

Value Chain Analysis of Sheep in Gumer Woreda, Guraghe Zone, Central Ethiopia

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Abstract- There is a lack of well-functioning marketing systems that effectively link the many smallholder producers and their cooperatives with domestic and international markets. The study was initiated to analyze the value chain of sheep in Gumer woreda. In order to explore this, both quantitative and qualitative data were used. Primary data were collected from selected 120 sample sheep producers, 12 sheep traders, 7 hotels and 10 individual consumers. Descriptive statistics, Simple statistical tools, SWOT analysis, marketing margin and value addition were used to analyze the collected data. The major value chain actors in the study areas are input suppliers, producers, collectors, small traders, large trader hotels/ restaurants and consumers. Shortage of land for feed production, lack of improved rams and shortage of forage seeds were input supply problems, whereas the constraints on production were low feed quality, inadequate training and lack of sheep market extension services. Low bargaining power of producers and limited access to market information, poor livestock marketing infrastructure, seasonality in supply and demand for sheep were the constraints of the marketing core function. While for the processing, the constraints were inadequate local market, low quality animals and backyard slaughtering of animals. Finally, the constraints of the consumption core function were inconsistent supply. Based on the finding of the study, support genetic improvement of the Gummer sheep breed based on other experience of community- based breeding programs, provide improved forage technologies and feeding practices, strengthening animal health posts were recommended to government policy- and decision-makers, donors and the wider development community.

Keywords: Value Chain Actors, Marketing Margins, Value Addition

I. INTRODUCTION

1.1 Background and justification

Ethiopia is one of the African countries with the largest small ruminant population in the continent containing about 28.89 million sheep and 29.7 million goats in the country, out of which, 99.9% of the total sheep population is indigenous breeds (Central Statistics Agency (CSA), 2016) which are owned and managed by resource poor smallholder farmers and pastoralists under traditional systems.

In Ethiopia, sheep are the second numerous farm animals with nine diverse breeds and ecotypes distributed across the different agro-ecologies ranging from cool alpine climate of the mountains to the arid pastoral areas of the lowlands (Solomon et. al, 2010). Sheep serve as a major means of livelihoods of poor livestock keepers, and thereby contribute to poverty reduction and means of attaining sustainable agriculture and food security.

Market oriented or commercial production is almost non-existent. On the other hand, there is huge demand for live sheep and sheep meat in the Gulf countries. The demand and prices for sheep are also increasing locally due to increased urbanization and increased income (Jaleta, 2011). Currently, it is reported that the export abattoirs are operating at 56% of their operational capacities.

The available marketing systems also failed to encourage sheep producers to coordinate and collaborate with each other to produce market-oriented products. Unless producers are organized and jointly act in activities like procurement of medicaments, supplementary feeds and marketing, the transaction costs of marketing for individual sheep producers are high.

According to Legese and Hordofa (2011), this is one of the reasons for market imperfections and for the limited participation of smallholders in existing markets. Second, different livestock species currently produced by farmers are not able to satisfy the quality attributes required by diverse markets.

Third, the existing livestock marketing system is fragmented and disorganized and the supply chain linking smallholder producers with domestic consumers and export markets is long and extended.

This depresses farm gate prices and denies producers from receiving better prices as a multitude of brokers and middlemen tap a large proportion of the price paid by the consumers and exporters without adding value to the product (Legese and Hordofa, 2011).

Clearly, therefore, cost-effective marketing channels and coordinated supply chains that reduce the transaction costs among different actors along the supply chain are needed. Nevertheless, this needs an understanding of market performance, conduct and functions, and business linkages as well as constraints and opportunities along the value chain of bonga, dawuro, abera and gummer sheep in SNNPR.

Therefore, this study is used to identify the different actors (operators and service providers), various activities (the main value adding activity, services provided, and the volume of products involved) throughout the chain, and leverage points in the chain to recommend solutions for the different constraints on the leverage points to up-grade the chain and improve the livelihoods of smallholder farmers.

