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Cow and camel milk production and marketing in agro-pastoral and mixed crop-livestock systems in Ethiopia

Kedija Hussien¹, Azage Tegegne^{2*}, Mohammed Yousuf¹ and Berhanu Gebremedhin²

¹Haramaya University, P.O. Box 138, Dire Dawa, Ethiopia; ²Improving Productivity and Market Success (IPMS) Project, International Livestock Research Institute (ILRI), P.O. Box 5689, Addis Ababa, Ethiopia

Introduction

Although Ethiopia holds the largest ruminant livestock population in Africa, productivity has remained low and its contribution to the national economy is limited compared to its potential. The overall milk production system in Ethiopia could be broadly classified as pastoral and agro-pastoral, crop-livestock mixed and peri-urban and urban dairy production systems. Cattle, camel and goats are the main livestock species that supply milk. Total annual milk production from about 10 million milk animals is estimated at about 3.2 billion liters, which translates to 1.54 liters per cow per day (CSA, 2008). The bulk of this milk production (81.2%) comes from cattle, while small ruminants and camels contribute 12.5% and 6.3%, respectively (CSA, 2008). The lowland covers 60% of total land area and is home for 12.2% of the total human population. Ecologically it has arid (64%), semi-arid (21%) and sub-humid (15%) areas dominated by semi nomadic transhumance population whose economy is entirely dependent on livestock production (GETACHEW, 2003). Milk is the major source of food and income. Cattle dominate the population (55.4% of the TLU) followed by camels (15.3%), goats (13.7%) and sheep (6.4%), (CSA, 2008), and produce 27% of the total annual milk production (Getachew, 2003). Information is very scanty on the milk production and marketing system in the lowland areas in general. This study was therefore undertaken in the lowlands of Mieso district to (1) characterize the milk production and marketing system, (2) identify major constraints for the development of market-oriented dairy production, and (3) formulate recommendations for further development interventions.

Materials and Methods

The study was conducted in Mieso district of Oromia Regional State, located 300 km east of Addis Ababa (IPMS, 2004). Five rural *Kebeles*, i.e., Dire Kalu, Gena, Huse Mendera, Hunde Misoma and Welda Jejeba, with milk production and marketing experience and potential, were selected using purposive sampling and farmers from each rural *Kebeles* were selected and a total of 120 farmers were selected using systematic random sampling methods. Group discussion was undertaken with key informants and a formal survey was conducted. For market study, Mieso and Asebot markets, were purposively selected. Milk marketing was monitored during the rainy and dry seasons. During the monitoring phase, a diagnostic survey was undertaken to identify households that have lactating cows and/or camels in the selected five rural *Kebeles*. Lactating cows and camels were stratified into early, mid and late stages of lactation, and daily milk yield was measured for a period of one week. Data were analyzed using SPSS (2003).

* Corresponding author. Email: a.tegegne@cgiar.org

Results and Discussion

Indigenous breeds of cattle, camels and goats are used for milk production. Average household holdings of goats, camels and cattle are presented in Table 1. Natural pasture and sorghum and maize thinning (locally known as *chinki*) and crop residues (sorghum and maize stover - locally known as *ker*) are important feed resources. Mineral soil salt (locally known as *haya*) is also used by about 40% of the respondents.

Average cow and camel milk yield per head/day was estimated at 1.24 ± 0.01 and 2.36 ± 0.063 liters, respectively (Table 2). Average milk produced per household per day in the wet and dry season was 4.80 ± 0.22 and 2.37 ± 0.11 liters for cows and 13.19 ± 0.95 and 7.63 ± 0.82 liters for camels, respectively. Mortality due to diseases was identified as a major cause of loss in cattle (65% of respondents) and camels (67%). Pre-weaning mortality was very high and was estimated at 41.7% for goats, 61.7% for cattle and 66.7% for camels (Table 3).

Table 1. Overall species composition and ownership of livestock in Mieso district

Animal species	Number of households (N=120)	Number of animals	Household ownership Mean \pm SE	% from total herd
Goats	113	723	6.03 ± 0.30	44
Camels	33	220	1.83 ± 0.92	14
Cattle	120	683	5.69 ± 0.35	42

SE= Standard Error of Mean

Table 2. Daily milk yield of cows and camels in different rural *Kebeles* in Mieso

Rural <i>Kebele</i>	Daily milk yield per head (liter)			
	Cow milk		Camel milk	
	N	Mean \pm SE	N	Mean \pm SE
Dire Kalu	15	1.28 ± 0.03	75	2.68 ± 0.10
Gena	35	1.05 ± 0.04	20	2.07 ± 0.23
Huse Mendera	95	1.23 ± 0.02	39	3.02 ± 0.15
Hunde Misoma	35	1.48 ± 0.06	80	2.21 ± 0.09
Welda Jejeba	10	1.24 ± 0.05	52	1.76 ± 0.12
Average	190	1.24 ± 0.01	266	2.36 ± 0.06

Overall, crop sale, live animals, milk and milk product sale were the major sources of income for 79.2%, 67.5% and 80% of the respondents, respectively. Most of the households sell whole milk (78%) and butter (67%). About 29% of the respondents indicated that only one fourth of the total milk production is delivered to the market, and only the morning milk is sold, while the evening milk is used for home consumption. As shown in Table 4, the amount of cow and camel milk sold per day was higher ($P \leq 0.05$) in Mieso (496.6 ± 19.12 liters) than in Asebot market (187.89 ± 19.12 liters). The amount of cow and camel milk supplied to the market decreases by 39% and 28%, respectively during the dry season. The amount of milk sold per day during the wet season was higher ($P \leq 0.05$) higher than during the dry season for both cow and camel milk.

