54(1.74)	10.44(3.31)
Dairy farming experiences (year)	8.7(3.81)	19.46(3.25)	7.02(3.77)
Milk price offered by outlets per liter (Birr)	5.40(1.21)	4.50(0.51)	5.27(0.97)
Land holding size (ha)	0.96(0.07)	1.41(1.45)	0.48(0.31)

***Source**: Authors collection, July and August 2010.*

[3] *US$ 1 = Birr 13.632 during the survey period. Birr is the currency unit of Ethiopia.*

Proportion of household characteristics by milk market outlets is given in Table 7. About 29%, 46% and 31% of households that had access to individual consumer, cooperative and hotel/restaurant milk market outlets, respectively had at least a child under the age of six. About 60%, 54% and 69% of household heads who had access to individual consumer, cooperative and hotel/restaurant milk market outlets, respectively attended formal schooling. Seventy five %, seventy eight % and seventy seven % of households that had access to individual consumer, cooperative and hotel/restaurant milk market outlets respectively were headed by male. About 31%, 50% and 40% of households who had access to individual consumer, cooperative and hotel/restaurant milk market outlets, respectively accessed dairy extension services.

About 76%, 85% and 81% of households that had access to individual consumer, cooperative and hotel/restaurant milk market outlets respectively accessed market information services. Households that had access to cooperative milk market outlet received relatively better of these services than others because cooperative were established by government. This was because they were given due attention by government extension services to ensure quality supply, support processing and to access better markets as compared to other outlets. Households who had access to cooperative market outlet replied that they did not have any other options as they are far from accessing urban market. About 43%, 42% and 17% of households that had access to individual consumer, hotel/ restaurant and cooperative market outlet, respectively received payment to their sales in cash. About 85% of households who had access to cooperative market outlet were cooperative members. All the households that had access to cooperative market outlet replied that they had not received payment for sales made for two months before data collection.

Table 7. Proportion of household characteristics by milk market outlets

Variables	Category	Proportion (%)		
		Individual consumer (N=118)	Cooperative (N=46)	Hotels (N=118)
Sex of household head	Male	75	78	77
	Female	25	22	23
Education level of head	Formal	60	54	69
	Otherwise	40	46	31
Presence of at least a child under 6 years	Yes	29	46	31
	No	71	54	69
Mode of payment	Cash	43	17	42
	Others	57	83	58
Membership to cooperative	Yes	15	85	25
	No	85	15	75
Access to market information	Yes	76	85	81
	No	24	15	19
Access to dairy extension services	Yes	31	50	40
	No	69	50	60

***Source**: Authors collection, July and August 2010.*

Conclusion and recommendations

Findings show that dairy farmers produced 8 liters mean milk yield per day, of which 27.8% was home consumed, 58.2% accessed by market outlets and 26.6% value added. Consumers, hotels/ restaurants and cooperatives accessed 27.9%, 22.1%, and 9.4% of the milk sold per day, respectively. Hotels/restaurants purchased on average 52.6 liters of milk per day with average purchase price of 5.5 Birr per liter and with average sale price of 5.9 Birr per liter. Traders purchased on average 53kg of butter per day with average purchase price of 54.49 Birr per kg and with average sale price of 59 Birr per kg. Consumers purchased milk and butter with average price of 4.9 Birr per liter and 53.63 Birr per kg. Because of localized market outlets, smallholder farmers were able to sell only 50% of their milk products. This implies that value chain actors need to upgrade capacities of existing market outlets such as cooperatives. Moreover, there are a few milk-processing cooperatives as compared to dairy potential of the study area. Therefore, there is a need to strengthen existing cooperatives, establish new milk processing cooperatives and zonal level cooperative union to serve as a mechanism in further vertically integrating the cooperatives to local and regional markets.

References

Acharya SS, NL Agrwal.1999. Agricultural Marketing in India. Oxford Publishing Co. Pvt. Ltd., New Delhi. 370p.

Best R, S Ferris, A Schiavine. 2005. Building linkages and enhancing trust between small-scale rural producers, buyers in growing markets and suppliers of critical inputs. *In*: Almond FR and SD Hainsworth (eds.). Beyond Agriculture-making markets work for the poor: Proceedings of an international seminar, 28 February-1 March 2005. Westminster, London, UK. Crop Post Harvest Program (COHP), Natural Resources International Limited, Aylesford, Kent and Practical Action, Bourton on Dunsmore, Warwickshire, UK. 176pp.

Central Statistical Authority (CSA). 2007. Summary and statistical report of 2007 population and housing census. Federal Democratic Republic of Ethiopia population and census commission.

Kaplinsky R, M Morris. 2001. A handbook of value chain analysis. Working paper prepared for the IDRC, Institute for Development Studies, Brighton, UK.

Lundy M, M Gottret, W Cifuentes, C Ostertag, R Best, D Peters, S Ferris. 2004. Increasing the competitiveness of market chains with smallholder producers. Field Manual 3. The Territorial Approach to Rural Agro-enterprise Development. Centro Internacionale de Agricultura Tropical, Cali, Colombia.

Padulosi S, J Noun, A Giuliani, F Shuman, W Rojas, B Ravi. 2004. Realizing the benefits in neglected and underutilized plant species through technology transfers and human resources development. Pp 117-127. In: Proceedings of the Norway/UN Conference on Technology Transfer and Capacity Building, 23-27 May, 2004. Trondheim, Norway.

Vermeulen S, J Woodhill, FJ Proctor, R Delnoye. 2008. Chain-wide learning for inclusive agro food market development: a guide to multi-stakeholder processes for linking small-scale producers with modern markets. International Institute for Environment and Development, London, UK, and Wageningen University and Research Centre, Wageningen, The Netherlands.

Yamane T. 1967. Statistics, an Introductory Analysis, 2nd ed., New York: Harper and Row.

Middle East Market Feedback on Ethiopian Meat, Live Animal Export, and Market Opportunities

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Introduction

Ethiopia is rich in ruminant livestock resources (CSA, 2009). However, livestock sub-sector's contribution to the economy in general and to the country's foreign currency earnings in particular, is very low. Some of the major factors contributing to poor performance of livestock sub-sector include widely scattered and non-market oriented livestock production systems, lack of an efficient and effective livestock marketing system, poor market infrastructure, lack of proper transport services, and limited knowledge and capacity of value chain actors to meet international trade standards.

In the Middle Eastern countries (Saudi Arabia, UAE, Kuwait, Yemen, Bahrain, Oman, and Qatar) and Egypt, very close to Ethiopia, there is a large potential market for small ruminants and beef. However, in 2010/11, Ethiopia exported 4% of live animals and 6% of the meat annual demand of the Middle East. This volume is extremely low considering animal resource base of the country, proximity to the market, and adaptation of importers to taste of our animals. There is also a high domestic demand for livestock products, particularly during religious festivals.

The international market for live animals and meat is becoming increasingly competitive and relevant actors must adopt improved practices in production, transportation, processing, and packaging of products to maintain and increase their market share. It is imperative that livestock producers, traders, and processors be aware of the status and requirements of export market so that appropriate support to livestock value chain actors provided to help them meet market requirements and maximize benefits from growing meat and live animal export trade. The objectives of the assessment was therefore to collect relevant feedback information from

meat and live animals exported from the Horn to the Gulf countries and use the information as inputs for development of training packages/toolkits for the major meat and live animals' value chain actors. This paper however, focuses mainly on the feedback provided on Ethiopian live animal and meat.

Status of Livestock and Meat Export

The type and volume of live animal and meat export and destination markets are summarized below.

Preferred breeds

According to abattoirs and live animal exporters, Ethiopian breeds preferred in the Middle East market are Black Head Ogaden and Afar sheep, Borana/Somali and Afar goats, Borana cattle and camels. The preferences to these breeds may have been due to breeds' lowland background, their adaptation to conformation of animals and taste of meat for longer periods. However, when there is high demand and abattoirs are unable to fulfill orders for specific breeds; other and highland breeds are also slaughtered and exported.

Export abattoirs

Currently, there are seven functional export abattoirs involved in exporting mainly small ruminant chilled meat and some beef. Two abattoirs (HELIMEX and ELFORA) are located in Debre Zeit; three abattoirs (Luna, Modern, and Organic) are located in Mojo, Abergele abattoir in Tigray and Ashraf in Bahirdar. The eighth one, Metehara abattoir is under renovation.

Volume of export

Considering the resource base, proximity to market and adaptation of importers to taste of our animals, export volume to the Middle East has been low. However, the volume of both meat and live export is growing compared with previous years. In 2010/11 Ethiopia formally exported nearly half a million live animals and 17, 000 tons of meat mainly to Middle East and Egypt (EMDTI, 2011). Edible offal such as liver, kidney, heart, tongue, and brain were also exported. In terms of informal live animal trade, MOA (2008) has reported that about 351,000 cattle and 1,131,000 small ruminants are annually traded with neighboring countries.

Export ports and destinations

Live animals from Ethiopia are mainly exported through Djibouti and Berbera ports and sometimes it reaches to destination countries through Yemen. The main destination countries are United Arab Emirates, Saudi Arabia, Kuwait, Bahrain, Yemen, Qatar, and Egypt. The United Arab Emirates and Saudi Arabia are however, the largest importers of live animals and meat.

Methodology

The assessment was conducted in United Arab Emirates (Dubai) and Saudi Arabia (Jeddah and Riyadh) in February and March 2011, respectively. During the period, discussion and consultations were made and feedback and import requirements collected from regulatory bodies of meat and live animals using checklists. Focused group discussion was also made with private companies and traders regarding their specific feedback on products imported from the Horn of Africa countries. Finally, market facilities such as live animal markets, sea and airports, supermarkets, wet meat market and cold stores were visited and observations made on products and livestock exported from Ethiopia and value addition made on the products.