II. RESEARCH METHODOLOGY

This chapter of the report provides research methodology deployed in the study in order to address the objectives of the study.

2.1 Description of the study area

The study was conducted in Gummer woreda, one of the 16 woreda in Guraghe zone, Central Ethiopia region. Arekit is the capital of the woreda located about 65 Km South East of Wolkite towns, capital of Guraghe zone, 206 Km from Hawassa, capital town

of SNNPRS and 215 Km from South West of Addis Abeba.

The Gummer woreda is totally Dega agro-ecology having 2700-3178 masl (meters above sea level). The minimum rainfall of the woreda is 1200 mm and the maximum annual rainfall is 1400 mm and the temperature ranges 10.70c-17 0c.

The woreda has a total of 20 kebeles (2 urban and 18 rural kebeles). The economic activities of the woreda are totally based on mixed crop and livestock production system. Livestock population of the woreda includes cattle, sheep, equines (mules, horse and donkey), poultry, and local beehives.

Major crops grown in the woreda include enset, barely, wheat, potato, faba bean and field pea. The total area of the district is 23,555 ha of which 6,132 ha (26%) is allocated for cultivation, 900.96 ha (3.8%) allocated for grazing and 1,051 ha (4.5%) is forest land. The total livestock population of the district is 230,388 heads, of which cattle and sheep accounted 63.59% (cattle 30.14% and sheep 33.45%).

2.2 Data types and sources

The aim of this study is to analyze sheep value chain. In order to explore this, both quantitative and qualitative data were used. Both primary and secondary data sources were used. Primary data were collected by using formal and informal surveys.

The secondary data sources include reports of line ministries, journals, books, Central Statistics agency (CSA), national polices, zonal and woreda reports, among others.

2.3 Sampling procedure and sample size determination

For this study, a multi-stage sampling technique was implemented to select representative sheep producer kebele and sample farm households. In the first stage, from Gummer woreda two major sheep producing and marketing kebeles were purposely selected in consultation with woreda agricultural and natural resource office.

In the second stage, using the list of sheep producing farmers, 120 sample sheep producers were selected randomly based on probability proportional to the population size of the selected kebeles. The sample size was determined by using Yemane (1967) simple formula.

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

Where n = the sample size
 N = Total number of households in the study Woreda which is 3000
 e = the error term and 10% (0.1) were taken.

In addition to the producers, primary data was also collected from the sheep traders at different levels. The traders' survey was conducted at districts market towns during the market days where transaction takes place. Here, sampling was the very difficult task due to absence of recorded lists of population of traders.

Hence, interview was conducted with purposively selected sheep traders, butcheries and hotels, individual farmers who were purchased sheep for breeding purpose at the market place. Both licensed and unlicensed traders were also included in the traders' survey.

As a result, totally 12 sheep traders and 7 hotels were purposively selected and interviewed from the districts. Furthermore, 10 consumers were interviewed by selecting randomly.

2.4 Data analysis
 2.4.1 Descriptive Analysis

Descriptive statistics is one of the techniques used to summarize data collected from a sample. Descriptive statistics such as mean, frequency, percentages and standard deviation were used in the process of examining and describing socioeconomic, demographic and institutional characteristics of the study area.

Marketing margin

As an indicator of the efficiency of channel, net marketing margins of a particular marketing agent are estimated as a residual of the gross market margin after paying marketing costs. The estimation of

market actors net marketing margin estimated following

$$\text{Gross Marketing Margin} = \text{Selling price} - \text{Buying price}$$

Total cost = Standard Marketing Cost + Transaction Cost (is a cost in making any economic trade when participating in a market)

$$\text{Net Marketing Margin} = \text{Gross Marketing Margin} - \text{Total Cost}$$

Data collected from the surveyed markets and from discussion made with key information were used to analyze marketing costs. Sheep producers marketing costs is considered as zero since they are trekking their animals to the nearby markets by themselves or using family labor.

