

An Analysis of Camel and Cow Milk Marketing Chain amongst Pastorals and Agro-Pastorals in Gursum and Babile Districts, Ethiopia

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Abstract

The Ethiopia pastoral and agro-pastoralists' are blessed with immense and untapped livestock and livestock product which is the main stay and milk blood. Though, they are not economically benefited out of it in the extent at which ought to be as a result of less access to basic services provided by the government as compared to the high land, as a result of this highest incidence of poverty and drought is a common phenomenon in pastoral and agro-pastoralists' areas of Ethiopia. Hence, this study is initiated to provide vital and valid information on the operation of milk marketing system for effective policy formulation by analyzing the milk market chain in Easter part of Ethiopia. To analyze the major camel and cow milk market channels, the role and linkages of marketing agent's the study used Structural Conduct and Performance (S-C-P) framework and commodity approach. The study found that, there is poor provision of public services by the government and the milk marketing system was found to be predominantly traditional and fragmented. Although, the milk market for both camel and cow was found to be strongly oligopolistic. Therefore, there is a need to link milk marketing agents through development of institutional arrangement such as dairy cooperatives, traders unions and contract; the government should also due attention to develop infrastructure specially the telecommunication, road, electric power and should integrating cross-bred cows as there was no exotic cross breeds in the herds surveyed; governmental and non-governmental actions are also required to license and inspect milk traders and producers to ensure achievement of minimum hygiene and quality standards; and there is also a need for development of processing facilities that would produce storable dairy products such as milk powders or hard cheese as adding value increase the profitability of the enterprise.

Keywords: Marketing agent, Structural Conduct and Performance(S-C-P) framework and Milk

INTRODUCTION

Ethiopian is blessed with immense and largely untapped livestock resource which plays a vital role as source of food, income, services and foreign exchange to the economy (Ayale *et al.*, 2003). However, as compared to its immense potential the existing income generating capacity of livestock and livestock products has not been exploited. The primary reason, among others, seems to be the inefficient livestock and livestock product marketing characterized by high margins and poor marketing facilities and services (CSA, 2006), lack of well-developed marketing infrastructures and appropriate marketing channel in the country (Getachew, 2003; Gizachew, 2005; Care Ethiopia, 2009).

The contribution of pastoral in the livestock population of the country is highly significant as pastoral own about 40 percent of the country's total livestock population. Nevertheless, Ethiopia pastoralists have the highest incidence of poverty and the least access to basic services compared with others areas (Oxfam, 2008). The National Agricultural Sample Enumeration data of 2001/2002 gives a total cow milk production of 2,591,187 MT out of this 217,275,591 liters was produced by Oromia pastoral and 114, 864,928 liters of camel milk was produced from the countries pastoralist (Ethiopia Economic Association, 2005). Though, they are not economically benefited out of it in the extent at which ought to be as most of the development efforts in the country have focused on cereal production in the highlands rather than to the lowlands. Therefore, this study is initiated to provide vital and valid information on the operation and efficiency of pastoral and agro-pastoral milk marketing system for effective planning and policy formulation.

Also the research will bridge the information gap on camel milk marketing chain analysis, camel milk marketing middle men and their role and associated problems. As camel milk production and marketing information and its contribution to the herders especially in eastern Ethiopia is inadequate (Yohannes *et al.*, 2009). The result of the study is structured as follows. In the next section (II), we discuss about the data collection and methodological issues. Results are produced in section III, while conclusion and policy recommendations are given in the last section.

METHODOLOGY

This section reviews the research methods used in collecting and analyzing data from pastoral and agro-pastoral households in Easter Oromia Regional State, Ethiopia.

Study area

The study was conducted in the area extending from Gursum to Babile in the east Hararghe Zone of Ethiopia, along the main way to Jijjiga, having an area of 967.3 Km² and 3022.2 km², respectively and the districts are characterized by warm lowland lying between 1, 200 to 2,950m and 950 to 2,000m above sea level, respectively. The areas have potential for livestock production which is mainly commenced by pastoral and agro-pastoral households. The districts livestock population comprises of 125996, 23160 and 10936 for cattle, sheep and camel, respectively (East Hararghe profile, 2009). There are three major local languages spoken, which are defined by geographical locations in the study areas vis-à-vis, are Afan Oromo, Somali and Amaharic. Afan Oromo is the major language spoken in all the rural areas of the study.

