

Full Length Research Paper

## Production and marketing of camel milk in Eastern Ethiopia

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**In the fragile and uncertain environment of arid and semi-arid area, camel plays a crucial role as a primary source of livelihood for pastoralists and agro-pastoralists. However, pastoral and agro-pastoralists in developing countries including Ethiopia are marginalized and generally not given due consideration in wider social-political analysis, although the camel and camel milk had been victim of neglect by policy, research and development under the livestock subsector. Therefore, this study is initiated with providing information on camel milk production and marketing through chain analysis and multiple linear regression model in agro-pastoral and pastoral area of Eastern Ethiopia as such information would be useful to develop policy which is based on evidence.**

**Key words:** Camel milk, agro-pastoral, fermented milk, lactation period.

### INTRODUCTION

Ethiopia has Africa's largest livestock inventories and diversity (ANRS, 2010). In the arid and semi-arid area of the country camel plays an important role as a primary source of subsistence for pastoralists and agro-pastoralists which are living in this fragile environment (Tura et al., 2010). However, pastoral communities are marginalized and generally not given due consideration in wider socio-political analysis and strategies of the country (Simenew et al., 2013) and worldwide. In Ethiopia, the livestock sub-sector has traditionally been given low priority within the agriculture sector, although the camel had been victim of neglect by policy, research and development under the livestock subsector. Therefore, pastoralist communities and their livestock production in general and camel production in particular need to be given due attention by policy makers for better

development of the pastoralists livelihood, through research and development.

According to FAO (2008) statistics, the total population of camels in the world is estimated to be about 20 million. Out of these Ethiopia possesses over 2.4 million dromedary camels that stand the country third in Africa camel population (FAO, 2012) and majority of camels are found in the dried areas of Eastern part of the country where water is limited. In these areas camels are mainly kept by pastoralists for milk production, especially in the dry season when milk from cow is scarce. Cattle, camel and goats are the main livestock species that supply milk in Ethiopia. According to CSA (2008), the annual milk production of the country is estimated about 3.2 billion liter, of this 2.76 billion liters of cow milk and 16.2 million liters of camel milk is produced by sedentary

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populations annually. However, as compared to its largest livestock population in Africa milk productivity has remained low and its contribution to the national economy is limited (Kedija et al., 2008).

Besides this low milk production level, milk collection, processing and marketing are not well developed (USIAD, 2010) as a result milk marketing is characterized by high margins and poor marketing facilities and services, especially in arid and Semi-arid area. In addition to that, market infrastructure and marketing facilities are not well developed this in turn reduced pastoralists incentives to participate in economic transactions and result in subsistence rather than market-oriented production system.

Despite the great role of pastoralism in contributing to the national and continental economic values and services to the Ethiopian and African economy, there is no adequate information that is disaggregated and focused on pastoral system, especially in Ethiopia the national data on production, consumption and marketing of livestock and livestock product in pastoral area is scanty and mere estimates.

Therefore, this study is initiated with providing information on camel milk production and marketing through chain analysis in agro-pastoral and pastoral area of Easter Ethiopia, as such information would be useful for policy planning and implementing camel milk production and marketing development programmes.

## MATERIALS AND METHODS

### Topography and climate of the study region

The study was conducted in the area extending from Gursum to Babile in the Eastern Ethiopia, Hararghe Zone, Oromia Regional State of Ethiopia, along the main road to Jijjiga having an area of 967.3 km<sup>2</sup> and 3022.2 km<sup>2</sup>, respectively. Gursum and Babile districts are characterized by warm lowlands between 1.200m to 2.950m and 950 to 2.000m above sea level, respectively. The area have a good potential for camel and camel milk production, which is mainly commenced by agro-pastoral and pastoralists households of both Oromia and Ethiopia Somali tribe. The districts livestock population are comprises of 125, 996 cattle, 23,160 sheep and 10,936 camel (East Hararghe profile, 2009).

### Source of data and sampling techniques

The field was conducted during 2010/11 year. Data collection focused on household heads, key informants, rapid market appraisal and focus group discussions. In addition to the primary data, different sources were used to collect secondary data. The selected districts and Peasant Associations (PAs) were selected as they were considered the milkshed due to their potential for camel milk production and marketing. Two-stage stratified sampling was employed to select the sample households (HHs). The base for stratification of sample household was milk production type as only camel, and both camel and cow milk producers as pastoralists and agro-pastoral own only camel and both camel and cow milk as their livestock herd. Based on the stratification, 53 and 40 households were selected from only camel and both camel and cow milk

producers, respectively. Then using probability to proportional sample size sampling technique making the sample HH level 93 households.