Table 3. Response on pre-weaning and post-weaning mortality of animals

Animal species	Mortality (%)			
	Pre-weaning		Post-weaning	
	N	Mean ± SE	N	Mean ± SE
Goat	10	41.7 ± 8.00	14	27.6 ± 6.60
Cattle	27	61.7 ± 5.20	41	32.6 ± 4.40
Camel	2	66.7 ± 14.70	10	23.5 ± 0.83

SE= Standard Error, N= sample households who encountered loss in dairy animals

Milk is sold by women organized in to traditional milk associations (locally called *Faraqa Annanni*) or on individual basis. The average amount of milk contributed by an individual per day in group marketing was higher ($P \leq 0.05$) (3.94 ± 0.17 liters) than those who sale on individual basis (1.64 ± 0.06 liters). The amount of milk sold (liter/person/day) was higher in Mieso (3.27 ± 0.17) than in Asebot (1.91 ± 0.06) market. In agreement with Holden and Coppock (1992), distance to market and availability of *Faraqa Annanni* were important factors that affected ($P \leq 0.05$) participation in milk marketing. Respondents indicated that milk sale was highly affected by low quantity (73%) and distance to market (38%). Cultural taboo on milk marketing was limited to only 7.6% of the respondents.

Table 4. Seasonal variation in quantity of milk sold per day and price of cow and camel milk in Mieso and Asebot markets

Variables	Market	Milk type	Season	Mean ± SE
Amount of milk sold (liters)	Asebot	Cow	Wet	473.3 ± 27.34
			Dry	213.4 ± 27.05
		Camel	Wet	243.1 ± 27.34
			Dry	143.4 ± 27.05
	Mieso	Cow	Wet	629.3 ± 27.05
			Dry	363.9 ± 27.05
		Camel	Wet	180.7 ± 27.05
			Dry	195.1 ± 27.05
Price (Eth Birr)	Asebot	Cow	Wet	1.94 ± 0.147
			Dry	3.14 ± 0.146
		Camel	Wet	1.42 ± 0.147
			Dry	2.96 ± 0.146
	Mieso	Cow	Wet	1.82 ± 0.146
			Dry	3.61 ± 0.146
		Camel	Wet	1.86 ± 0.146
			Dry	3.00 ± 0.146

SE=Standard Error of means; 1 USD = 9.6 Eth Birr

As shown in Table 5 feed scarcity, water shortage and security were the major problems identified by 41%, 30% and 15% of the respondents, respectively. Lack of knowledge in modern dairy production and management system, inadequate input supply and services, poor product quality, low volume and market problems are critical issues raised by respondents as hindering market-orientation of the production system.

Table 5. Problems in dairy production as prioritized by respondents in Mieso district

Problems	Total HH (N)	Priority of problems in dairy production							
		1 st		2 nd		3 rd		4 th	
		N	%	N	%	N	%	N	%
Shortage of feed	120	51	42.5	40	33.3	17	14.2	7	5.8
Shortage of water	120	37	30.8	40	33.3	10	8.3	9	7.5
Security problem	120	18	15.0	11	9.2	29	24.2	29	24.2
Poor vet. service	120	10	8.3	12	10.0	39	32.5	37	30.8
Lack of transport	120	4	3.3	4	3.3	14	11.7	19	15.8
Lack of dairy breeds	120	0	0.0	13	18.8	11	9.2	12	10.0
Absence of credit service	120	0	0.0	0	0.0	0	0.0	3	2.5
Poor extension service	120	0	0.0	0	0.0	0	0.0	4	3.3
X ² P-value	0.032								

HH=Household, (N) = Total number of respondents, N= Sample respondents

Conclusion and Outlook

This study has shown that there is a good potential for market-oriented dairy development in Mieso district. Smallholder dairy producers can benefit from economies of scale through integration into vertically coordinated dairy value chain. Organizing dairy producers and integrating them vertically to processors and input suppliers can reduce marketing and transaction costs; improve productivity and product safety; encourages value addition, and can create employment opportunities. Public support is needed in different forms such as business development service, improving access to resource and knowledge by private actors and developing market for their products and services. There is need for interventions to develop infrastructure; enhance input supply system; improved access to veterinary services including training of paravets; improved feed production, conservation and feeding systems; improved marketing system and introduction of improved dairy breeds in some areas where feasible. Capacity development and training is a key factor to enhance the skills of farmers and pastoralists in dairy production, processing and marketing. Attention should also be given for effective conflict management and resolution including the application of customary systems.

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