Source of data and Sampling techniques

The field was undertaken between January and March 2010. Data collection during the field study focused on household heads, key informants, rapid market appraisal (RMA) and focus group discussions. Also various sources of line were used to collect secondary data. The selected districts and district Peasant Associations (Pas) are selected as the milk-shed because of having potential for both camel and cow milk production and marketing. In the study a total sample size of 140 pastoralists (64) and agro-pastoralists (76) were interviewed randomly from the strata. For the sampling purpose, two-stage stratified sampling was employed to select the sample households. The base for the stratification of sample household is milk production type as only cow, only camel and both producers. Based on the above stratification, 47, 53 and 40 households were selected from cow milk, camel milk, and both camel and cow milk producers, respectively, using probability proportional to sample size sampling technique. The stratification is needed because the sample household milk production type is heterogeneous in the milk-shed which makes the sample selection of household difficult to select by simple random sample method.

Sampling of rural assemblers, retailer and wholesalers

Milk traders were sampled from five markets (Gursum, Babile, Harar, Dire Dawa and Jijjiga), in which these markets are recipient of the produce from the selected milk producing areas. As the number of camel milk wholesalers and both camel and cow milk rural assemblers at each stage were very few, all of them were interviewed. While the selection of retailers in each market was made based on the size of the markets after estimating the number of retailers, the retailers are selected by random proportion method from each market with consideration of number of retailers.

Methods of date analysis

To identify the major camel and cow milk marketing channels, the role and linkages of marketing agent's the Structural Conduct and Performance (S-C-P) frame work and the commodity approach were used. In different agricultural marketing studies market structural characteristics are used as a base for classification of market as competitive, oligopolistic and monopolistic based on the characteristics of the market. As Scott (1995) thought that, there are four salient aspects of market structure which include the degree of seller concentration, degree of buyer concentration, degree of product differentiation, and the condition of entry to market.

Market concentration is defined as the number and size of sellers and buyers in the market (Scott, 1995). The greater the degree of market concentration, the greater there be the possibility of non-competitive behavior in the market. To measure the degree of concentration we can use different techniques such as Concentration Ratio (C) Hirschman Herfindahl Index (HHI) and Gini-Coefficient. However, for this study the concentration ratio is implemented as other methods are limited in their application for imposing additional burden.

The Concentration Ration (C) is defined as

$$C = \sum_{i=1}^r S_i, i = 1, 2, 3, \dots, r \quad (1)$$

where, S_i is percentage share of the i^{th} firm, and r is the number of firms considered to calculate the ratio.

Kohls and Uhl (1985) suggested that as a result of thumb, a four large enterprises' concentration ration of 50 percent or more is an indication of a strongly oligopolistic, 33-50 percent, a weak oligopoly, and less than

that, indicates concentrated industry.

Bain (1968) contends that a barrier to entry is simply any advantage held by existing firms over those that might potentially produce in a given market. Potential entry barriers would be investigated based on demand conditions, product differentiation, absolute unit-cost advantages, legal and institutional factors, economies of scale, capital requirement and technological factors.

Market conduct defines the conditions which make possible competitive or exploitative relationships between sellers and buyers. Competitive forces are directed by market forces. Exploitative relationship is done via unfair price-setting practices including collusive, predatory, or exclusionary.

According to Cremer and Jense (1982), market performance refers the reflection of the impact of structure and conduct on product price, cost, volume and quantity of output. For instance, if the market structure for a given milk resembles monopoly or strong oligopoly rather than pure competition, then one can expect that the market is with poor performance rather than efficient. Market researchers use two major measures of market performance this are net return and marketing margin. Net return per middleman for milk marketing is calculated by subtracting fixed and variable cost from gross return and it verifies the existence of above average profit to middlemen.