### Methods of data analysis

To identify major camel milk marketing channels, the role and linkages of marketing agents, the structural conduct and Performance (S-C-P) framework and the commodity approaches were applied while to investigate factors affecting marketed surplus of camel milk in the study area, the linear regression models was used. When analyzing factors affecting marketed surplus of camel milk, the following variables were used as an independent variable: Age of the household head (AG\_HH), Sex of the household head (SEX\_HH), educational level of household head (EDL\_HH), household members under 5 years (HH\_MMYR), distance to near district market (DS\_MLK\_MRK), livestock extension services (LV\_ESV), number of milk camel owned (N\_MIK\_CAM), camel milk market information (MRK\_INFO), family size (FS\_HH) income from non-dairy source (IN\_NOND) and market price of camel (PRIC\_MLK).

## RESULTS AND DISCUSSION

### Use of camel milk in the study area

Camel milk is a vital part of a diet for households in environment that may be right termed as hostile in terms of temperature, and its contribution to a healthy nutritional status especially during the drought and lack of pasture is undoubtable.

In the study area, camel milk is consumed as a raw state or fluid milk, milk tea, and in the form of fermented milk by pastoralists and agro-pastoralist without any subject of processing. However, small number of sampled respondent's process camel milk into milk product such as butter and cheese by mixing it with cow and goat milk, as a result milk utilization patten is only limited to calve, family and sale.

However, Huilu et al. (2014) indicated the possibility of coagulating camel milk by using ginger rhizome crude extract and improved firm curd at a pH value of 5.0, a temperature of 65 0C and crude extract concentration of 10% by volume.

Regarding the value addition on camel milk, we Ethiopian's can learn much more from our neighboring country Kenya (even though we are the leading country in camel population and milk as compared to Kenya). For instance Vital Camel Milk Limited plant based in Nanyuki, Laikipia district process camel milk into fermented milk, yoghurt, cheese and pack fresh milk in half liter units (Musinga et al., 2008).

In addition to these, in Rajasthan district of India good low-calorie ice cream called "Desert Dessert" is processed by adding value to the camel milk and it has already been very popular with both Indian and foreign tourists (Lokhit Pashu-Palak Sansthan, 2010). Although in the US, Israel and Australia soaps based on camel milk are on the market.

### Description of the sampled dairy camel size

In the study area, pastoralists and agro-pastoralists own more camel than cattle, and their products are considered as the most important source of livelihood than small ruminants. Sheep and goats are also considered important next to camel and cattle since they are considered as liquid assets. According to the survey, the number of camel for the sampled household was found to be 1,237 TLU. While the average was 14.69 TLU in Gursum, and 12.34 TLU in Babile districts.

### Milk yield and lactation length of camel

The survey showed that the average lactation period for camel in the study area was found to be 10 month which is lower than the lactation period reported by Tefera and Gebreab (2001) which is one year for Eastern Ethiopia and 12 to 18 months for Kenya (Dasel et al., 2011). Even for the study sampled districts Gursume and Babile the lactation period had shown difference.

The average milk yield per day per camel was estimated to be 4.8 L under desert condition for the study area, which is higher than 1.24 L reported in Meso district of Oromia Regional State, Ethiopia (Kedija et al., 2008) and lower than 20 liters a day or more in Israel (Yagil et al., 1994).

However, according to Gindeel and Ahmaddon (2012) it is possible to increase the milk production of camel milk from 3.5 liters under desert condition to 40 liters under intensive management condition. Moreover, the study revealed that total camel milk production per day in the study area was calculated to be 1.720.25 L or 12.041.75 liters of milk per month, and the average milk yield per lactation/head was found to be 1.391.23 liters.

However, this is very low as compared to Pakistan average milk yield of 4.179 liters per year with a lactation length of 9 to 18 month (Asim et al., 2013). This showing that, there is a need for genetic improvement of indigenous camel by implementing development project in the country like it has been done to improve the indigenous zebu breed cow of Ethiopia, which produces about 400 to 680 kg of milk/cow per lactation compared to grade animals that have the potential to produce 1120-2500 litres over a 279 day lactation (Ahmed et al., 2003).