Results and Discussion

Imports of meat

The Middle East imports meat from the Horn of Africa and other countries, mainly from Australia, Brazil, New Zealand, India, and Pakistan. Of the total imports of nearly 245, 000 metric tons, sheep meat imports accounted for 75 %, beef for 15 %, goat meat for 9.7 % and camel meat for 0.3 %.

The cattle meat imports totaled 36.697 metric tons; the major importer was Oman at 27.8 % followed by UAE at 24.5 %, Qatar at 16.5 % and Kuwait at 12 %. In goat imports, the major importer was UAE accounting for 50.9 % followed by Qatar at 19.9 %, Saudi Arabia at 14.7 % and Omani at 10.4 %. Sheep imports were dominated by Saudi Arabia (34 %), UAE (26%), and Kuwait (8.4%). Major competitors are shown in Table 1. Though most of these countries are very far from importing

countries, their volume of export is increasing. This increase is mainly due to those countries meeting export sanitary/ requirements, better economies of scale of livestock production, and well-informed, capable value chain actors able to take advantage of the current market more so than traditional exporting countries such as Ethiopia.

Imports of live animals

The Middle East is a large importer of live animals. This is mostly because Islamic law requires animals to be slaughtered in a 'halal' way. Imports of camels were 170,549 head. Egypt was the major importer accounting for 39.9 %. Other importers were Qatar, UAE , Saudi Arabia and Kuwait. Cattle imports totaled 608,548 head. The largest importer was Lebanon accounting for 29.3 % of the total, followed by Yemen (22.2 %). Yemen re-exports cattle to the rest of the Gulf States. There are also considerable imports of goats, which in 2008 totaled 4.6 million head. The largest importer is UAE, accounting for 34.2 % followed by Oman (32.2 %). Sheep are the most imported livestock in 2008 totaling 6,062,850 head. Saudi Arabia is the major importer accounting for 24 %, followed by Kuwait (20.6 %) and Bahrain (11.9 %).

Table 1. Major competitors in the Middle Eastern market

Export type	Competitor	Remark
Live sheep	Australia	Australia exported 3.8 million sheep to middle East in 2007
Beef	Brazil, India, Argentina,	
Sheep meat	Australia, New Zealand	
Sheep and goats	India, Iran, Somalia, Sudan	

***Source**: Gulf trade fair 2011, FAOSTAT, 2007*

Livestock product requirement

Generally, the requirement regarding livestock type and carcass weight category specified in most of the Middle East importing countries is shown in Table 2.

Table 2. Requirement of importing Middle East countries for livestock and meat

Type	Product specification
Mutton	Skin-off carcass; mutton: 8–12 kg
Goat	Skin-off carcass; goat: 5–7.5 kg
Live small ruminants	25-30 kg
Cattle	300-400 kg, mainly Borana breed
Camel	200-400 kg

Feedback and observations on exported meat

From the assessment and observations on the market facilities, the following major issues and feedbacks were collected and shared with national consultants, Ethiopian Meat and Dairy Technology Institute (EMDTI) and Ministry of Agriculture so that feedback and import requirements are addressed and considered in preparation of training packages for major value chain actors and in other development efforts. From the Horn countries, mainly Ethiopia, Somalia, and Sudan are involved on live animal export market. In meat export, however, Ethiopia is available in both countries. The KSA and UAE import from the Horn countries for two reasons i.e. for direct consumption and re-export purposes to other Middle East and Northern African (MENA) countries.

Regarding import requirements

The need for certification is justified by interest to secure trade of animals and animal products between the Horn of Africa and Middle Eastern Countries. Certification also helps increasing transparency in livestock trade and enhances trust between importing and exporting trade partners. To ensure that value chain actors are well informed with most important requirements of live animals and meat, certification procedures and guidelines were collected in Arabic language from regulatory bodies, translated and shared. The major findings in both missions regarding feedback and observations on live animal and meat import from the Horn countries are indicated below.

Demand, supply, quality, and transport

There is high demand for chilled carcass of sheep and goats having a weight category between 5-9 kg. Moreover, there is also some demand for heavier carcasses (10-18 kg). The latter currently being mainly covered by the Australian sheep (FAO/SFE, 2011). The chilled whole carcass of small ruminant meat is available in different meat shops in KSA and sold without labels on the origin. However, the goat meat cut (6 way cuts, Figure 1) is available in one supermarket in Dubai labeled Ethiopian. The cuts that should have been made in Ethiopia are being undertaken by Dubai supermarket and our actors lost the benefit due to limited value addition.

The other feedbacks are related to inconsistent and inadequate supply of the carcass, less fat cover and sometimes-poor hygienic condition of the carcass. One importer has also suggested improvement on the quality of

the packaging material i.e. thickness, size of the stockinet. Sample stockinet from the importers brought and shared. The traders use Ethiopian and Saudi Airlines to transport chilled meat. With Ethiopian Airlines, though the airfare is high (0.8 USD/kg), the limited cargo space is a major constraint to take more carcasses. The Saudi Airlines is however relatively cheaper (0.60 USD/kg) but recently it is making delay in departure or cancellation of flight and consequently affecting the shelf life of their carcasses.

Figure 1. Ethiopian goat meat cut in Supermarket, Dubai (Photo: Ameha Sebsibe)

Frozen product

The UAE and KSA markets import frozen whole carcasses and retail cuts of small ruminants and beef cuts from Australia, India, Pakistan, New Zealand, and Brazil. However, none is supplied from Ethiopia in this category.

Documentation for certification

Discussion and observations made on the various forms filled by Ethiopian meat exporters and sent with the product to both importing countries were reported satisfactory except that sometimes there is variation in actual weight received and filled on the form. This and related feedback are shared to the concerned actors.

The meat price

It was learnt that prices of the products vary with the source country, quality, and uniformity of the products. The chilled meat of small ruminants from Ethiopia fetched on the average 4,500 USD/T in the UAE. However, in KSA, the chilled small ruminant meat from Ethiopia

fetched about 4,800 USD/T as that time some Indian exporters stopped/reduced the supply temporarily.

Market for non-offal

It is also observed that there is a 'new' market opportunity in UAE and KSA for non-edible part such as feet (Fig. 2) for it is used in the preparation of soup. Countries such as Ethiopia, where feet are not properly utilized, shall plan how to add value from each part of slaughtered animal and increase the income of the actors.

Figure 2. Processed feet for soup in the Dubai market (Photo: Ameha Sebsibe)

Feedback and observations on live animal import

Approved quarantine facilities

Currently sheep, goat, and camel are exported to Middle East from four approved quarantine facilities i.e. Djibouti, Berbera, and Bosaso in Somalia and Alkdro in Sudan. Ethiopian export standard quarantine facility is under construction and currently animals are exported through Djibouti and/or Berbera using third country certificate. It has been reported that there are some rejections of shipment at the ports of destination. As a result, the regulatory bodies and traders questioned capacity and ethics of these quarantine facilities providing certificate to the shipment. Both regulatory bodies and traders indicated that cattle are not imported from the Horn as before due to observation of Foot and Mouth Disease (FMD) and urged the exporting countries to export

vaccinated animals or as deboned beef for the risk of having, this disease will be minimal.

Major diseases observed

Some of the major diseases of concern to KSA and UAE are FMD, Rift Valley Fever (RFV), PPR, and Brucellosis. The importing countries take samples from the shipment to check the presence of diseases. Hence, exporting countries/quarantines are advised not to take risk of sending live animals without genuine confirmation /certifying before loading. These save resource, improve exporters' image in the importing countries and the trade performance.

The price of live animals

In both UAE and KSA, live animals in the livestock market are sold with eye appraisal, not on weight basis and the weight mentioned below are estimates. Generally, consumers that could afford prefer local/Saudi/ small ruminants and pay more i.e. well finished sheep weighing about 35-40 kg can be sold at an equivalent price of 320-340 USD. However, the system there cannot support to produce adequate number of small ruminants for peak seasons. Moreover, the price of the locals is not affordable to most of the consumers. On the other hand, Ethiopian animals are also liked by consumers there due to long adaptation of taste. However, animals from the Horn are generally paid less. This is mainly due to poor condition of animals and consequently their lower weight. For instance, sheep (Black Head Somali) and goats (Borana) from Ethiopia with average weight of 25 kg, poor condition sold at KSA for 100-120 USD. These animals were sold to importers from Ethiopian side at about 40-60 USD/head (FAO/SFE, 2011). One can see how the margin is wide. Moreover, we need to use market opportunities over there such as limited livestock and feed production.

Regarding cattle, the Borana breed purchased from Ethiopia and Somalia, finished in KSA and having an estimated body weight of 400 kg is sold about 930 USD. According to Ethiopian exporters, similar breed but before it is well finished is sold at about 400-500 USD to importers. The camel, with an estimated weight of 300 kg is sold about 820 USD. Hence, for better price and benefit for exporting actors, there is a need to address issues such as finishing of animals targeting peak seasons and strategies to improve bargaining power of traders to minimize wide margin shown.

Conclusion and Recommendations

The Horn countries including Ethiopia has high livestock resource base and better comparative advantages in the Gulf market provided that private and public sectors involved in livestock value chain work jointly to address importers feedback indicated. The actual market demand and opportunities for diversified products of meat and livestock is also high in Middle East countries. The following are some of the recommendations to improve export standard there by livestock /meat trade performance.

Capacity building

- Synthesize value chain actors on the standard import requirements, existing guidelines and market opportunities;
- Regular training for value chain actors on increasing productivity, value addition and marketing. The demand for sheep and goats live export is high during Eid Al-Adha (Arafa). The price per kg live weight is also higher for this festival than other times of the year as many families will sacrifice an animal during this period. Hence, support for organized production shall be targeted during this time; and
- Technical assistance to public and private service providers to meet SPS requirements, producing qualified graders, butchers, quality control experts in the meat industry.