Marketing margin is one of the commonly used measures of the performance of a marketing system. Jema (2008) defines marketing margin as the difference between the price of the consumer pays and the price that is obtained by producers. Computing the total gross marketing margin (TGMM) is always related to the final price or the price paid by the end consumer, expressed in percentage (Mendoza, 1995).

$$TGMM = \frac{P_c - P_p}{P_c} \times 100 \quad (2)$$

where TGMM=total marketing margin; P_c =consumer price; P_p =producer price

Here, it is also better to introduce the idea of producer's gross margin (GMM_p) which is the portion of the price paid by consumer that belong to the producer. Net marketing margin of producer (NMM_p) who acts as marketing middle men is also computed as:

$$GMM_p = \frac{P_c - MGM}{P_c} \times 100 \quad (3)$$

where MGM=marketing gross margin

Another parameter to analyze marketing margin is the producer's share. The producers share is the ratio of producer price to consumer's price (retail). The producer share can be expressed as:

$$P_s = \frac{P_x}{P_r} = 1 - \frac{MM}{P_r} \quad (4)$$

where P_s = producer's share; P_x = producer's price of product and by-products; P_r = consumer's price of product and by-products; MM=Marketing margin

RESULT AND DISCUSSION

This chapter presents descriptive results obtained on camel and cow milk marketing especially, on marketing channels, and the role and lineage of marketing agents. It also presents result of the analysis of costs and margins for key marketing channels in Gursum and Babile milk-shed.

In the study area cow butter is used for household consumption and as cosmetics especially for female, while milk was used as food and source of income. Cow milk is sold mainly in fresh (raw) form and a small portion (approximately 10 %) of sales is in the form of sour milk or butter. Households which produce camel milk tended to sell liquid milk without processing it into other dairy derivatives because cheese and butter cannot be made from camels' milk in large amount like cow milk. However, in the study area pastoral/agro-pastoral produce small amount of butter from camel milk by mixing it with cow milk or sheep milk which is not common in other places.

Description of the sample dairy camel and cow size

The number of dairy camel and cow size for the sampled household in the milk-shed was found to be 1,237 and 519 Tropical Livestock Unit (TLU), respectively. Livestock rearing is the most dominant livelihood activities, with some crop production in the agro-pastoral area. In the study area pastoralists/agro-pastoralists own 1,235

dairy camels and 519 dairy cows by indicating the existence of more camel than cattle.

Milk yield and milking days of dairy camel and cows

The survey result showed that, the average milking days/lactation period in the study areas was found to be 232 days for local dairy cows. This result is comparable with the result of Kurtu (2003) who indicated that an average lactating length of 212 days for local cows in the Harar milk-shed. The average milk yield per day per cow in the study area was estimated to be 2.19 liter. This result is higher than the national milk yield of 1.54 liter/day per cow (CSA, 2008) with regard to camel the average milk yield per day was estimated to be 4.8 liters. Moreover, the study result revealed that total milk production for camel and cow per day in the study area was respectively calculated to be 1,720.25 liters, and 543.12 liters of milk or 12,041.75 liters and 3,802.61 liters of milk per month. The average milk yield per lactation/head was found to be 1,391.23 liters for camel and 511.87 liters for cow, respectively.

Milk production and its importance for dairy households

The indigenous cow breeds, although are generally considered as low milk producers, are the major source of milk in the study area and there is no exotic cross breeds in the herds surveyed. The share of milk sold for camel milk producer households and cow milk producer households was 77.76 % and 57.14 %, respectively. The share of camel milk producers was high due to their large milk production base and more market-oriented production objective by pastoral/agro-pastoral. The share of cow milk producers' market participation was found to be small in terms of quantity which was due to less production of the indigenous breed cow and less demand of cow milk as compared to camel milk by traders in the study area.

The mean milk production per day per dairy households in the milk-shed during the survey period was found to be 6.31 for cow milk producers and 18.49 for camel milk producers, which is three times greater than that of cow milk producers. For the sample pastoralist and agro-pastoralist dairying was found to hold 78 % and 83.31 % of annual income value of Gursum and Babile, respectively. This result confirms that, milk is a cash product for the sample dairy households and it is most important source of livelihood.