### Composition and physical characteristics of camel milk

Dromedary camel milk composition is excellent from nutritional view point (Sisay and Awoke, 2015) as it has valuable nutritional properties as it contains a high nutritional value, with vitamin C, which is three times greater than the cow's milk, iron content ten times and B vitamins present in reasonable amount (Arrowal et al.,

2005). In addition to that, cow milk tend to make people fat, causing obesity but camel milk gives strength, endurance and stamina, and attribute that pastoralists need in order to pursue a nomadic life style (Sisay et al., 2011). However, the camel milk has not been given as much attention in research and development as the cow milk, especially in Easter Africa.

### Market participation of camel milk producers

Camel milk is one of the most important traded dairy product in pastoral and agro-pastoral area of Easter Ethiopia, even at the global market camel products has a potential of US\$10 billion a year (FAO, 2011), however, Ethiopia is unable to reap the full benefit from the global camel product marketing even though the country is the third largest country in camel population and camel milk production next to Somali and Sudan.

The share of camel milk sold by sample producer was 77.76%, and the mean milk production per day per dairy household during the survey period was found to be 18.48 liter. The survey result found that, 98.9% of sampled camel milk producers were found to participate in milk marketing during survey period by confirming that milk is a cash product for the sampled households, therefore, Ethiopian government has to give attention to improve the camel milk market by developing a long-term strategic framework.

### Access to public services

Despite the country's huge and extensive investment in promoting extension services, the survey shows that only 40% of the sampled respondents received extension services. In addition, the contact of development agents with milk producers was not frequent and regular. The rapid market appraisal showed that some development agent (DAs) did not have the time to offer technical advice due to the fact that they were involved in other non-related activities. Thus, it is worthwhile to mention the necessity of efficient and committed DAs for their needy technical advices, which is aimed to bring significant changes in the livelihood of milk producers in the remote pastoral and agro-pastoral area. The source of extension service for milk producers in the districts were government agents and NGO (Meschen für Meschen) agents.

According to the survey result, only 6% of the sampled milk producing households in the study area had access to credit. Indicating that, 94% of the sampled milk producing households was in need of credit. Most of the time market information is said to be perishable than the agricultural commodity itself, however, in the study area there is no organized market information system on milk market. However, 80% of the total sample households