Policy related

- Need for structural support to have adequate livestock extension staff to strengthen extension services at federal and regional levels;
- Coordination of livestock projects and have complementary and synergy role of the stakeholders to fill priority gaps of the meat industry;
- Support to regulatory bodies to enable them enforce relevant standards/guidelines; and
- Strategies to increasing cargo space

Investment

- Special incentive packages to private companies to help them establish ranches for contribution to consistent supply for the market; and
- Support to strengthen facilities on cattle slaughter, fabrication, and cold chain storage and designated transport facilities.

Market linkage and promotion

- In spite of the actual high demand for livestock and meat products in UAE, KSA, the promotion efforts are limited and hence, strengthening promotional activities through participation of annual Gulf food fair in Dubai and use of the trade consular/ Embassies based in the Gulf countries are essential. The current

strategy of the Ethiopian meat plants is selling small volume of meat to many importers and each client is not satisfied as they are getting below their request order. Currently, Ethiopian meat in most cases ends up and sold in the Indian or Pakistan meat shops;

- Support establishment/strengthen producers' and marketing cooperatives;
- Strengthen and empower Ethiopian Meat Producers and Processors Association; and
- Expansion and diversifying the market

References

Central Statistical Agency (CSA). 2009. Federal Democratic Republic of Ethiopia. Statistical Abstract. CSA, Addis Ababa, Ethiopia.

Ethiopian Meat and Dairy Technology Institute (EMDTI). 2011. Annual report, Addis Ababa, Ethiopia.

FAOSTAT, 2007.

FAO Sub-regional office for Eastern Africa (SFE). 2011. Middle East mission report on requirements and feedback on live animal and meat import from the Horn. Addis Ababa, Ethiopia.

Ministry of Agriculture (MOA). 2008. Annual report, Addis Ababa, Ethiopia.

Market Opportunities for Value Added Beef Products

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Introduction

Ethiopia ranks first in Africa and tenth in the world with respect to livestock population. Livestock is central to the Ethiopian economy, contributing 20% of the GDP, supporting the livelihoods of 70 % of the population and generating about 11% of annual export earnings. The country has been earning foreign currency by exporting mainly chilled shoats' carcass and live animals namely cattle, sheep, camels, and goats to major destination markets of UAE, KSA, Yemen, and Egypt. As the country has the largest number of livestock in Africa, Ethiopia has much to gain from the growing global market for livestock products (SPS-LLM, 2010).

The levels of foreign exchange earnings from livestock and livestock products are also much lower than what would be expected, given the size of the livestock population. The fundamental constraints of these outcomes include

- traditional technologies;
- limited supply of material inputs (feeding the stock, artificial insemination and water);
- poor extension service;
- high disease prevalence;
- poor marketing infrastructure
- the lack of marketing support services and market information;
- limited credit services; and
- absence of effective producers' organizations at the grass roots levels, and natural resources degradation (Berehanu *et al*, 2007).

On the other hand, if properly developed and managed through modern animal husbandry practices, Ethiopia has a suitable environment for livestock production. Its indigenous livestock breeds, which have good meat quality, could increase marketable surplus if improved management practices are in place along the value chains. The growing domestic

demand, which results from increased urbanization, higher incomes due to economic growth, and rising population, offers significant incentive for increased market oriented livestock production. The increasing export demand for meat and live animals in the Middle East and African regions also offers Ethiopia to exploit market opportunities. The growing demand for quality meat products in the Middle East and African regions is also driving new market opportunities for value added meat products. However, significant technical and institutional barriers continue to limit the benefits of these changes to small-scale producers and market agents. Concerns for value addition most often limit the small holders' producers to access both conventional and niche markets. To this effect, Value chain assessment on exploiting market opportunities for value added meat products was conducted in and around Addis Ababa.

Methodology

Study Area

The research was carried out in and around Addis Ababa where the major actors are operating. The population of Addis Ababa is estimated to be about 2.72 million (CSA, 2010).

Scope of the study

The study delimited to the capital city of Addis Ababa and its outskirts (town of Burayu) where the actors are majorly operating for the City. The value added product selected was beef being it is the major meat item consumed.

Research approach

The study focused value chain approach (as outlined by Kaplinsky and Mories, 2002). Data were collected through literature review; RMA; and questionnaire survey.

Rapid market appraisal

Rapid Market Appraisal (RMA) was carried out to describe and understand how the value chain actors are operating. From each value chain category a minimum of five representatives were randomly selected and interviewed or hold group discussions. Observation of the actual operation patterns ran concurrently with the interviews. The information obtained through these tools were properly summarized and interpreted.

Sample survey

Based on the RMA results, butcheries and supermarkets are the major outlets of beef retail for the city of Addis Ababa, hence chosen for the subsequent study to supplement further information. Structured questionnaires were developed for butcheries and supermarkets. Butcheries are found in all sub-cities, from which 10% or more sample butcheries were selected using the random sampling method. As supermarkets are not found in all sub-cities, purposive sampling technique was employed to select sub-cities having supermarkets and from which 10% or more sample supermarkets were randomly selected. Therefore, from a total of 1,369 butcheries and 120 supermarkets found, 161(11.7%) butcheries and 23(19.2%) supermarkets were used for survey study conducted from January to March 2011.

Analysis of survey Data

The survey data were analyzed using SPSS software and descriptive statistics was employed to compare the values.

Results and Discussion

Various actors participated differently in a continuous process along the value chain. However, this assessment report focuses on the major value chain actors and activities, whose roll and contribution for the exploiting market opportunities for value added beef commodities clearly identified (Fig 1).

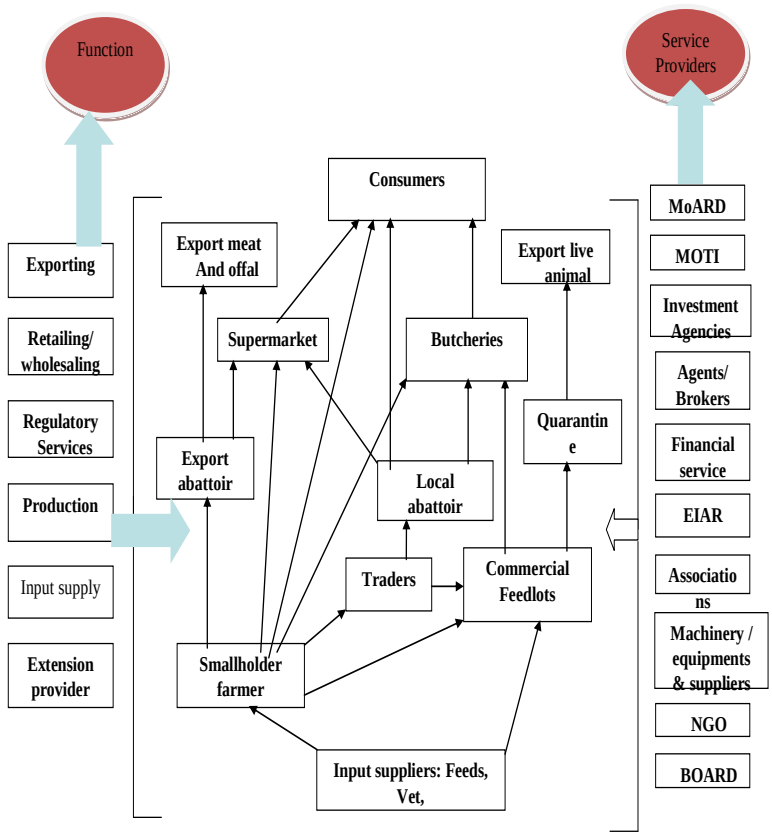

Figure 1. Map showing the Beef value Chain, Roles of the Actors and Support services

Inputs

The major limiting factors as inputs that producers need in order to obtain the intended product are feed and veterinary services.

Feed

The producers' of beef animals particularly the small holders majorly obtain the feed input producing them from: crop residues; improved fodder bank; or purchasing from other sources. The distant rural dwellers keep their animals on pasturelands while those urban and peri-urban depend majorly on zero grazing i.e. on purchased feed resources depending on the availability and its affordability by the producers.

Veterinary services

The major support for smallholder farmers in this regard obtained from local agricultural offices. However, commercial feedlots employ either part time veterinarians or permanent workers based on their scale of operation. The meat inspection and certification service in all abattoirs is fully the tasks of the government veterinarians. The quarantine certification service for animals intended for export purposes provided by federal veterinary offices operating in the areas.

Beef cattle producers

The major sources of beef cattle for domestic consumption are small holders' producers and to some extent commercial feedlots.

Smallholder producers

The smallholder producers of the highland areas of the country are the major sources of beef for domestic consumption. Particularly the smallholder highland farmers of Hararghe, Northern Shewa, Sidama, and Wolaita Zones are the major sources of beef cattle to terminal markets Addis Ababa. The producers of these areas do have strong tradition where 1-2 head of beef cattle are tethered and managed on hand fed feed resources. The problem with this system of production are: they use majorly beef cattle at final phase of their primary purposes (traction power, milk production, and breeding) so that at the stage of final fattening period the cost of production incurred become very high. This is because the genetic makeup of the animal and the age at which the animals allowed to inter fattening prolongs the days of the fattening cycle to attain the desired beef ability. The smallholder producers to minimize the cost of production keep their animals relatively on cheaper feed resources that obviously are poor in quality as well as quantity to the biological need of the animal. Finished animals are sold directly to butchers and traders.