Milk market participants and non-participants

The survey result indicates that 98.9 % and 87.4 % of sample camel and cow milk producer households were, respectively found to participate in milk market during the survey period. While the rest 1.1 % and 12.64 % of camel and cow milk producer households did not sell at the time of survey. Table 1 depicts that, the t-test statistics for milk producer's household member under five years old of milk market participants and non-participants was found to be significant at less than 5% probability level. This indicates that farm households with large number of household members under five years old had low market participation than household members under five years old. This result also confirms that, the studies area pastoral and agro-pastoral gives high priority for children milk consumption that selling their milk produce to the market, especially for cow milk. The mean experience in cow milk production of milk market participants and non-participants was 18.9 and 10 years, respectively, and the means were statistically significantly different at 5 % probability level. Indicating that, pastoral/agro-pastoral who has more experience in milk production can supply more milk to the market than the less experienced households as experience matters proper handling of milk. This result is consistent with the finding of Woldemichail (2008).

Table 1. Socio-economic characteristics of cow milk market participants and non-participants

Variables	Mean(Std)		t-value
	Participants	Non participants	
Age of household head (years)	41(12.02)	41(12.76)	-0.085
Number of household members	7.57(4.05)	10.27(3)	2.115**
Family size in adult equivalent	4.29(2.07)	4.14(1.45)	0.88
Household members under the age of five	1.47(1.3)	10(4.4)	-2.13**
Experience in milk production (years)	19(13.7)	10(4.4)	-2.13**
Number of milking cow owned	2.72(2.72)	1.81(1.25)	-1.081
Quantity of cow milk produced per day	6.8(10.15)	3(1.86)	-1.238
Income from non-dairy source per annum	4,510.25(7,247)	11,585(10,299)	2.624**

Source: Survey result, 2010

Note: *, ** and *** represent 1%, 5% and 10% Significance level, respectively.

The independent sample t-test also revealed that there is statistically significant difference (<1%) in mean value of financial income from non-dairy source between participating and non-participating sample milk producer households. The non-participant sample milk producer households had 2.56 times higher non-dairy

financial income than participating sample dairy households. This reveals that, households who have a lesser source of income from non-dairy source sell more milk to earn money from sale of milk as milk is there only source of income.

Access to public service

Provision of adequate services for the forgotten pastoral/agro-pastoral community enhance the socio-economic development of pastoral/agro-pastoral area in general and improve the well-being of individual in particular. However, as the study reveals that, the provisions of public services like access to livestock extension, credit, road and market information is poor in general for the study area.

Despite the county's huge and extensive investment in promoting extension services, the survey shows that only 20.7% and 19.3% of the total sample respondents from Gursum and Babile districts received dairy extension services, respectively. In addition, the contact of development agents with milk producers was not frequent and regular. The result from RMA showed that some development agents did not have the time to offer technical advice due to the fact that they were involved in other non-related activities. The source of extension service for milk producers in the districts were government agents and NGO (*Meschen für Meschen*).

According the survey result, 0.7% and 5% of the sample milk producing households in Gursum and Babile had access to credit, respectively. While the rest 41.2% and 52.1% of the sample milk producing households in Gursum and Babile were in need of credit from the total sampled households.

Market information is mostly said to be more perishable than the commodity itself as timely market information is a vital for the success of business. However, the study result reveals that, 81.5% of the total sample households had milk market information on supply, demand and price before they sold their milk from unorganized market information systems such as milk traders, personal observation and friends.

Milk being a perishable commodity, good access to market is of paramount importance. Even though, about 26.6 % of the sample respondents had to travel more than 20 km to reach the nearest district market place and most of these respondents are found to be from Gursum district.

Milk traders' social and intellectual capital

For the source of primary data used in the study forty six milk traders and five hotels and restaurants were interviewed. From forty six milk traders 11.8% of milk traders were engaged on only cow milk trading, 37.3% of milk traders were engaged on only camel milk trading and 51% of milk traders were engaged on both camel and cow milk trading activity.