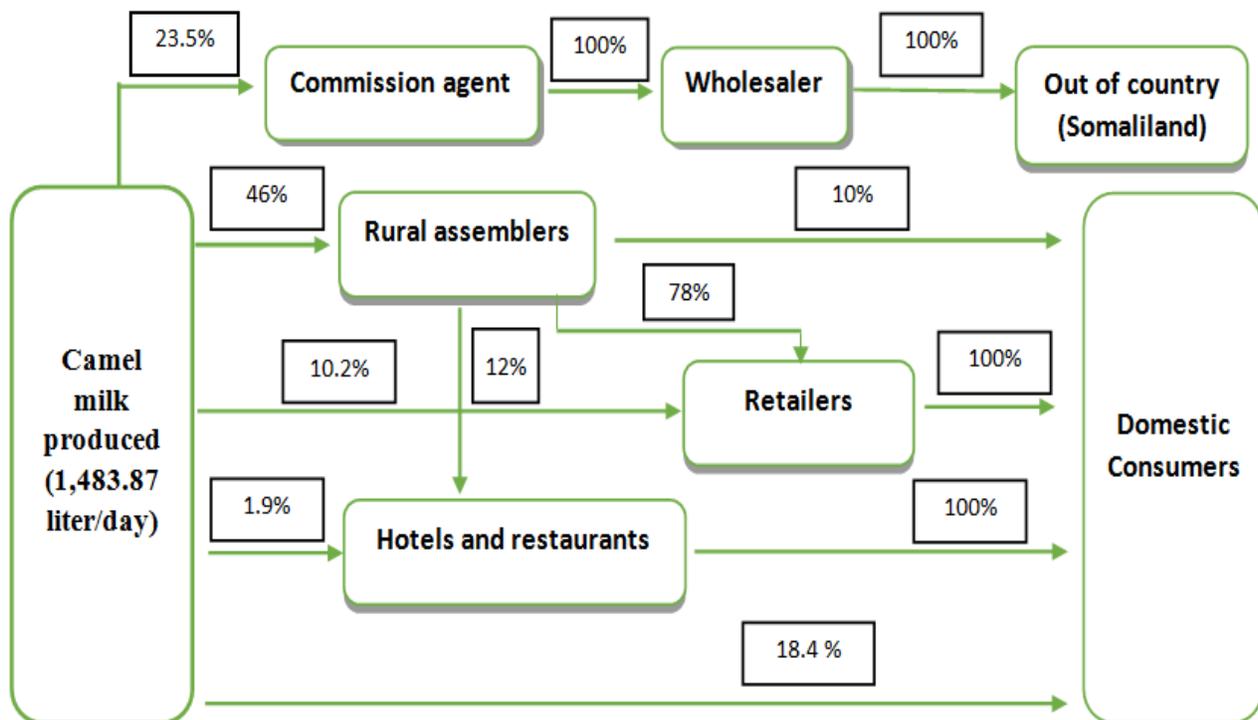


Figure 1. Camel milk marketing channel.

had milk market information on supply, demand and price before they sold their milk, from unorganized market information source. Most of the time sample pastoralists and agro-pastoralists have to walk a long distance from home to the nearest district market center to sell their dairy products. The average distance from home to the nearest district market center was found to be 17 km and about 27% of the sample respondents had to travel more than 20 km to reach the nearest district market place.

#### Milk traders' social and intellectual capital

In the study, forty milk traders and five hotels and restaurants were interviewed. From forty milk traders 49% of milk traders were engaged on only camel milk trading while the rest were engaged in trading both camel and cow milk. The survey result reveals that traders at the wholesale level were only engaged in camel milk trading.

The average initial and current working capital for the sampled respondents milk traders were 928.33 ETB and 2.950 ETB, respectively. The initial and working capital of only camel milk traders was estimated to be 11.8 times greater than initial working capital of both camel and cow milk traders, respectively.

As compared to cow milk, camel milk is less perishable, and it is not processed into different dairy derivatives to

improve its shelf life. Therefore, the opportunity cost of working capital tied in the dairy trade especially liquid milk is insignificant. Almost all traders in the study area milkshed don't involve brokers in buying and selling processes and operate by owners themselves.

Social capital has a significant role in the milk marketing process in the study milkshed as it reduces transaction cost of milk marketing, as a result traders take milk from suppliers on credit basis and repayment is made once a week after the sale based on trust. However, sometimes traders have high opportunity cost because of inability to look for quality milk and negotiate or haggle over the price.

#### Milk marketing participants, their roles and linkages

In this study, different camel milk market participants were identified in the exchange function between producers and the final domestic consumers. These were; producers, rural assemblers, retailers, commission agents, wholesalers, hotels and restaurants, and domestic consumers (Figure 1).

The survey showed that, camel milk in the study area was found to be marketed only through informal marketing system. The actual marketing channels of camel milk were more complicated in the pastoral and agro-pastoral milkshed area, however, the main marketing channels of camel milk market in terms of

quality flow in 2011/12 was shown in Figure 1.

Most of the pastoralists and agro-pastoralists sold milk in an open milk collection centers located at their vicinities area. As Figure 1 shows that, 18.4% of the total camel milk producers pass from producers to consumer's channel, accounting about 199.86 L. On the other hand, 46% of the camel milk pass from producers to rural assemblers at vicinity milk collection centers. The main duty of rural assemblers in the study area was accumulating milk from rural village for sale to retailers in the regional markets, hotels, restaurants and consumers in urban markets.

Pastoral and agro-pastoral in the study area supply milk in two ways, the first way of supply camel milk to market is as a unit of household and the second way is by forming informal types of groups locally called 'affosha' and supply milk to one another by grouping themselves up to 10 persons together to market milk by round up to same amount as they were agreed.

As Figure 1 shows, about 10% of camel milk produced by pastoralists/agro-pastoralists was sold for rural and urban area. The lowest share from the total camel milk produced went to hotels and restaurants which accounted for 1.9% of the total milk sold. The camel milk collected by commission agents (23.5%) at the nearest collection centers for wholesalers was informally exported in to Somaliland, Kenya and sometimes to Gulf States, this result is also supported by Abdi et al. (2012) study in Gode town, Somali Regional State, Ethiopia.