Pastoralists

The pastoralists keep their animals on what is available on the rangeland and their lively hood depends on production of these animals. They sale their beef cattle to traders, feedlots or the highland farmers when a need of cash arises or the feed resource is problematic. The beef cattle kept by the pastoralists in the majority of the year are poor body condition so that they are not directly demanded as animals for beef production for the terminal markets of Addis Ababa. Therefore, such animals are kept under

the smallholder farmers of the highlands or feedlots before reaching the terminal markets of Addis Ababa.

Commercial feedlots

The existing commercial feedlots in the country are majorly found around Adama (Adama town, Mojo and Dera). They buy growing cattle from primary and secondary markets of the southern lowlands of Borana areas and feed them on concentrates such as wheat bran, oil seed cake, and molasses. Almost all the animals used for commercial feedlots are "Borana Bullock "and in rare cases the "Guji and Ogaden" bullocks. The major reasons as explained by the feedlots are

- the preference of the importing traders;
- the feed conversion efficiency of these animals; and
- the unique traits that these breed have got to withstand the stress conditions (long distance transport; water economy during shipment to export destination; calmness of the animal and easy adaptation to new environment).

Current commercial cattle feedlots, under normal condition produce totally for live animal export and are not considered as sources of domestic beef production. This is because of the price competitiveness between the domestic and export markets towards these particular animals. In rare cases the commercial feedlots supply the domestic markets, the main reasons are: unfit for export due to underweight or over weight; skin branding; some abnormal defects on the animal; luck of export market opportunity and when the feedlot owner decided as the last resort to sale to domestic markets. Currently, the domestic market is considered by the operating commercial feedlots as "Market at Loss".

Beef Cattle Markets, Traders, and Brokers

Markets

Most of the beef cattle come from producers in different regions of the country by traders and sold at beef cattle terminal markets in Addis Ababa, i.e. Kera, Shegole, Karalo, and Akaki. Wednesday and Friday are the major beef cattle marketing days of the week. These terminal markets are fenced, supply of water, and feed brought by the animal owners to keep the animals in the market for subsequent days in the premises of the market. The suppliers who come to these markets at any one time (market day total for the four markets) on the average brought about 2000-3000

cattle. The major actors in these markets at a particular time reaches about 200 traders, 80-100 brokers and more than 1000 buyers operating in the transaction.

Traders

Beef cattle producers in different parts of the county, produce the beef cattle and sale to traders in the nearby markets. The traders buy the animals from primary or secondary markets, assemble, and transport them to the terminal markets. Along with the producers the cattle traders, purchase the animals, at the market it is not only the producers and the traders, but the brokers play active roles in setting the market price. Depending on the number of cattle in the market and the particular time of the year, prices tend to increase rapidly or become lower. The market condition swings up or down depending on the composition of these actors.

Brokers

These market agents serve as mediators between buyers and sellers in the livestock market. They usually presumed to link buyers with sellers and moderate negotiations and facilitate the terms of exchange. However, buyers have to pay Birr 20/head of cattle as a broker's fee whether they are mediated by a broker or not. Most often, brokers in these markets intentionally create a communication gap between buyers and sellers (producers) and arbitrate them in the way they need. After the two parties come to agreement, they take the money from buyers and pay a deducted amount to the sellers. Therefore, brokers are considered as market barriers by both the traders and buyers. According to the respondents of the visited markets, the problem is very serious to the producers' sellers who do not have much experience of the markets.

Mode of animal transaction

In Ethiopia, animal transaction for domestic markets is carried out by judging the attributes of each individual animal. The transaction of feeder beef cattle (fatten animal) for markets like Addis Ababa is very difficult to undertake by ordinary traders. This is also supported by the study of (Jabbar and Benin, 2004) that revealed the marketing system in both primary and secondary markets is based on visual assessment rather than established grade and live weight. Therefore, such transaction entails experienced judgment skills that most often gained through rigorous working in the domestic abattoir or livestock markets.

Animal transport

Distances traveled to primary markets can reach as far as 10 to 40 km; from the primary markets, those livestock purchased by traders are trekked or trucked to larger secondary, and eventually for most, to tertiary markets. Through these occasions, distance of up to several hundred kilometers may be involved. Because of these, animals generally pass through several markets and traders' hands before reaching their final destination. Currently the major mode of transportation of beef cattle to terminal market of Addis Ababa is trucking using undesignated ISUZU lorry. Accordingly, the beef cattle are tracked from all directions of its destination to terminal markets of Addis Ababa traveling as far as 100kms to 400kms. Animal management during transport towards the terminal market of Addis Ababa is very inhuman. Beating and disturbing the animal using heavy stick while transport by the attendant of the animals locally known "Combiner" is a common practice to prevent the lay down of animals on the truck. Now days, it is almost common to see heavy bruised and blood splashed defects on the major retail cuts of dressed carcass at every retail shops. This situation causes several problems

- Discoloration of the meat which is major obstacle to purchase at spot;
- Loss of meat as a result of trimmings of the blood splash and bruised;
- Quality deterioration (shelf life) of the carcass since the slaughter animal lost the muscle glycogen;
- Loss quality of the hide as a result of beating with heavy stick and kicking; and
- Loss of palatability of the meat that was attributable to change in the chemistry of the meat.

Distances traveled to primary markets can reach as far as 10 to 40 km; from the primary markets, those livestock purchased by traders are trekked or trucked to larger secondary, and eventually for most, to tertiary markets. Through these occasions, distance of up to several hundred kilometers may be involved. Because of these, animals generally pass through several markets and traders' hands before reaching their final destination. Currently the major mode of transportation of beef cattle to terminal market of Addis Ababa is trucking using undesignated ISUZU lorry. Accordingly, the beef cattle are tracked from all directions of its destination to terminal markets of Addis Ababa traveling as far as 100kms to 400kms. Animal management during transport towards the terminal market of Addis Ababa is very inhuman. Beating and disturbing the animal using heavy stick while transport by the attendant of the

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- Discoloration of the meat, which is major obstacle to purchase at spot;
- Loss of meat because of trimmings of the blood splash and bruised;
- Quality deterioration (shelf life) of the carcass since the slaughter animal lost the muscle glycogen;
- Loss quality of the hide as a result of beating with heavy stick and kicking; and
- Loss of palatability of the meat that was attributable to change in the chemistry of the meat. Moreover, the animal welfare condition of the country is also becoming very serious and needs attention of the relevant Authority. Its consequence may extend to the meat and live animal export trade as a whole.

Domestic abattoirs

In the Addis Ababa city there are three domestic slaughterhouses of these, two are public properties and administered under the Addis Ababa slaughterhouses organization, one situated in the main city (kera area) and the other one in Akaki sub-city. The third abattoir found in the Addis Ababa is Karalo Slaughter house, a private enterprise found in the Kotebe area of the city. There are also two medium sized slaughterhouses at the outskirts of Addis Ababa, in Burayu town. All these five abattoirs do give slaughtering services and transport the carcass to respective clients /Butchers and supermarkets. The daily average slaughtering capacity of these Addis Ababa abattoirs is 900 cattle, 1200 sheep and goats, and 100 swine; Karalo slaughterhouse 350 cattle; and the 2 abattoirs of Burayu 200 cattle. With the rise of the population of Addis Ababa and the need for varieties of meat products to the community, the slaughter service given by these few abattoirs cannot fulfill the demand for slaughtering services. It is common to see roadside and back yard slaughtering in the city mainly during festive dates and for ceremonial activities.

Butcheries and supermarkets

According to the Addis Ababa City Trade and Industry Bureau, there are 1369 butcheries shops, 120 supermarkets that retailing beef and beef by-products. Supermarkets majorly sell raw as well as processed beef and by-products directly to consumers for home consumption while butcher shops sell raw as well as roasted products to their customers for home consumption as well as serve at the retail shops. Butcheries and super

markets in Addis Ababa have different price rates depending on the type of beef animals they use for meat selling, the location of the butcheries and the quality of the meat cut they offer for sale. Butcheries around Piassa, Lideta, Kasanchis and Arat Killo for instance charge about 70-90 Birr/ kg of meat ready for raw and roasting, while at Karalo, Burayu and Akaki areas charge as low as 36 Birr per kilogram(as of February, 2011). At the later areas, the price of good quality cut does not exceed 65 Birr/kilogram. This price variation is also attributable to the cost of utilities (house rent, workers salary, and facilities used). The sale of meat is observed to be steady and unaffected, despite in price increase from 20 Birr to 90 Birr/kg in the last five years. This could be attributed majorly to the cost of production of the final meat and associated overhead costs (the cost of slaughtered animals, house rent, labor cost, and slaughter service cost); small number of butcheries and supermarkets compared to the large population of customers. There is no strong consumers' association, consumers' awareness and solidarity in this regards. Hence, consumers accept whatever price set by the butcheries.

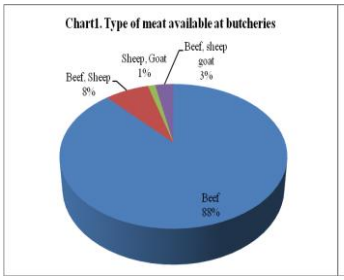
Survey Results

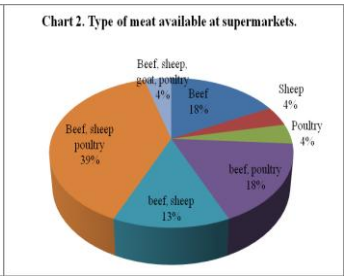
Respondents' gender, level of education, experience, and responsibilities

Female respondents accounted for 11% (n=17) sampled butcheries and 13% (n=3) in supermarkets (N=23). During the study period, 879 workers comprising 40.8% adult men, 28.4% adult women and 30.7% youth were operating in butcheries, whereas 701 workers were operating in the supermarkets, of which 33% were men, 45% women, and 22% youths. No woman was observed to take part in meat cutting, selling, or serving in butcheries, but often involved in cooking and cleaning. Nearly above 50% respondent in butcheries had completed their primary education, 33.5% completed secondary education, and one (an owner) completed his tertiary education. Of the supermarkets' respondents, 26.1% completed secondary education, 30.4% completed advanced education and 34.8% (n=8) completed tertiary education. The respective respondents' age, family size and experience in butchery work was ranged from 18-68 years, 1-18, 2 months - 50 years. The respondents' age, their family size and experience in supermarkets work was ranged from 25-75 years, 3-25, and 2 months to 40 years, respectively.