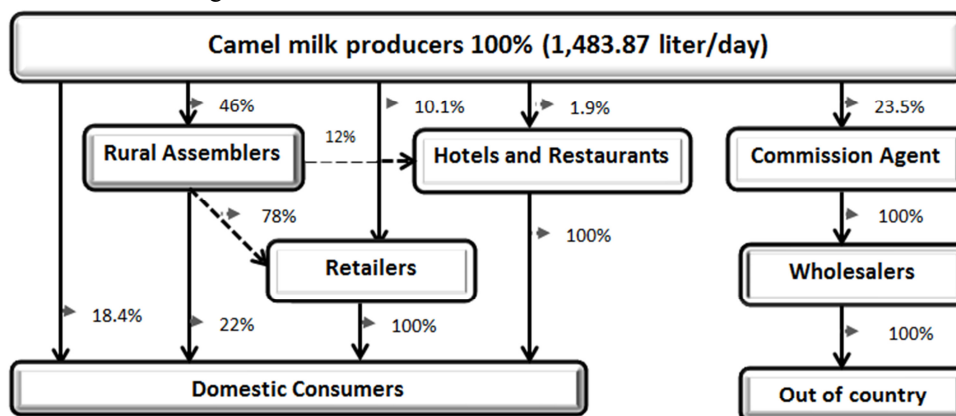
The survey result indicates that the average years of milk trading experience was found to be 10.66 years. As to the sex, female traders dominated both camel and cow milk trading by consisting 94.2% of the sampled households in the different market centers. However, traders at wholesaler level were found to be male and they were only engaged in camel milk traders. As to the source of working capital, majority of the traders respond as they used their own capital from the time they began milk trading unit the time of survey period. Of the total interviewed traders, only 30.7 percent of milk traders used credit from relatives and friends to run their milk trading business, while the remaining 67.3 percent of the respondent traders have their own source for initial milk trading activity. As all the traders point out that there was no formal credit source for milk traders.

Milk marketing channels, participants, their roles and linkages

In the study different camel and cow milk market participants were identified in the exchange functions between producers and the final consumer. These were: producers (pastoralists and agro-pastoralist), rural assemblers, retailers, commission agents, wholesalers, hotels and restaurants and consumers for camel milk marketing; and producers, rural assemblers, retailers, hotels and restaurants and consumers for cow milk market.

A marketing chain may link both formal and informal agents. The survey results depicts that milk in the study area was found to be marketed only through informal marketing channels. Furthermore, the survey result revealed that dairy marketing chains prevailing in the milk-shed was found to be comprised of various camel milk and cow milk marketing channel. The camel and cow milk markets show a little difference in their market channel. The camel milk markets show longer route as there is the participation of wholesalers unlike the cow milk markets channels. The actual marketing channels of camel and cow milk is more complicated, but the main marketing channels of camel and cow milk market in terms of quantity flow in 2010 for the study area is depicted as follow in figure 1 and 2.

Figure 1. Camel milk marketing channel



Source: survey result, 2010

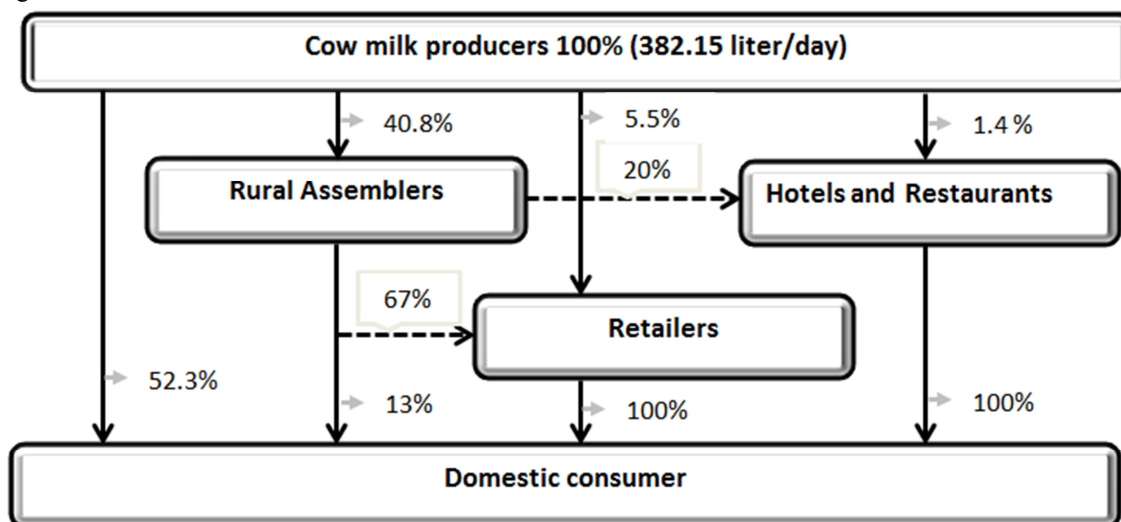
Most pastoralists sold milk in an open collection centers and markets in their vicinity. As figure 1 and 2 shows that, about 18.4% and 52.3% of the total camel and cow milk produced, respectively, passes from producers to consumers. The cow milk sold in this channel (producers to consumers) accounted for the largest share than other channels. On the other hand, 46% and 40.8% of the camel and cow milk, respectively, of the total sold went from pastoralists to rural assemblers at vicinity milk collection center. The main duty of rural assemblers in the study area is that they accumulate milk from the rural village of pastoralist and agro-pastoral to resale to retailers in the regional markets, hotels, restaurants and consumers in urban market.



