Journal of Marketing and Consumer Research
ISSN 2422-8451 An International Peer-reviewed Journal
Vol.34, 2017

Dairy Production and Marketing Systems of Smallholder Farmers: The Case of Urban and Pre-urban of Guto Gida and Bako Tibe Districts, Western Oromia, Ethiopia

Kifle Degefa
Bako Agricultural Research Center, Bako, Ethiopia

Abstract
Ethiopian's economy is still dominated by agriculture and livestock share about 13-16% of total GDP. Dairy production could play a great role in the economy, considering its strong potential to provide regular income to poor rural, per-urban and urban households in Ethiopia. The objectives of the study are: to characteristics dairy production and marketing, to assess milk production and marketing system of dairy producers and to identify milk production and marketing constraints in dairy production in the study areas. Both purposive and random sampling techniques were employed to draw appropriate sample households. Data was obtained through household survey using a semi structured questionnaire. The result showed that dairy is the most important household livelihood in the study areas and out of the total dairy, about 72.97% are Horro breed. The overall average of local and cross dairy milk is 2.33 and 7.88 litter per day, respectively. The major constraints are livestock disease, feed shortage, labor shortage and low milk yield. These findings demonstrate the vital need to strengthen dairy production and market information delivery systems, encourage improved forage crop, improved breeding system and establish more market outlets with improved market facilities in order to promote production dairy in high value by smallholder farmers.
Keywords: Dairy production, Ethiopia, marketing, system, pre-urban, smallholder, urban

1. Introduction

Ethiopian's economy is still dominated by agriculture. It accounts for about 45% of the GDP, employs more than 85% of the total population that directly or indirectly, generates about 80% of the foreign exchange earnings, raw materials for 70% of the industry (Dawit *et al*., 2010). The share of livestock in the agricultural is about 13-16% of total GDP (Seifu, 2000 cited by Aleme and Lemma, 2015). Livestock serve for Ethiopian economy as sources of food traction, manure, raw materials, investment, cash income, security, foreign exchange earnings and social and cultural identity.

Dairy production could play a great role in the economy, considering its strong potential to provide regular income to poor rural, per-urban and urban households in Ethiopia and it has a huge potential for dairy production in Africa with diverse livestock genetic resources, better market opportunities and existing of diverse suitable agro-ecology (Azage *et al*., 2013). Milk and milk products are also play a very important role in feeding the rural and urban population of Ethiopia and have a high nutrition value and is daily produced, sold for cash or readily processed. It is a cash crop in the milk-shed areas that enables families to buy other food stuffs, contributing significantly to the household food security. It also assists spread farming risks and creates opportunity to make some idling resources enter to human food chain. Most of the local cattle used for milk production in Ethiopia are zebu breeds.

Horro breeds are known as milk producers and the former being reared the later western Oromia including east Wollega and west Shewa zones which have low production performance due to shortage of feed, access to inputs and services, long traditional milk and milk products and low adoption of improved. The observed growth in milk production has been attributed mainly to growth rather than increased milk productivity. Higher productivity is still hindered by low adoption of improved technologies and management practice. Therefore, there is considerable potential to increase dairy productivity in the study areas.

In order to improve dairy productivity and production, Bako agricultural research center was made a great effort for many years to improve dairy technologies. Besides the improving technology, efforts were also made to promote these dairy technologies in potential dairy production areas in the mandate areas. Based on production inputs used, location and access to market the center were focused on three dairy production systems which are smallholder crop-livestock mixed system, peri-urban and urban dairy production systems in the study areas. The study was focused on peri-urban and urban dairy production systems because of dairy production technologies include improved breed, feed and others had been under taken and popularized by Bako Agricultural research Centers for these areas (BARC, 2014).

Although at the study areas, there is lack of empirical information on dairy production and marketing constraints and opportunities of dairy improvement were not yet been characterized and well documented. Therefore, the investigating dairy production, marketing system in the study areas is crucial to reducing information gap by contributing to work better understanding on improved strategies of dairy production and

marketing conditions for benefit of dairy producers and traders and to suggest the possible interventions for further with the objectives: to characteristics dairy production and marketing, assess milk production and marketing system of dairy producers and identify milk production and marketing constraints in dairy production in the study areas.