Meat types available

About 88% (n=142) of butcheries run business on selling beef alone than either on beef and sheep meat, sheep and goat meat or all the three types (Chart 1). About 39% (n=9) of supermarkets sell beef, sheep meat and poultry meat collectively, while a few supermarkets sell beef alone (Chart 2). Most of the respondents had knowledge of their meat animals' source areas originally coming both from lowlands and highlands areas, particularly with beef cattle.





Facilities in use

The majority of butcheries (n=72) were built part of a hotel/restaurant, part of business house (n=35) and part of residence house (n=17). Only 23% (n=37) of the interviewed butcheries were built independently. On the other hand, 14 supermarkets were built independently, while 8 supermarkets were part of business houses and 1 supermarket was found part of a hotel. Moreover, many of the butcheries and supermarkets were built roadside being oriented to wind direction. Floor of butcheries was built entirely from concrete (4.9%), cement (92%) wood (2%) or ceramic (0.6%), while that of the supermarkets' was built from cement (43.5%), concrete (26%) or other materials like ceramic, marble etc.(26.1%). Walls of 87.6% butcheries and 95.7% supermarkets were constructed from smooth bright and impervious material, while that of others were built from rough and dark impervious material.

Not all facilities are built part of the main buildings. Butcheries owning bathroom, toilet, utensil room and change room comprised 4.3%, 45.3%, 6.8% and 4.3%, respectively, but all were not found within the butchery house. Butcheries lack bath room, toilet, utensil room and change room accounted for 28% (n=45), while supermarkets owning bath room, toilet,

utensil room and change room comprised 8.7%, 21.7%, 4.3% and 4.3%, respectively. However, two of the supermarkets lacked these facilities at all. About 52% (n=12) of supermarkets had all the facilities listed above, except utensil room. About 69% (n=111) of butcheries had no freezer or cooler facilities. Some butcheries (n=48) owned freezer and coolers (n=2). Seventeen supermarkets use freezers and 6 used coolers. Where used, the maximum holding capacity of most freezers in butcheries is 500liters, while 11% of supermarkets own freezers holding over 500litres. Butcheries carcass chamber protected by mesh wire was accounted for 2.5% (n=4) and that with glass window was 11.2% (n=18), while the rest of the butcheries lack these facilities leading to direct exposure of meat to the external environment. Not all, but 39% (n=63) of butcheries and 61% (n=14) of supermarkets were noted to use insect traps. Use of complete protective cloths by employees was uncommon. Workers operating only in 11 butcheries and 9 supermarkets were observed to use hair cover, while overall suit was used in 100 butcheries and 9 supermarkets interviewed. Only 3.1% (n=5) of butcheries and 39.1% (n=9) supermarkets appeared to wear complete set of cloths. Use of hand gloves and plastic boots was also uncommon. About 77.6% (n=125) of butcheries and 47.8% (n= 11) of supermarkets used hot water as a sole sanitizing agent to clean utensils, though the cleaning practice right after use is uncommon. Seven butcheries and 1 supermarket use heat, while chemical sanitizers (by 1 butchery and 5 supermarkets), powder soap were often used. During the study period the number of supermarkets owing and applying different technologies was limited. Only a supermarket has lab for microbial testing, 5 supermarkets apply anti-microbial chemicals and 4 supermarkets use high pressure processing.

Meat processing and marketing

According to the survey result, 51% of butcheries have processed meat in retail cuts before sale, while 74% of sampled supermarkets responded to process meat into whole carcass. Most of the butcheries and supermarkets process meat into whole carcass, half carcass, quarter, and retail cuts is indicated in table 1. Some butcheries and supermarkets also process meat into minced meat and sausages.

Table1. %age of butcheries and supermarkets processing different meat products

Retail shops	Whole carcass	Half carcass	Quarters	Retail cuts
Butchery	29	9	11	51
Supermarket	74	4	9	13

Nearly 69% (n=111) of the butcheries were responded to sell raw meat, cooked meat and offal, while butcheries selling raw meat, raw meat and cooked meat, raw meat and offal was 13.7% (n=22), 9.3% (n=15), 7.5% (n=12), respectively. About 74% of supermarkets sell raw meat and 21.5% sell burger meat. Method of price setting would vary: 36.6% of butcheries set price by judging, 38.5% by weighing, and 24.8% both by judging and by weighing, while 17.4% of supermarkets set price by judging, 65.2% by weighing, and 17.4% by judging and weighing. According to survey result, butcheries' customers were individual buyers (39.8%), household consumers (37.3%), individual buyers, and household consumers (13%), while all customers of the supermarkets' were household consumers. About 44% of the butcheries sell beef carcass amounted to a quarter per day, while 29.8% and 25.5% of the butcheries sold half carcass and whole carcass. Most supermarkets (47.8%; n=11) finish selling of half carcass per day, while only 6% complete whole carcass or a quarter. Extent of the daily consumption of meat in each retail shop would vary by meat type and sub-city.

Capacity building/training

According to the respondents, only 11.8% (n=19) of butcheries and 39.1% (n=9) of supermarkets received training on meat processing and retailing, also explaining the relevance of training on job performance was high to fair. Training on meat production and safety aspects was also provided for supermarkets' employees. According to the respondents, 52% of the supermarkets received continuing informal on-the-job training, 13% received formal periodic refresher course given by professional trainers and 4.3% received a scheduled on-the-job refresher course given by supermarket personnel. However, 30.4% of the supermarkets received none of these trainings.

Estimated meat production (carcass equivalence)

Meat production is gauged by a mix of livestock population, productivity, age, and sex of the animals and off-take rates. Based on cattle, sheep, goats, camel and poultry population (CSA, 2007) and respective off-take

rates of 10, 35, 38, 6.5 and 200 %; and the national estimates (MOARD, 2006): carcass weight 130 kg for cattle, 10 kg for shoats, 200 kg for camels; and for poultry the annual meat production of Ethiopia is estimated at 0.885 million tones. Beef production accounts for 69.9, mutton and lamb for 10.3, goats 9.3, camel 1.5, and poultry 8.9 % of the total country's meat output. Assuming a population of 74 million people in the country for the same year(2007), the per caput meat availability is estimated at 12 kg per capita which is much below than that of the per capita consumption of the developing countries (Delgado et al. 1999). This analysis will have an implication on the volume of export; competition between the domestic and export markets for slaughter animals and the price competitiveness of these markets.

Consumers and consumption patterns

The results of consumer preference with regards to the quality and safety attributes showed that, meat used for *kitfo* (prepared from raw minced and better) is red, tender, lean and free from gristles; whereas meat which is less tender and with gristles is used for sauce whereas meat with some fat is used for *tibis* (roasted meat). Consumers' quality preferences on meat differ. Thus, no gristles, blood spot, longer shelf life, and high sales turnover are considered as indicators of quality. Regarding safety; some argued on presentation of health certificate, the housing of the butchery, availability of cold chain facilities and protected meat display cool box to protect the meat from dust, flies and un-necessary materials in the meat shops.

Consumers preferred that meat product should be fresh. The meat demand shows seasonal and sale turnover is small in the major fasting seasons. Fasting Christian Orthodox households do not consume meat in fasting seasons. It is also observed that most of the butcher houses are closed during Wednesdays and Fridays, which are weekly fasting days of the Orthodox Christian households. The meat consumption in most Orthodox households is very seasonal. No consumption in fasting seasons and relatively long time of consumption after the fasting season is observed.

Data obtained from CSA Showed that Ethiopia's per capita meat consumption has been very low (2.7 to 3.5) and could not be considered as essential part of daily household nutrition (CSA 1996; CSA 2000 and CSA 2004). More than 40% of meat in the country is consumed in urban

areas (7.8 to 9.7kg) while that of the rural areas (1.7 to 2.6kg per-capita) total account 60%. Per capita meat consumption in urban households changes more steeply with change in per capita income compared with rural households. The consumption and its response to income change has distinct pattern between urban and rural households (Shawel Beteru and Kawashima H., 2010).

Value addition activities

Different value addition activities are performed at each segment along the value chain until beef products reach the final consumers.

- Producers (producing, transporting, selling);
- Brokers (brokering/ negotiating the buyers and sellers);
- Traders (purchasing, assembling, transporting, selling);
- Butchers (Buy Animals and send it to Abattoir, displaying, cutting beef, mincing and raw meat roasting/cooking);
- Supermarkets (availing cooled chain facilities, cutting beef, mincing, de-boning, packaging, displaying and selling);
- Restaurants (mincing, cooking, roasting and serving);
- Hotels (cutting beef, mincing, roasting, cooking and serving); and
- Abattoirs (inspection and certification slaughtering, cleaning, cooling, transporting and distributing of carcasses and semi-processed beef by-products)

Consumer preference for beef quality and safety attributes

Beef quality attributes

The quality of meat differs from person to person. Some say fatty meat is of high quality while others say red lean meat is better. Accordingly, different parts of the same carcass have different quality depending on the individual preference. The quality difference is also revealed depending on the purpose for which the meat is utilized. The meat used for *kitfo* is red, tender, and lean one. Meats with gristles are used for sauce and red meat with some fat is used for *tibs.* For understanding the consumer preferences consumers were interviewed at various places (at homes, butcher shops, eating places and supermarkets) to indicate their perceived preference of meat quality and safety. Fat content, absence of gristle, absence of blood spots, freshness, sale turnover, and place of purchase, price, color, and marbling are qualitative indicators of meat quality. They think that they can identify the quality of meat by sight than price.