### Structure, conduct and performance of Camel milk market

The market concentration for camel milk market refers to the numbers and relative size, and distribution of camel milk buyers and sellers in a milk market. For an efficient market where the demand and supply determines the market price, there should be sufficient number of buyers and sellers in each market. However, the camel milk market for the sample milk market was found to be inefficient in general as almost all of the sample milk market were characterized by a strong oligopoly market, which is character by few numbers milk seller.

The  $CR_4$  measure of market concentration ratio shows that the top four or 44.44% of the camel milk traders controlled 63.87% of the camel milk per day at Gursum district. While the Babile milk market was strong or tight oligopoly with 93.47% concentration ratio for camel milk market. Although the milk market for Harar was with similar concentration ratio of 66.65%, this means that the first four traders controlled 66.65% of the purchase of camel milk market in Harar. The Dire Dawa milk market concentration ratio was 73.32%, indicating strongly oligopolistic market types which is similar with Gursum, Babile and Harar market. As compared to the other milk market, the Jijjiga milk market had weakly oligopoly with

$CR_4$  of 45.06%, this was because of that there were a number of farmers who bring camel milk from nearby rural area to Jijjiga market.

### Degree of market transparency

The degree of market transparency refers to the adequacy, timeliness and reliability of market information that the traders have for their marketing decision. Survey result indicates that 39.1% of milk traders got information through other traders. About 29% of the traders knew price by personal observation and 21.6% of the traders got information through friends. The rest of camel milk traders had information through combination of friend, other traders, personal observation and neighbors. It was observed that wholesalers and their commission agents line up by mobile to check market price in distance market. In the case of nearby market information was not as such problem for milk traders but market information on distance market was the main problem in milk marketing.

The most important factors considered by sampled camel milk producers in their decision to who to sell were proximity to market center (60%), followed by price of milk (40%). The structure of the camel milk market indicates that licensing and formal education did not hinder entry into camel milk market and most of the traders (75%) were illiterate in the sample markets. However, business experience, clan relationship, risk and capital were important barriers to enter into camel milk market.

There was no organized standardization and grading system in purchasing and selling camel milk. However, locally camel milk traders can differentiate quality by testing the milk. The milk marking system for camel milk was predominantly tradition, fragmented, weak seasonal demand, low price and low value addition along the milk chain. In addition to that, the camel milk was characterized by poor quality, also study by Mulugojjam et al. (2013) revealed that camel milk in Eastern Ethiopia was generally poor and microbial contamination of camel milk occurs along the value chain while transporting.

It was also found that camel milk production and marketing played an important role in economic and socio-cultural tradition of pastoral and agro-pastoral in the study area, there were no commercial farms, value addition, vertical and horizontal integration at primary level and agro-processing industries in the study area. Although the production of camel was constrained by under developed infrastructure, lack of input supply, lack of properly functioning veterinary services and disease prevalence.

As a result, the current income generating capacity of camel milk was not encouraging, and the share of final price received by producers was apparently very small. The producers' share of the consumers' price was found

**Table 1.** OLS result of factors affecting marketed surplus of camel milk.

| Variable   | Coefficients | Standard error | t-ratio |
|------------|--------------|----------------|---------|
| Constant   | -33.8        | 19.42          | -1.74   |
| AG_HH      | 0.044        | 0.013          | 0.33    |
| SEX_HH     | -3.52        | 14             | -0.25   |
| EDL_HH     | -0.17        | 3.366          | -0.05   |
| HH_MM5YR   | 0.07         | 1.12           | 0.06    |
| DS_MLK_MRK | 0.46         | 0.13           | 3.36*** |
| LV_ESV     | 2.36         | 3.13           | 0.76    |
| N_MLK_CAM  | 1.23         | 0.17           | 7.07*** |
| MRK_INF    | 7.14         | 3.58           | 2.00**  |
| FS_HH      | 0.32         | 0.41           | 0.78    |
| IN_NOND    | 0.001        | 0.00002        | 3.49*** |
| PRIC_MLK   | 3.65         | 1.84           | 1.98**  |

Dependent variable= Total camel milk supplied to the market, mean= 13.63, St. deviation= 23.28 Model size parameter= 12, Deg.Fr= 81, R-squared= 0.70, Adjusted R-square= 0.66 (prob) = 0.0000, log likelihood= -367.096, restricted (b=0)= -424.207, Rho= 0.0752, significance level= 0.0000; Note: \*\* and \*\*\* represents significance level at 5% and 1% probability level, respectively.

to be the highest along channel-I, channel-II and channel-IV that was 100, 75 and 56.27%, respectively (Appendix 1 for more information).