Picture 1. Collection center by rural assemblers at Bekeka/Qorre and Erare Gudda Peasant Association to transport milk to Jijjiga and Harar.

Milk producers in the study area supply milk in two ways, the first way of supplying milk to market is as a unit of household and the second way is by forming informal type 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.

Figure 2. Cow milk market channel



Source: survey result 2010

As figure 1 and 2 shows that, about 10% and 6% of camel and cow milk produced by pastoralist/agro-pastoralist was sold for retailers at rural and urban market, respectively. The least share from the total for both camel and cow milk produced goes to hotels and restaurants which account 1.9% and 1.4% of the total sold by pastoralists/agro-pastoral, respectively. For camel milk commission agents collect about 23.5% of the total sold from the pastoralists and agro-pastoralists at the vicinity collection center for wholesalers which goes to Somali Land informally.

Structure, conduct and performance of camel and cow milk market

Market concentration refers to the number and relative size distribution of buyers and sellers in a milk market. For an efficient milk market, there should be sufficient number of buyers and sellers in each market. However, the milk market for the sampled milk market was found to be inefficient in general as almost all of the milk markets sampled are characterized by strongly oligopolistic market. As the result of the concentration ration for the four large enterprises' (CR_4) shows that the CR_4 for Gursume and Babile milk market was found to be 63.87 % for camel and 69.02 for cow milk, and 93.48% for camel and 86.19 for cow milk, respectively.

For Harar the CR_4 was 66.65% for camel and 51.33% for cow milk and for Dire Dawa it was 73.32 for camel and 77.75 for cow milk and for Jijjiga it was 45.06% for camel and 75.34% for cow milk. But the camel milk market in Jijjiga was found to be weakly oligopolistic. For the remaining markets CR_4 was found to be 66.65% and 51.33% for Harar, 73.32% and 77.75% for Dire Dawa, 45.06% and 75.34% for Jijjiga camel and cow milk markets, respectively. From the sampled markets we can observe that, the camel milk market for Jijjiga was found to be the only weakly oligopolistic market. The reason for this is that, there were a number of farmers who bring camel milk from nearby rural area to Jijjiga market.

The most important factors considered by sample milk producers in decision to whom to sell for the study are closeness to market center which had greater influence (57% of the respondent) followed by price of milk (43% of the respondent). The structure of the markets indicates that licensing and formal education did not hinder entry into milk market, as there is no need of licensing to start camel milk and most (56.9%) of the traders are illiterate in the sampled markets but business experience, clan, risk and capital were important barriers to enter into milk market.

With regard to standardization and grading of camel and cow milk, there was no organized standardization and grading system in purchasing and selling of milk. But, locally, milk traders can differentiate quality by testing the milk. And the marketing system for milk was predominantly traditional and fragment, and characterized by adulteration, poor quality, week seasonal demand and low price.

Even if, livestock husbandry played multiple role both in economic and socio-cultural tradition of the study area there are no commercial farms, value addition at primary level and agro-processing industries in the study area. As a result the current income generating capacity of dairying is not encouraging and share of final price going to the producers is apparently small. The producers' share of the consumer's price was found to be the highest along channel-I, channel-II and channel-IV that was 100%, 75% and 56.27%, respectively for both cow and camel milk. For further information on milk market performance see table 2 and 3 below.