2. Research Methodology

2.1. Description of the Study Areas

The study was conducted in per-urban and urban areas of Guto Gida and Bako Tibe districts from east Wollega and west shewa zones, respectively. BakoTibe district is located in West Shew zone of Oromia in the Western part of Ethiopia. It located at about 251 km from Addis Ababa, the capital city of Ethiopia. The average elevation of the district is 1610 masl and located 37.0575′ longitude and 09.015′ latitude. Geographically, it categorized into three agro-ecologies like lowland (51%), mid-highland (37%) and highland (12%) with annual rainfall and temperature range of 1200-1300mm and 13.8-27.8oc, respectively (BTWARDO, 2015).

Guto Gida district is found in East Wollega zone in the western part of Ethiopia. It is located at about 328 kilometres distance from Addis Ababa to the western direction possessing a total area of 901.80 km^2. It is divided in to 21 kebeles and one urban center having the capital town named Nekemte. Geographically, it categorized into three agro-ecologies; namely, highland, midland and the lowland with 0.26%, 46.74% and 53%, respectively (GGWARDO, 2015).

2.2. Sample Techniques

In this study, both purposive and random sampling techniques were employed to draw appropriate sample households. Guto Gida and Bako Tibe districts were selected purposively based on dairy production technology had been under taken and popularized. In the next stage, three kebeles (two peri-urban and one urban) from each district were selected randomly having dairy and prepare list of dairy producers. Finally, 111 dairy producers, 15 hotel owners, 13 restaurant owners and 10 traders were selected randomly using probability proportionality size.

2.3. Data Collection and Analysis Methods

The required data were collected through household survey using a semi-structured questionnaire. Actual data collection was headed by selection and recruitment of appropriate enumerators and trained on objectives, contents and methods of data collection. The primary data were collected relating to farm and farmers characteristics, livestock and livestock management, Inputs, milk production, marketing outlets, milk and butter buyers, price of milk and milk products, constraints and opportunities of dairy production. The secondary data were gathered by reviewing the required documents as additional information to strengthen the primary information for rational conclusion.

To address the objectives of the study both qualitative and quantitative variables collected by a semi-structured questionnaire were analyzed using SPSS. The qualitative variables included types of breeds, dairy performance, customers preference, milk and milk products marketing, market participants, constraints where as quantitative variables livestock number, number of milking cows, amount of milk produced, consumed and processed, lactation length, etc analyzed by descriptive statistics method.

3. Results and Discussion

3.1. Demographic and Socio-economic Characteristics

The aggregated average age of sample households was about 41.68 years with standard deviation of 13.51 and the average education level of sample households was about 5.69 years with standard deviation of 4.50. The aggregated average household size of the sample households was 5.96 persons per household with standard deviation of 2.28, which is relatively higher than the national average agricultural household size which is 5.1 persons per household (World Bank, 2013). With regards to the sex of respondents, about 65.77% of sample households were male headed and remaining 34.23% sample households were female headed (Table 1).

Table 2. Sample household demographic and socio-economic characteristics

Variable description		Bako Tibe (N = 60)		Guto Gida (N = 51)		Total sample (N = 111)	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age of HHH		43.08	11.66	40.02	15.36	41.68	13.51
Education level		4.53	3.92	7.06	4.79	5.69	4.50
Family size		6.33	2.17	5.49	2.34	5.95	2.28
		Frequency	Percent	Frequency	Percent	Frequency	Percent
Sex of HHH	Male	40	66.7	33	64.7	73	65.77
	Female	20	33.3	18	35.3	38	34.23

Source: survey data

3.2. Farming Characteristics

Land Holding: The aggregated average own land holding of sample households was about 2.19 ha. The aggregated average cultivated land of sample households was about 1.95 ha and only on average 0.19 ha of land was left for grazing (Table 2). The own land holding result implies that relatively there is large land size where compared to national average of land farmers in Ethiopia which is 1.2 ha (Essa, 2011).