### Factors affecting camel milk marketed surplus

The data collected from the sampled respondents revealed that about 99% of the sampled camel milkproducer households were found to participate in camel milk market during the survey period.

The multiple linear regression model is used to identify factors affecting camel milk marketed surplus. In the model, eleven variables (eight continuous and three dummy) were hypothesized to affect sales volume of camel milk marketed surplus (Table 1).

Distance to nearby district market (DS\_MLK\_MRK) was expected to adversely affect sales volume. However, the opposite has been observed in the study result. Access to the market was significant ( $P < 0.01$ ) and positively affected marketable surplus. Indicating the benefits of being far from town, such as greater availability of pasture land outweigh the additional transaction costs of selling milk.

The model result depicts that number of milk camel owned (N\_MLK\_CAM) as expected had a positive and significant ( $P < 0.01$ ) impact on the quantity of camel milk volume supplied to the market. The positive and significant relationship between the two variables indicates that addition of one camel cause the marketable milk surplus of the dairy household to rise by 1.23 liters per day per dairy household

As hypothesized the regression coefficient of access to camel milk market information (MRK\_INFO) had

significant (0.05%) and positive impact on quantity of camel milk supplied, by suggesting that marketable milk surplus of the pastoral and agro-pastoral household are more responsive to milk market information.

As expected, (Table 1) income from non-dairy source (IN\_NOND) was found to be significant at 1% probability level. The variable has positive coefficient, indicating that such income strengthen the ability of smallholders camel milk producers' to cope with different risk of production and consumption and enter to economic transaction.

Market price of camel (PRIC\_MLK) has a positive effect on milk sale volume per household per day as expected because price has positive relation with the level of sale volume and it is statistically significant at 5% probability level, *ceteris paribus*. The result depicts that when milk price is high in the market farmers tends to supply more milk to the market.

### POLICY IMPLICATION

The result of this study suggests the following policy implications for the future intervention strategies in camel milk production and marketing.

One of the major constraints to market camel milk from remote pastoral area to high demand urban area are lack of well-developed infrastructure such transportation, roads and telecommunication service. To improve the situation, government should increase its efforts to develop appropriate dairy policy and investment in infrastructure. In addition to that, camel milk marketing lack inadequate horizontal and vertical integration among pastoralists and agro-pastoralists milk producers, milk assemblers, retailers, wholesalers and consumers.

Therefore, it is advisable to develop vertical and horizontal linkage among the pastoralists and agro-pastoralists through enhancing institutional arrangement, such as by developing dairy cooperatives and traders unions among the camel milk producers and traders as cooperatives and traders unions are more likely than individual agents both in overcoming information asymmetry and in attaining competitive edge by forming a strategic alliance in the camel milk production and market development.

As most of the milk traders in the camel milk at assembler and retailer level are females, improving the milk trading practice through vertical and horizontal linkage would empower the female milk traders to enhance their capacity and productivity. Also, there should be programs which aimed at gender smart intervention approach to consider gender as a core process in the camel milk value chain development, as such intervention brings the gender gap in the study area in particular and in arid and semi-arid area of the worldwide in general.

It was also found that the camel milk produced in the study agro-pastoralist and pastoralist can be increased by 12.5% if the current desert condition milk production system shifting to intensive management condition that allows the country to reap the full benefit of market opportunity provided by the European Union in importing camel milk from African countries if it is possible to adhere the international standards governing food safety, also there is a need to formalize the milk exported to Somaliland informality as it has a negative effect on welfare of pastorals and agro-pastorals.

In the study area, camel milk marketing system was predominantly traditional and fragmented due to lack of proper milk standardization, grading, inspection and licensing. It was also characterized by adulteration, poor quality, weak seasonal demand and low price. Hence government, private-public partnership and donors intervention in terms training, extension services, licensing, inspection, developing milk processing firm to add value to camel milk such as fermented milk, yoghurt, cheese, ice cream, soaps and packing fresh milk are required to ensure milk market competitiveness in the country.