Safety attributes

Regarding safety attributes consumers most frequently raised the following issues. Consumers go for shopping in those outlets where evidence for animal health certification can be provided and they are worried mostly about tapeworm cyst presence in the meat. They also give importance to the butcher house and butcher's own neatness. Some households commented that they purchase meat in super markets because they believe that the product is safer than that of the butcher house. Many comment that it would be nice if the butchers display the meat with refrigerator glass/cool box rather than the current way of keeping meat which is not safe as it is exposed to dusts, flies and other contamination. Most of them are also concerned on the way distributors from the abattoirs dress whose working cloths supposed to be neat.

Grades and standards

There are local and national beef cattle grades and standards at three levels, i.e. high, medium, and low, simply based on the physical condition of live animal, however not actually realized along the value chain. These local beef cattle grades and standards exclusively are utilized for routine extension services such as farmers training, and awareness creation. On the other hand, the QSAE formalized six national grades and standards for imported fabricated meat products as chilled and frozen beef, Corned beef, Determination of Nitrate Content, Determination of Moisture Content, Determination of Total Fat Contents, and Determination of Free fat Content.

Conclusion and Recommendation

The findings of this study indicate that beef sector in Ethiopia is a sector with high potential prospect for its immense livestock population with varying breed types, presence of markets. However, the current production as well as consumption levels is very low. Provision of training as a capacity building option is inadequate. The current operational practices employed and facilities in use by most of the supermarkets and butcheries are far below the standards set for safety and quality concerns of the markets. The linkages and trust ship between the value chain actors are also very weak to exploit the potential market opportunities. It is recommended that, strategic capacity building development should be given for the value chain actors through various means particularly in modern production, processing, marketing and

consumption techniques to enable all actors share equitable benefit from the sector. Stringent support measures should also be taken by the regulatory bodies to ensure that the quality and safety of meat is not affected by the existing poor facilities and working practices. As these will increase productivity, reduce losses, add value to products, and make the products competitive in the conventional and niche markets.

References

Berhanu Gebremedhin, D Hoekstra and Samson Jemaneh, 2007. Heading towards commercialization. The case of live animal marketing in Ethiopia. Improving Productivity and Market Success (IPMS) of Ethiopian Farmers Project Working Paper 5. ILRI (International Livestock Research Institute), Nairobi, Kenya. 73 pp.

CSA. 2007. Statistical Abstract. Agricultural Sample Enumeration. Addis Ababa, Ethiopia.

CSA. 2005. Statistical Abstract. Addis Ababa, Ethiopia.

CSA. 2010. Central Statistic Authority Ethiopia, Agricultural Sample Enumeration. Livestock

Delgado C, M Rosegrant, H Steinfeld, S Ehui, and C Courbois. 1999. Livestock to 2020: The Next Food Revolution. Food, Agriculture and the Environment Discussion Paper 28. IFPRI/FAO/ILRI.

Ethiopian Customs Authority. 2011. Ethiopian Export commodity data by value.

FAO (Food and Agriculture Organization of the United Nations), 2004. Livestock sector brief: Ethiopia. Livestock information, sector analysis and policy branch (AGAL), FAO, Rome, Italy.

HICE. 1996. Central Statistical Authority Revised report on the 1995/96 Household income, consumption and expenditure Survey, 204 Statistical Bulletin.

HICE. 2000. Central Statistical Authority Revised report on the 1995/96 Household income, consumption and expenditure Survey, 258 Statistical Bulletin. Volume I Analytical report.

HICE. 2004. Central Statistical Authority Revised report on the 1995/96 Household income, consumption and expenditure Survey, 394 Statistical Bulletin. Volume II Statistical report.

Jabbar MA and S Benin. 2004. Trader behavior and transaction costs. In: Live animal marketing in Ethiopia. Paper presented at the workshop on improved land management and agricultural market development in the Ethiopian highlands. Addis Ababa, Ethiopia, 19–20 February, 2004. 23 pp.

Makokha S and F Mahamadou. 2010. Exploiting markets for Dairy and Meat Products Quality and Safety in Kenya ILRI.

MOARD. 2006. Animal off-take rate estimate. Un-published report.

Shawel Betru and H Kawashima. 2010. Pattern and determinants of meat consumption in urban and rural Ethiopia. Department of Global Agriculture, Graduate School of Agriculture and Life Sciences, the University of Tokyo, Bunkyo-ku Yayoi 1-1-1, Tokyo, Japan.

SPS-LMM. 2010. Trade Bulletin Issue I. Focus on Ethiopia's meat and Live Animal Export.

Dairy-Meat Value Addition and the Environment

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Introduction

Addis Ababa with its growing population, being a diplomatic center and hosting many international organizations, the demand for beef and dairy products is bound to increase as time comes along. As these sectors flourish with time, the effluent load on the environment will be tremendous unless measures are taken starting from the planning period. Thus, along with creating the conducive environment for the industry to expand, effort need to be put in preparing the industry for better handling of the effluent load. This needs to be thought carefully and provision be made in the design of the new plants for minimal emission and best practices and management techniques should be integrated to both the old plants and the new upcoming dairy industry. In the meat sector, when cattle are slaughtered, though meat is the significant product, by-products like hides, blood, fat, bone, and offal are substantial. The profitability of an abattoir and its environmental friendliness operation depend on the extent to which these materials are put to use. It also includes appropriate location of the plant to minimize pollution of rivers, groundwater, air, and negative impact on residents. Most site losses come from activities associated with liquid handling and, to a lesser extent, with the discharge of air and solid waste. The traditional effluent handling is after the effect management, while cleaner production is a proactive preventive management, which is based on the elimination of toxic raw materials and the reduction of wastes and emissions. This study was launched to assess the environmental condition at the dairy and meat sector and suggest ameliorating steps for better productivity of the sector in a more sustained and environmentally friendly way.

Methodology

The study was conducted through review of documents, discussions with knowledgeable persons, site visits, rapid market appraisals, survey using structured questionnaire and validation of the findings through workshops and stakeholders meetings.

Review Results

Documents by the Ethiopian Environmental Authority (EPA), the research community, the QSAE, MoA, and trade associations; leaflets and brochures prepared by milk and dairy enterprises were reviewed.

In Addis Ababa milk shed there are about 66,766 cattle and 31,062 (44.5%) are crossbred dairy cows (Tefera, 2006). It is easy to imagine, the amount of manure, feed loss and urine produced from these animals, which create environmental pressure. The per capita consumption is estimated to be 22litres (Azage *et al*, 1997), which is much lower than the recommended 250 ml of milk per day per person.

Currently the small dairy farmers keep an average 3-4 heads of cow, the manure from these animals is partly used as fuel, and some dump it without any consideration to the environment. Most of the farmers do not have a proper holding yard, and there is no drainage system to dispose of effluent. The source of feed for the animal is hay, industrial by product. Feed loss is high and consequent handling is not proper.

With the erection of factories and industries in Addis Ababa and the country as a whole, the pressure on the environment have been felt and a number of directives and proclamations were made by the government and has established the EPA as an organ, which creates awareness, prepares guidelines, and influences the policy environment. Accordingly, the EPA has prepared environmental protection guidelines and has taken a number of steps, though it is hard to say that it has reached the implementation stage especially in the dairy and meat sector.

As indicated in the Environmental Impact Assessment Procedure guideline prepared by EPA (EPA, 2003), the EPA is now organized to

guide the government and developers to stick to approaches, which will ensure environmental sustainability.

The document quotes articles in the Constitution of the Federal Republic of Ethiopia as manifested in Article 43: *The Right to Development, Article 44: Environmental Rights and* Article 92: Environmental objectives.

The document further brings in different proclamations to strengthen and necessitate the preparation of the guidelines as stipulated below

- *"Environmental Protection organs Establishment proclamation (proc.no.295/2002)"* has stipulated the need to establish a system that enables to foster coordinated but differentiated responsibilities among environmental protection agencies at federal and regional levels. The proclamation clearly articulates the establishment of Federal and Regional Environmental, Units and Agencies, respectively. This shows that institutionalizing and mainstreaming environmental concerns has a legal foundation.
- *The Environmental Impact Assessment Proclamation (Proc. no. 299/2002)* has made environmental assessment (EA) to be a mandatory legal prerequisite for the implementation of major development projects, programs, and plans. This proclamation is a proactive tool and a backbone to harmonizing and integrating environmental, economic, cultural, and social considerations into a decision making process in a manner that promotes sustainable development.
- The *"Environmental Pollution Control Proclamation (Proc. no. 300/2002)"* is promulgated with a view to eliminate or, when not possible to mitigate pollution as an undesirable consequence of social and economic development activities. This proclamation is one of the basic legal documents, which need to be observed as corresponding to effective EA administration.
- The *Environmental Policy of Ethiopia (EPE, 1997)***,** provides a number of guiding principles that indicate and require a strong adherence to sustainable development. In particular EA policies of EPE includes, among other things, the need to ensure that EA:

    - considers impacts on human and natural environments;
    - provides for an early consideration of environmental impacts in projects and programs design;
    - recognizes public consultation ;
    - includes mitigation plans and contingency plans;
    - provides for auditing and monitoring;
    - is a legally binding requirement; and
    - is institutionalized

In the document, it is indicated that any licensing agency, that gives an investment permit, must ensure compliance to the environmental requirements prior to issuing their respective licenses and permits. It is also their legal duty to require proponents to submit authorization, a letter of approval or Environmental Clearance Certificate awarded by the appropriate Environmental Agency, and to seek advice or opinion from the appropriate environmental agency if deem necessary.