Table 3. Land distribution of sample households

Variables	Bako Tibe (N=60)		Guto Gida (N=51)		Total sample (N = 111)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Own land (ha)	2.01	1.94	2.36	1.45	2.19	1.69
Cultivated land (ha)	1.86	1.10	2.04	0.99	1.95	1.05
Grazing land (ha)	0.05	0.01	0.32	0.06	0.19	0.03
Forest and others	0.10	0.07	0.04	0.02	0.07	0.04

Source: survey data

Livestock Holding (TLU): Given a mixed farming system in the study areas, livestock has considerable contribution for household income and food security and the size of livestock holding for sample dairy producers in the study areas by their status summarized in Table 3. The aggregated sampled dairy producers own an average of 3.33 and 2.17 cows and oxen of TLU, respectively. This result implies that in both study sites dairy is the most important for household livelihood. There was no statistically significant difference between Bako Tibe and Guto Gida in terms of size of holdings of different livestock species. From observed aggregated sample of dairy producers the average number of bulls and heifers were 0.75 and 1.24 of TLU, respectively.

Table 4. Households' livestock holding during survey period

Description	Bako Tibe (N=60)		Guto Gida (N=51)		Total sample (N = 111)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Cows	3.45	3.37	3.23	2.04	3.34	2.93
Oxen	3.27	2.25	0.71	0.06	2.17	2.16
Bulls	0.71	0.92	0.79	0.69	0.75	0.90
Heifers	0.88	0.80	1.68	1.45	1.24	1.21
Calves	0.30	0.34	0.77	0.49	0.52	0.56
Shoats	0.11	0.18	0.12	0.06	0.13	0.22
Others*	0.68	0.39	0.15	0.05	0.51	0.77
Poultry	0.06	0.03	0.03	0.04	0.05	0.06

*Others are donkey, horse and mule

Source: survey data

In general, the dairy farmers own high heads of dairy cows in both study areas than others species and relatively own higher heifers than bulls. This implies that dairy cows are the most important in terms of income generation sources and food security in the study areas.

3.3. Dairy Breeds and Breeding of Sample Households

Some important breed types and their status are summarized in Table 4. The aggregated sample dairy producers own about 72.97% pure Horro which is less than total cattle indigenous population in Ethiopia which is about 99.4% (Belete *et al.,* 2010). The result indicated that sample dairy producers own about 10.81% pure Horro and Horro cross and 5.41% own Horro cross. It is observed that there is a few Horro and Boran crosses which dominated only by urban dairy producers. From the result none of sample dairy producers own either Boran or Boran cross in Bako Tibe district.

In the study areas, there are three breeding methods practiced by dairy producers: indigenous bulls, crossbred bull and Artificial Insemination (AI). Across the whole sample, about 72.35% of sample households used indigenous bulls from zebu breeds. Due to low pregnancy rate to AI, farmers prefer to breed their cows naturally to crossbred bulls. This indicated that almost AI services take place only in and around the town.

Table 5. Breeds type of sample households in the study areas

Type of breeds	Bako Tibe (N = 60)		Guto Gida (= 51)		Total (N = 111)	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Horro	48	80.0	33	64.7	81	72.97
Horro cross	2	3.3	4	7.8	6	5.41
Horro and Horro crosses	10	16.7	2	3.9	12	10.81
Boran cross	0	0	4	7.8	4	3.60
Horro and Boran	0	0	3	5.9	3	2.70
All breeds	0	0	5	9.8	5	4.50

Source: survey data

3.4. Dairy Feeding Systems

The nutritional needs of dairy animals with respect to energy, protein, minerals and vitamins have long been known and reined over many years and highly sensitive to changes in feeding regimes where as production can fall dramatically with small variations. The main dairy feeding systems in the study areas are crop residues, crop aftermath, agro-industrial by products and community grazing land and combinations thereof. Out of total sample dairy producers, 65% were produced own feed from own pasture, crop residues and crop aftermath. Improved forage production is not a common practice in both study areas. The main reasons identified by sample dairy producers are insufficient of land, shortage of labor due to allocation of family labor for farming activities, lack of awareness on forage technologies and lack of improved forage seeds. In both areas large areas of community grazing land have been transformed into crop farms and there is severe shortage of feed resources in the study areas.