Table 2. Cow milk market channel and marketing margin

Marketing actors	Marketing measures	Cow milk marketing channels					
		CHA-I	CHA-II	CHA-III	CHA-IV	CHA-V	CHA-VI
Quantity flow (liter)		199.86	20	31.18	104.45	21.01	5.35
Producers'	Price/liter	7	4.5	4.5	4.5	6	6.5
Rural assemblers	Price/liter	-	8	7.5	7	-	-
	Gross margin/liter	-	3.5	3	2.5	-	-
	Marketing cost/liter	-	0.45	0.45	0.45	-	-
	Net marketing margin/liter	-	3.05	2.55	2.05	-	-
Retailers	Price/liter	-	-	-	8	8	13
	Gross margin/liter	-	-	-	1	2	6.5
	Marketing cost/liter	-	-	-	0.1	0.1	0.75
	Net marketing margin/liter	-	-	-	0.9	1.9	5.75
Hotels and restaurants	Price/liter	-	-	13	-	-	-
	Gross margin/liter	-	-	5.5	-	-	-
	Marketing cost/liter	-	-	0.75	-	-	-
	Net marketing margin/liter	-	-	4.75	-	-	-
Total gross marketing margin (%)		0	43.75	65.38	43.75	25	50
Producers portion (%)		100	56.25	34.61	56.25	75	50
Rank of channels by producers' share		1	3	5	3	2	4
Rank of channels by volume (liter)		1	5	3	2	4	6

Source: Survey result, 2010

Table 3. Camel milk market channel and marketing margin

Marketing cost	Marketing measures	Camel milk marketing channels						
		CHA-I	CHA-II	CHA-III	CHA-IV	CHA-V	CHA-VII	CHA-VIII
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	62.5	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

CONCLUSION AND POLICY IMPLICATION

On the basis of the results of this study, the following policy implications are drawn so as to suggest for the future intervention strategies at camel and cow milk production and marketing.

One of the constraints to dairy marketing in the study area is inadequate horizontal link among the rural producers and lack of vertical linkage between the rural producers, rural assemblers, retailers, wholesalers and consumers. This missing vertical and horizontal linkage can be forged through institutional arrangement such as dairy cooperatives and traders unions among the milk producers and traders as cooperatives and trade unions can be very successful in dealing with both information asymmetry and in attaining competitive edge by forming a strategic alliance in the milk market chain. The development of these milk producer cooperatives and traders unions would also allow the development of persistent and horizontal network relationship rather than the

existing spot market relation which will enable the milk market agents to come up with higher level of trust and some level of interdependence to develop contractual agreement and business to business organization in the milk marketing chain. As most of the milk traders were female in the study area improving the milk trading practice through vertical and horizontal linkage will empower the female trader who operate in the milk marketing practices.

Collecting and transporting camel and cow milk from the distant agro-pastoralist and pastoralist production site to the transformation unit or consumption zone is a very challenging task to the milk producers and traders as a result of poor infrastructure, mainly poor transportation, roads and telecommunication systems. So the government should due attention in developing appropriate dairy policy that could be formulated and implemented to enhancing the dairy sub sector in pastoral and agro-pastoralist area. If it is difficult to develop infrastructure specially the telecommunication and electric power system by the government, it is better to invite investors who are willing to offer quality and reliable service at cost.

The indigenous cow breeds, although which are considered as low milk producers, are the only source of milk in the study area and there is no exotic breeds in the herds surveyed. Therefore, governments and other existing and potential dairy sector development partners of the pastoralist and agro-pastoralists area are required to give due attention for integrating cross-bred cows to the pastoralists and agro-pastoralists dairy sector to boost the dairy productivity and market participation of the pastoralist and agro-pastoralist.

In the study area milk marketing system was predominantly traditional and fragmented as a result of lack of proper milk standardization, grading, inspection and licensing. It is also characterized by adulteration, poor quality, week seasonal demand and low price. Thus, government actions are required to license competing traders, and also inspect milk traders and producers to ensure achievement of minimum hygiene and quality standards to facilitate efficient milk production and marketing process though the development of adult education, extension services and training.

The seasonal glut in milk production and the mismatch between seasonal production and demand in the study area suggests the need for processing facilities that would produce storable dairy products such as milk powders or hard cheeses. As adding value to produce increases the shelf value of the product, it will improve the profitability of the enterprise and enhance food security in the pastoralist and agro-pastoralists area.

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