In the annexes attached to the document, though the dairy industry and butcheries are not specifically mentioned, these are indirectly addressed in the livestock and abattoirs section. The EPA has also prepared a standard on the permissible effluent level that can be tolerated from the different sectors. In line with that, the permissible level for the dairy and meat sectors is listed.

The Ethiopian Standard Authority has 92 technical committees (TC), Out of these, a substantial number are for livestock and livestock products. TC 18, TC 20, TC 25, TC 26, and TC 34 are on animal feed, AI, milk and milk products and live animals respectively. The authority has a number of standards ranging from specifications for meat and milk products to testing methods.

One will not have any problem of identifying the required standards in order to establish the industry that meets both the national and international standards. The standards are available at the library for spot reading and can be purchased at a nominal price**.**

Rapid market appraisal

The desk review work was supplemented with Rapid Market Appraisal (RMA) of the meat and dairy markets in and around Addis Ababa. The study in both cases (dairy and beef) started from the input side where cattle markets were surveyed and discussion was held with stakeholders. Also milk producers, feed lots, dairy processors, butcheries, abattoirs, supermarkets, hotels, restaurants were visited and consumers were consulted to get a rapid and general picture of the meat and milk value chain in and around Addis Ababa.

The dairy industry

In the traditional milk shed, little attention is given to feed wastage, manure, and waste handlings. Most farmers keep one–three cows and there is no provision of feeding compartment, which minimizes feed loss. Besides, the dairy shade does not have a cemented floor, which imparts difficulty for cleaning and washing. There is no proper drainage system. In certain areas the manure and wastewater is spilled all over, which creates smell and odor. There are no provisions for handling the manure load in a clean and environmentally friendly way.

Milk processors

There are few milk processors in and around Addis Ababa, which can be categorized as medium size processors, excluding substantial number of operators handling the job at household levels. Some industry scale setups like Bora and Genesis farms at Debre Zeit and Sebeta Agro Industry were visited.

The Bora processing plant at Debre Zeit produces pasteurized milk. Looking at the environmental factor, there is a poultry farm in the neighborhood and the wash water was being dumped to an open ditch near the main processing building at the time of the visit. The Genesis farm has a well-organized farm, where wash water and manure are directed to a biogas digester and the leftover from the biogas digester is used as fertilizer to the horticulture farm.

The Sebeta Agro Industry Milk Processing Plant is situated between Alemgena and Sebeta. The plant has a capacity of processing some 60000 liters and now process about 30000 liters. The factory though established, without due consideration to the environmental aspect, it looks a well-planned factory with a modern facility and clean compound. Wash water and other factory wastes are not dumped everywhere, but are used as nutrient for the factory farm, but during the rainy season it joins the natural water course with the rainwater. Though well organized, there is still a gap on the treatment of the factory wastewater before dumping off and even before using it as a nutrient source for the factory farm.

The meat value chain

The first actors in the meat value chain are the cattle producers, who are the small producers, the pastoralists, and the feedlots. The small producers feed their cattle on pasture, concentrate, and bring the animals

to the terminal market. Pastoralists sell their cattle to traders or feedlots. The feedlots, feed their animals cut hay and concentrate. The animals end up at the abattoirs and some are slaughtered in the backyard. From the abattoirs, the meat reaches at the butcheries and supermarkets, which finally end up at the individuals' homes and restaurants. The environmental load at all the nodes of the value chain need serious attention, as all contribute menace to the environment. As part of this study beef cattle markets, feedlots, abattoirs, butcheries and restaurants in and around Addis Ababa were visited.

Addis Ababa cattle markets

The rapid market assessment on local cattle market was undertaken at Addis Ababa Karalo and Shegole markets The physical set up of the market including the site, topography, shade condition, watering and feed trough facility were assessed. Both markets do not have adequate watering and feeding trough. There is no adequate water for the animals and because of this problem, especially at Karalo, the traders register their animals and take them out for watering and grazing to the nearby area. The animals stay out in the open air and there is no shade, and lose weight and the traders at times sell the oxen at a loss. There are no veterinarians in the establishment, whenever the traders face a problem they pay as much as 70 Birr/shot for private veterinarians.

The barnyards are paved with big bolder stone. In the dry season, leftover feed and manure are easily picked up by the people in the neighborhood, made to dried dung, which are later used as fuel for cooking purposes. The collecting drain at the lower most edge of the barn is an open cemented ditch, where animals are usually caught in, when they become aggressive at times, especially at night. These have inflicted damage on the animals even deaths are reported occasionally. The effluent load on the downstream side is substantial especially during the rainy season. The barns have a problem of foot and mouth disease. This problem makes the animals lose weight and traders lose money.

At Shegole, cleaning of barn is done by the traders, where the individual takes care of the area allotted to him. Effluent build up is not exhibited, but the dumping ground is the land just outside the barn.

Feedlots

The rapid market assessment on feedlots was undertaken in Nazareth. Assessment was done on a feedlot in district 13 and in the newly designated feedlot zone. The feedlot inside the town has a problem of road, water, and electricity, which required the operators to incur some cost, for transporting feed and conduct any other interaction. The one in the feedlot-designated area has water, but other things are similar. There are no enough feed and water troughs, compared to the number of animals in the feedlot. There are no shades to shelter the animals from the sun and rain. Both feedlots feed their cattle pressed oil seedcake, chaff, bran, hulled bean, and maize, which are mixed using, spade. Seasonal high feed cost is exhibited in both farms. In both farms, all the employees are men mainly dominated by casual labor. Veterinary service is given by the quarantine division of the MoA, except in the larger feedlot where a retired vet officer is employed on contractual basis during the operation period of the feedlot.

Places currently away from residential area were selected as feedlot sites without giving due consideration to other important parameters like soil type, seepage problem to ground water source. The effluent load was substantial and did not look as if it had some form of disposal system.

Training is given neither to the operators nor to their employees on the management of the farm. No technology is disseminated from research to these feedlots. The effluent load is substantial, is cleaned, and is dumped outside the barn. Some make dung cake for fuel and at times, some farm operators buy for fertilizer use. The bulk is pushed out of the barn and is left to dry. There is no proper means of disposing off the waste and as some are in the middle of crop farms, it may contaminate and burn the crop, because of the concentrated raw waste flowing to the farmland. Most of the sites soils were luckily neither clay nor sand. Similar problems are observed in the new feedlot designated area.

Feed processing plants

The Kaliti and Alema feed processing plants were visited as part of this study. The general set up of the sites, the kind of feed processed and future conditions were assessed in line with the future expansion of the dairy and beef industries.

Alema Feed Processing Plant is located in the industrial zone of Debre Zeit on an adequate area. The factory has modern machineries with input receiving room. At the input receiving end, maize, soybean, chaff, rapeseed, nougcake, cassava, meat and bone crushed in flour form are used as the main ingredients. Besides, pre-mix and concentrates are used at a rate of 3%. Molasses is a major feed component. The plant produces about 14 types of feed using more than 14 types of ingredients. The plant has a capacity of processing 120 quintals of feed per hour. Currently the plant processes about 3000 quintals of feed per month. Raw material availability is seasonal and accordingly price is adjusted to maintain profit margin. Demand is increasing compared to the previous years.

The plant produces broiler, growers feed, broiler finisher feed, rearing feed, pullet feed, layer and layers breeders feed, piglet feed, sow general feed, sow lactation feed, pig fattening feed, calf rearing feed, beef fattening feed, dairy fertility feed and goat and sheep feed. All together, the plant produces more than fifteen types of feed at a price rate ranging from 261 Birr/q to 682 Birr/q. The plant is fully automated and has four storage bins, hammer mills, and vertical mixers. Depending on the requirement, each type of feed is prepared separately using the plant's software and coding system.

The Kaliti feed processing plant has been a government organization, but now it is a private company. This plant has a capacity of producing 1500 quintals of feed /day. It produces feed for equines, but has not embarked on producing pet food yet. The factory claims that there are equal number of men and women working in the factory. They further claim that there is no environmental hazard accounted to the plant and occupational health problems are not there.

Abattoirs

Local and export abattoirs at n Addis Ababa, Debre Zeit and Burayu were visited**.** The Hashim, Halal Export at Debre Zeit is a highly sophisticated two-lane abattoir, for beef and small ruminants. The abattoir works for export purposes.

The abattoir has a collecting yard with a vaccination crash and a twenty-four hours holding space for the animals before slaughtering. After slaughtering, the Caracas is kept in cold store for 24 hours. Offal and other non-edible parts are dumped in an open ditch. The abattoir is a

modern abattoir, but the effluent and other non-edible parts are not handled properly, where odor is sensed once one enters the compound. There is no supply problem, except intermediaries manipulate price. Women employees are limited to office and cleaning works.

The Addis Ababa city slaughter house has a collecting barn, where animals stay 24 hours, water is available, and have good laundry and sanitation facility for the operators. They have incinerators for burning waste and have proper waste handling facility. They have a capacity to handle 3500 animals per day. The work force is 500 permanent employees with 200 contractual workforces. The women are more responsible for cleaning and hygiene related works.

The Addis Ababa city slaughterhouse has diversified its service and involved itself in the meat value addition besides giving slaughter service. The traditional non-edible parts like bull sexual organs, hoofs, and intestine are now have markets and the plc is exporting them successfully. The slaughter service is running smoothly and at times operates to its full capacity. The slaughterhouse is now adding value and processing non-edible parts into pet food and industrial products like glue. So far, it is only blood from slaughterhouse, which remains unaddressed. The odor of the slaughterhouse is now tolerable compared to the previous years.