3.5. Dairy Productive Performance

Smallholder dairy cows are not only few in numbers but also characterized by low productivity such as low milk yield and short lactation period (Asfaw, 2009). Total dairy products, processed, consumed, sold per house hold are summarized in Table 5. The overall average local and cross daily dairy milk production is vary depending on feed availability.

Table 6. Production performance of sample dairy producers' production

Dairy Production Parameters	Bako Tibe (N= 60)		Guto Gida (N= 51)		Total (N = 111)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Daily milk yield of local cow during dry season (lit)	1.69	1.31	1.87	1.34	1.78	1.33
Daily milk yield of cross breed cow during dry season (lit)	6.47	4.98	6.50	4.64	6.48	4.81
Daily milk yield of local cow during rainy season (lit)	2.78	2.17	2.97	2.29	2.88	2.23
Daily milk yield of cross breed cow during rainy season (lit)	9.70	6.02	8.83	5.54	9.27	5.78
Total daily milk yield (lit)	7.83	5.88	7.12	7.89	7.48	6.88
Daily milk consumed by family (lit)	1.95	1.58	1.75	1.33	1.85	1.45
Weekly milk processed (lit)	23.66	22.51	20.31	26.98	21.99	24.75
Weekly milk sold (lit)	20.97	19.38	18.10	15.80	19.54	17.59
Lactation length of local cow (days)	270.38	93.83	280.64	106.93	275.51	100.38
Lactation length of cross breed cow (days)	282.67	61.09	293.13	59.41	287.90	60.25

Source: survey data

The average local cow milk during dry and rainy seasons is 1.78 and 2.88 liters per day, respectively. The average cross cow milk during dry and rainy seasons is 6.48 and 9.29 liters per day, respectively. This low productivity of local cow especially, during dry season could be a serious constraint to smallholder dairy development and competitiveness and there is a need to improve the productivity of dairy herd structure of smallholder farmers. Across the whole sample, about 23% of dairy farmers consumed milk and about 41% and 36% of was processed and sold milk, respectively.

3.6. Dairy Farm Operation

The major important sample dairy producers' farm operations are milking cows, milk handling, milk processing and milk and butter marketing (Table 6). All household members have different responsibilities for different

dairy farm operation. In both study areas women played major role in dairy farm operations (mainly in milking, milk handling, milk processing and milk and butter marketing following children) where husbands have less roles in dairy farm operation. In general, women and children are the major contributors in dairy farm operations.

Table 7. Dairy farm operation of sample dairy producers

Variable	Bako Tibe (N= 60)			Guto Gida (N= 51)			Total (N = 111)		
(%)	Wife	Husband	Children	Wife	Husband	Children	Wife	Husband	Children
Milking	56.67	6.67	36.67	58.82	5.88	35.29	57.66	6.31	36.04
Handling	46.67	11.67	41.67	47.06	9.80	43.14	46.85	10.81	42.34
Processing	63.33	3.33	33.33	58.82	7.84	33.33	61.26	5.41	33.33
Marketing	58.33	15.00	26.67	58.82	15.69	25.49	58.56	15.32	26.13

Source: survey data

3.7. Milk and Butter Market Outlets and Buyers

Smallholder's dairy producers' market outlets and buyers are summarized in Table 7. The major row milk buyers are cooperative, hotels and restaurants while butter sold to local traders, restaurants and individuals consumers. Hotels and restaurants and local traders are the main milk buyers and local traders are the main butter buyers in the study areas. Milk and butter marketing outlets are farm gate, village market, town market and cooperative. Farm gate and town market outlets are the major market outlets for raw milk where as village market and town market are the major market outlets to butter market.