The result of the linear regression model revealed that, the policy relevant variables having the greatest impact on camel milk sale volume were number of milk camel, access to market information, income from non-dairy source and market price of camel milk. Therefore, governmental and non-governmental partners who are involved in improving the camel milk production and marketing are required to due attention for increasing the herd size or/and integrate cross-breed camel that provide more milk yield (for instance the Pakistan dromedary for instance can produce 9.1 to 4.1 kg of milk when well fed) to improve the productivity of camel milk in the study area though the development of project which are aimed at

provision of AI service, distribution of crossbreed milk camels, and/or bull service.

Although, milk market information on supply, demand and price needs to be disseminated through public sector such as extension agent or public media (such as radio and TV) and even by dialing to specific mobile number and text as most of the pastoralists are mobile from place to place with their herds in search of better grazing place.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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**Appendix 1.** Camel milk marketing channel and marketing margin.

| Marketing cost                       | Marketing measures         | Camel milk marketing channels |       |        |        |        |        |        |
|--------------------------------------|----------------------------|-------------------------------|-------|--------|--------|--------|--------|--------|
|                                      |                            | CH-I                          | CH-II | CH-III | CH-IV  | CH-V   | CH-VI  | CH-VII |
| Quantity flow (liter)                |                            | 273.67                        | 68.22 | 81.87  | 532.17 | 150.61 | 328.84 | 28.5   |
| Producers'                           | Price/liter                | 7                             | 4.5   | 4.5    | 4.5    | 6      | 5      | 6      |
| Rural assemblers                     | Price/liter                | -                             | 8     | 7      | 6.5    | -      | -      | -      |
|                                      | Gross margin/liter         | -                             | 3.5   | 2.5    | 2      | -      | -      | -      |
|                                      | Marketing cost/liter       | -                             | 0.35  | 0.35   | 0.35   | -      | -      | -      |
|                                      | Net marketing margin/liter | -                             | 3.15  | 2.15   | 1.65   | -      | -      | -      |
| Retailers                            | Price/liter                | -                             | -     | -      | 8      | 8      | -      | -      |
|                                      | Gross margin/liter         | -                             | -     | -      | 1.5    | 2      | -      | -      |
|                                      | Marketing cost/liter       | -                             | -     | -      | 0.1    | 0.1    | -      | -      |
|                                      | Net marketing margin/liter | -                             | -     | -      | 1.4    | 1.9    | -      | -      |
| Wholesalers                          | Price/liter                | -                             | -     | -      | -      | -      | -      | -      |
|                                      | Gross margin/liter         | -                             | -     | -      | -      | -      | -      | -      |
|                                      | Marketing cost/liter       | -                             | -     | -      | -      | -      | -      | -      |
|                                      | Net marketing margin/liter | -                             | -     | -      | -      | -      | -      | -      |
| Hotels and Restaurants               | Price/liter                | -                             | -     | 12     | -      | -      | -      | 12     |
|                                      | Gross margin/liter         | -                             | -     | 5      | -      | -      | -      | 6      |
|                                      | Marketing cost/liter       | -                             | -     | 0.75   | -      | -      | -      | 0.75   |
|                                      | Net marketing margin/liter | -                             | -     | 4.25   | -      | -      | -      | 5.25   |
| Total gross marketing margin (%)     |                            | 0                             | 43.75 | 62.75  | 43.75  | 25     | -      | 50     |
| Producers portion (%)                |                            | 100                           | 56.25 | 37.5   | 56.25  | 75     | -      | 50     |
| Rank of channels by producers' share |                            | 1                             | 3     | 5      | 3      | 2      |        | 4      |
| Rank of channels by volume (liter)   |                            | 3                             | 6     | 5      | 1      | 4      | 2      | 7      |

Source: survey result, 2010/11; price are given in Ethiopian Birr; CH stands for channel, CH-I stands for producers to consumers, CH-II stands for producers to rural assemblers to consumers, CH-III stands for producers to rural assemblers to hotels and restaurants to consumers, CH-IV stands for producers to rural assemblers to retailers to consumers, CH-V stands for producers to retailers to consumers, CH-VI stands for producers to commission agents to wholesalers to out of country, CH-VII stands for producers to Hotels and restaurants to consumers.