Burayu is a small town on the outskirts of Addis Ababa and is in the watershed of the Gefersa reservoir. Burayu does not have enough beef cattle, but more slaughter service is given in the town. Slaughter service is given by two abattoirs; where one is a PLC and the other is operated by an individual rented from the town's municipality. The abattoirs give service to some 54 butcheries operating in the town and others operating in Addis Ababa. The abattoirs give slaughter service to the shareholders, as most of them own butcheries as well. Though some butchery are said to have improved their handling they are far from meeting some modest standard. Non-edible offal, blood and other liquid wastes are dumped to the nearest waterways, which empty to perennial streams as most abattoirs are situated on riversides. The butcheries are getting enough service from the abattoirs. It looks that both the abattoirs and butcheries have a steady market, but the effluent load both from the abattoirs and butcheries need serious attention

Butcheries

A number of butcheries were visited in Burayu, Addis Ababa, Adama, and Debre Zeit. However, some look and clean, they are not established following the standard requirement for butcheries. Most have white painted walls, with ordinary mild steel hooks to hang the meat and the floors are not easily washable. Practically all use ordinary wooden meat chopping boards. None of them uses stainless steel knives or marble meat chopping boards. They do not have screened meat display rooms. In most places the cashier and the person cutting meat is the same individual. The operators do not have proper clothing, head cover and do not wear any gloves. Bones and other remnants are collected by women organized by the district administrative office and the butchery is charged added to its monthly water bill.

Luna supermarket

Luna is a modern supermarket dominated by meat and milk products. Meat comes from the owner's abattoir, which is an export abattoir. It has a proper trimming cutting mincing equipment and a large cold store large enough to handle six beef carcass. The cut meat display is kept at a temperature of 3 degrees. The operators have proper outfits including appropriate head covers. The supermarket products are sold like hot cake as reported by one of the workers in the supermarket. The worker is proud of his shop, the products, and the total handling system**.**

Other supporting organizations

There are some governmental and nongovernmental organizations, which are working to enhance the dairy and meat sector in the country. Organizations like the Artificial insemination center (AI), Land O'Lakes and the Ministry of Trade and Industry are some of them.

The AI center at Kaliti is the main supplier of improved breed through artificial insemination production. The Ethiopian Dairy Development project (EDDP) is part of Land O'Lakes International Development and is supported by USAID. The EDDP is focused on strengthening the markets for Ethiopian milk and dairy products.

The Ethiopian trade and industry development office though the livestock area has not been their prime priority, they explained that consideration has been given to the dairy and meat sector in their current approach. Accordingly, they have prepared some guidelines on the standard of

butcheries and on the establishment of cattle, sheep, and goat markets. The proposal included the establishment of 4 cattle and 30 small ruminants markets in the Addis Ababa region.

Survey

Structured questionnaires were developed to capture quantitative information to address milk producers, milk collectors, super markets and butcheries. Surveys were conducted in Addis Ababa and its vicinity by the project staff and enumerators. The questionnaires among many things were targeted to capture the environmental issues as well. The data collected were analyzed and the information was extracted accordingly. About 161 milk producers, butcheries, and super markets were contacted. The survey focused on environmental and health aspect of the customers.

Results

Milk producers

Nearly twenty-two % of the milk producers use wooden floors in their milk shade, and the walls in the 31.3% cases were made from dark, rough, impervious material. Waste material is disposed only once in 40% of the cases, 68.8% of the respondents reported that they do not have a proper waste disposal system and 73.5% of them do not have any processing means prior to disposing off the waste.

Butcheries

In the butcheries although there are rules and regulations about the required standards in preparing places for butcheries, about 34.8 % of the butcheries reported that they are not aware of the existence of the regulations , while 65% acknowledged the existence of the rules. Among the butcheries interviewed, 50 % reported that they are not visited by any official. Also 77.6% of tools are treated using hot water and about 17% use chemical treatments to disinfect their tools. It is only in 62% of the butcheries, where protective clothes are used. Only in 45.3% of the cases, exist proper toilets. It is only in 9.9% of the butcheries, where proper toilets, change rooms and utensil rooms are observed. Butcheries are placed in the proper orientation only in 44.7% of the cases. In 11.8 % of the cases, no proper wall material is used. It is only in 66% of the cases where the butcheries are properly placed. In 60.2% cases, the butcheries

are cleaned at the most once in a day and only 46% of them have a proper waste disposal system. Offensive odor is felt in 10% of the butcheries.

Consultation workshops

At workshops conducted at Holetta, Addis Ababa stakeholders appreciated the problems encountered at the different stages both in the dairy and meat value chain. Feed losses, manure loads, and poor handling were felt as prime problems detrimental to the environment. Biogas plants were suggested as one means of minimizing the effluent on the environment, but the cost of building the biogas plant and absence of credit system to build such an infrastructure was underlined as an issue to be addressed.

Discussion

As observed above the current milk and beef production level is far from meeting the current demand let alone the future demand of the country, which indicates that more need to be done to increase production and the associated work to flourish in the value addition. This indicates that many things need to be in place to protect the environmental from hazardous load and assure the sustainability of the resource base. Though the EPA is established to deter environmental pollution, it has overlooked the environmental load from the livestock sector (as there are no regulations set pertinent to the sector). The proclamation and rules are there but these are not extrapolated to address the pressure that will be added from the livestock sector. To address sustained environmental protection and enter the global livestock markets, these need be captured in the EPA guidelines EA and regulations.

There are standards adopted by the Ethiopian Standard Authority, which will help enter pruners enter the market, but it looks as if not many enter pruners and stakeholders know about it. People and government organizations should be made aware of these standards and serious consideration must be there to take these standards beyond voluntary adoption. The existing trade associations are mainly limited to flower and horticultural crops, but the dairy and meat sector need serious consideration, as this is a potential area to penetrate the international market.

As observed from the survey, a number of operators are not aware of the importance of environmental requirement. It is not only the operators, but also the implementing government offices do not seem to be aware of the site requirements, when allocating land for the dairy and beef industry. Butcheries, feedlots are established by river or streamside's and no pretreatment plant requirement are set and no directives are put about the mode of operation.

Conclusion

- The meat-dairy industry expansion or the placement feedlots. Abattoirs and processing plants should take into consideration nearby land uses, soil type, possible future developments, the volumes and nature of wastes produced and the proposed nature of waste recycling, reuse or disposal system;
- Appropriate location of the plant to minimize the impact on residents need to be observed;
- Maximum recovery of products such as milk fat and solid should be practiced;
- Recycling and or reuse of wastes, minimal waste production and recycling of water and treatment of waste before disposing off is encouraged;
- Wastewater treatment and disposal areas should not be sited above major ground water recharge areas such as gravel sand beds or fractured rock aquifers;
- Training should be organized on site selection, building material standards, dairy operations for farmers, operators, government officials and other stake holders;
- The walls, floor of the slaughter houses should be built with materials which can be easily washed and scrubbed;
- There must be a proper drainage system, which discriminates solid wastes from the other liquid waste material. There must be provision of hot water ;
- The tools for chopping cutting need to be stainless steel, where the overhead rail, which is not in contact with the meat material, could be of some other material;
- There must be a provision for washrooms, shower toilets for the operators. The people working in the abattoirs and butcheries should have proper clothing with gloves, head cover and apron to protect themselves and to avoid contamination;
- There must be a provision by town's municipality to cooperate with investors and entrepreneurs who are ready to be involved in animal byproduct and non-edible beef parts processing;
- Butcheries should not be placed on the road side, there must be separate rooms for casher, meat display, change rooms, wash rooms and shower;
- The meat show room must have a proper screen with a glass on the sides. The walls and floors must be smooth, white and easy to clean;

- The chopping desk must be marbled to avoid buildup of contaminants. The walls and floor need to have smooth edges to avoid buildup of dirt, other contaminants and for ease of cleaning;
- Proper training and skill upgrading programs and information exchange systems need to be in place for both dairy and meat operators. The College training programs, especially in the engineering and food processing areas should be strengthened to deliver the necessary skilled human resource especially in the processing sector
- The EPA has to organize the work force, set its programs and should be aggressive in implementing what is supposed to be done in order to safeguard the health of the population and win the confidence of the market for the good of the nation;
- Standards are the gateways to both the affluent national and international markets. The Ethiopian Standard Authority should have a program be it through the media and other means of communication to avail the information to potential entrepreneurs to help them enter the market; and
- Provision of credit system for building infrastructure like biogas plant should be available for people who are interested to be involved in the meat-beef industry.

References

Azage Tegegne and Alemu Gebre Wold. 1997. Prospects for peri-urban dairy development in Ethiopia.

Environment Protection Authority (EPA). 1997. Environmental guidelines for the dairy processing industry. State Government of Victoria.

EPA. 2003. The Environmental Impact Procedure guide line. Addis Ababa, Ethiopia.

Federal Republic Government of Ethiopia. 2002. Environmental Protection organs Establishment proclamation (proc.no.295/2002). Addis Ababa, Ethiopia.

Federal Republic Government of Ethiopia. 2002. The Environmental Impact Assessment Proclamation (Proc. no. 299/2002).

Federal Republic Government of Ethiopia, 2002. The Environmental Pollution Control Proclamation (Proc. no. 300/2002). Addis Ababa, Ethiopia.

Federal Republic Government of Ethiopia, 2008. Prevention of Industrial pollution, Regulation No. 159/2008 Addis Ababa, Ethiopia.

Proceedings of the 5th National Conference of the Ethiopian Society of Animal Production (ESAP), May 1997, Addis Ababa, Ethiopia, pp 28-39.

Teferra Abreha. 2006. Dairy production in Addis Ababa. A paper presented at a Regional Workshop organized by ASARECA, Kampala, Uganda.