The major producers who participate in fluid milk marketing are those who own crossbred cows and live in and around town formal and informal. Formal milk marketing is based on contractual agreement between the producer and customers[1]. The prices are negotiated and the milk delivered on a daily basis and paid at the end of the month. In peri-urban and rural part milk marketing is very low due to lack of modern milk stored material, limited rural road networks, absence of milk collection system and processing facilities. The report indicated that, marketable amount of milk will be increased by organizing and strengthening dairy cooperatives to collect and deliver milk to customers.

Table 8. Major Milk and butter market outlets and buyers by dairy producers

Market Outlets	Bako Tibe (N= 60)				Guto Gida (N= 51)				Total (N = 111)			
	Raw milk		Butter		Raw milk		Butter		Raw milk		Butter	
	F*	%	F*	%	F*	%	F*	%	F*	%	F*	%
Farm gate	19	31.67	17	28.33	20	39.22	6	11.76	39	35.14	23	20.72
Village market	15	25.00	20	33.33	8	15.69	21	41.18	21	18.92	41	36.94
Town market	26	43.33	23	38.33	13	25.49	24	47.06	39	35.14	47	42.34
Cooperative	0	0	0	0	10	19.61	0	0	12	10.81	0	0
Buyers												
Local traders	0	0	28	46.67	7	13.73	22	43.14	7	6.31	50	45.05
Hotels and restaurants	34	56.67	19	31.67	17	33.33	15	29.41	45	40.54	34	30.63
Milk cooperatives	0	0	0	0	16	31.37	0	0	26	23.42	0	0
Individual consumers	26	43.33	13	21.67	11	21.57	14	27.45	33	29.73	27	24.32

F* =Frequency

Source: survey data

In both study areas, there are no functional dairy cooperatives and producers were acknowledged the importance of dairy production. Out of the total sample of dairy producers 88% of respondents have willingness about dairy cooperatives and held as members, but there is no body get opportunity to well established and functionalized the existing dairy cooperatives. But, there is information lack on the organizational, management and operation characteristics of these cooperatives. This information is important to design and implement various interventions aimed to enhance the role of cooperatives in facilitating smallholder dairy producers' access to the market.

3.8. Dairy Production and Marketing Constraints

Dairy production and marketing systems in the study areas are affected by a number of constraints. The most important constraints associated with milk dairy production and marketing as prioritized by respondents in the study areas were summarized in Table 8. Livestock diseases are the major serious constraints and dairy farmers are characterized by limited control of dairy cattle diseases and parasites. Across the sample, it is observed that vaccination against major diseases such as foot-and-mouth disease, black leg, anthrax and lumpy skin diseases are practiced by major of the households and households who treat dairy cattle against worms and parasites, mastitis, brucellosis and salmonellosis is very low similar to (Belay, *et al*., 2012). Dairy producers similarly,

[1] Customers are hotels, restaurants, cooperative and consumers

labor shortage is reported as very important problem by 73.87% of the households.

Table 9. Dairy production and marketing constraints

Major constraints	Bako Tibe (N =60)		Guto Gida (N= 51)		Total (N= 111)	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Feed shortage	46	76.67	35	68.63	81	73.00
Low milk yield	31	51.67	37	72.55	68	61.26
Low quality of feed	37	61.67	19	37.25	56	50.45
Labor shortage	36	60.00	46	90.20	82	73.87
Poor market infrastructure	38	63.33	24	47.06	62	55.86
Lack of milk processing equipments	29	48.33	38	74.51	67	60.36
Low price of milk	41	68.33	20	39.22	61	54.95
Disease problem	39	65.00	48	94.12	87	78.38
Shortage of improved breeds	35	58.33	25	49.02	60	54.05

Source: survey data

Most of the milk dairy in the study areas based on rain-fed natural postural and crop residues. The human population has been increasing rapidly, resulting in increased demand and competition for arable land. Household give priority to production of food crops and land available for grazing is shrinking in the study areas. Feed shortage is reported as the major important problem by 73% of the sample households. Due to feed shortage and low quality of feed milk yield is reported as very low by 61.26% of sample households. The other important problems reported are: lack of milk processing equipments (60.36%), poor market infrastructure (55.86%), low price of milk (54.95%), shortage of improved breeds and low quality of feed (50.45%).

4. Conclusion and Recommendations

Dairy production could play a great role in the economy, considering its strong potential to provide regular income to poor rural, per-urban and urban households in Ethiopia and most of the local cattle used for milk production in Ethiopia are zebu breeds. The objectives of the study are characteristics dairy production and marketing, assess milk production and marketing system of dairy producers and identify milk production and marketing constraints in dairy production in the study areas.

In this study, dairy production and marketing system of per-urban and urban areas were analyzed in two Districts of western Oromia. Both local and cross-bred dairy was kept with inferior milk yield performance. The quantity of milk collected in the study areas is low. There is no formal milk marketing and processing system prevailed at the study areas. The milk produced is generally channeled through informal route and only few formal collections by contractual agreement made between producers and customers. Therefore, there is a clear need milk collection cooperative centers is a crucial in both areas.

The key constraints of dairy production and marketing system that deserve considerable attention were finally identified: disease, shortage of feed, labor shortage, low yield, lack of milk processing equipments, poor market infrastructure, low price of milk, shortage of improved breeds and low quality of feed. Strategic direction to alleviate these constraints and dairy development project more attractive are pinpointed for further development interventions.

5. References

Aleme A. and Lemma Z. (2015). Contribution of Livestock Sector in Ethiopian Economy: A Review. *Advances in live science and Technology*; (29):79-90.

Asfaw, N. (2009). Improving smallholder farmers' marketed surplus and market access for dairy products in Arsi zone, Ethiopia. Research Report 21. ILRI (International Livestock Research Institute), Nairobi, Kenya. 107p.

BARC (Bako Agricultural Research Center), (2014). Bako Agricultural Research Center annual report. Bako, Ethiopia.

Belay D., Yisehak K., and Geert P.J. Janssens. (2012). Survey of Major Diseases Affecting Dairy Cattle in Jimma Town, Oromia, Ethiopia. *Global Veterinaria* 8(1):62-66, 2012.

Belete A., Azage T., Fekadu B. and Berhanu G. (2010). Characterization of cattle milk and meat production and marketing system and opportunities for market-orientation in Fogera woreda, Amhara Region, Ethiopia. IPMS Working Paper No. 19. Nairobi: ILRI.

BTWARDO (Bako Tibe Woreda Agriculture and Rural Development Office), (2015). Bako Tibe Woreda Agriculture and Rural Development Office, the annual report. Ambo, Ethiopia.

Essa Chanie, (2011). Economic efficiency of smallholder major crops production in the central highlands of Ethiopia. An M.Sc. thesis presented to Agricultural Policy and Trade of Egerton University.

GGWARDO (Guto Gida Woreda Agriculture and Rural Development Office), (2015). Guto Gida Woreda Agriculture and Rural Development Office, the annual report. Nekemte, Ethiopia

Seifu, K. (2000). Opening address proceedings of the 8th annual conference of the Ethiopian Society of Animal Production (ESAP) held in Addis Ababa, Ethiopia.

Strock H., Bezabih Emana, Berhanu Adenew, A. Borowiecki and Shimelis W/Hawariate, 1991. Farming systems and farm management practices of smallholders in the Hararghe Highlands. Farming system in practices of resource economics in the Tropics, Vol. 11, Wissenschaftsverlag, Vauk, Keil KG, Germany.

Tegegne, A., Gebremedhin, B., Hoekstra, D., Belay, B. and Mekasha, Y. (2013). Smallholder dairy production and marketing systems in Ethiopia: IPMS experiences and opportunities for market-oriented development. IPMS (Improving Productivity and Market Success) of Ethiopian Farmers Project Working Paper 31. Nairobi: ILRI.

6. Appendix

Appendix Table 1. Conversion factors used to estimate Tropical Livestock Unit equivalents

Animal category	TLU
Calf	0.25
Weaned Calf	0.34
Donkey (Young)	0.35
Donkey (adult)	0.70
Camel	1.25
Heifer	0.75
Sheep and Goat (adult)	0.13
Caw and Ox	1.00
Sheep and Goat young	0.06
Horse	1.10
Chicken	0.013

Source: Storck et al. (1991)