Marketing costs and margin analysis is especially comparison of prices at different levels of marketing over the same period. Computing the total gross marketing margin (TGMM) is always related to the final price or the price paid by the end consumer and is expressed in percentage (Mendoza, 1995).

$$\text{TGMM} = \frac{\text{consumer price} - \text{producers/pastoralists}}{\text{consumer price}} \times 100$$

Total gross marketing margin (TGMM) is the final price paid by the end consumer, minus the producers' price, divided by the consumers' price and expressed as a percentage. The TGMM is useful to calculate the producer's gross margin (GMMp), which is the portion of the price paid by the consumer that goes to the producer.

$$\text{GMMp} = \frac{\text{price paid by the consumer} - \text{marketing gross margin}}{\text{price paid by the consumer}} \times 100$$

Where GMMp= producers' participation (pastoralists portion)

In marketing chain with only one trader between producer and consumer, the net marketing margin (NMM) is the percentage over the final price earned

by the intermediaries as his/her net income once his marketing costs are deducted.

$$NMM = \frac{\text{Gross margin} - \text{Marketing costs}}{\text{End buyer price (Consumers price)}} \times 100$$

Where NMM = net marketing margin

The collected data were analyzed using computer software package particularly SPSS and STATA.

III. RESULTS AND DISCUSSION

3.1 Household characteristics

The result of the study revealed that high percentage of respondents, involved in sheep production activities in the study areas were male headed 99 (82.5%) when compared to female's 21(17.5%) (Table1).

Table 1: Distribution of sample household heads by sex

Sex	Frequency	Percent
Male	99	82.5
Female	21	17.5
Total	120	100

Source: Own computation of survey data, 2019.

The average age of the sample household head was found to be 48.5 years where the minimum is 23 and the maximum is 80 years. The average age implies that most of the household heads were above their productive age bracket (Table 2). The average family size of sample farm households was estimated to be 5.6.

The minimum and maximum family size of sample farm household was 2 and 12 respectively. The amount of income generated from farm and off/non-farm activities varied among sample farmers. The off/non-farm activities include casual labor, salaried employ, trading, handicraft, remittance etc.

Remittance is the main source of off/non-farm income for most of the households. Farmers annual income ranging from no additional income to a maximum of birr 58,376 birr (ETB) per annum. The

average amount of annual income earned by sample farmers was 9502.54 birr (ETB).

The study shows that; the minimum education level of the households was grade 0 (0 years) and the maximum were grade 12(12 years of schooling). The average education levels of the household heads were about grade 4.4. This shows that on average, farmers attended the minimum required education level that is adequate for understanding and adoption of introduced modern sheep production technologies.

The number of livestock owned by a household in the study area is considered as a measure of wealth. In a mixed farming system, the contribution of livestock to crop production cannot be undermined. They are an important source of income, food and draft power for smallholding farmers.

The types of livestock found in the study area were cattle, equine, sheep, goat and chicken. The average number of livestock in TLU was 4.8, where the minimum is 0.63 and the maximum is 10.94. The result of the survey showed that number of sheep farmers have differ from no sheep (0 sheep) to maximum stock of seven sheep in size.

The average sheep sizes of farmers were 2.6. The study result indicated that, farmers had on average 0.16 hectares of grazing land with maximum grazing land of 2 hectares and minimum of 0 hectares (Table 2).

Table 2: Summary of socioeconomic and demographic results of descriptive statistics analysis

Variables	Min	Max	Mean	Standard dev.
Age	23	80	48.5	10.4
Family size	2	12	5.7	2.2
Level of education	0	12	4.4	1.6
Number of sheep	0	7	2.4	1
TLU	0.63	10.94	4.7	1.4
Total income	0	58,376	9502	1851

Source: Own computation of survey data, 2019.

3.2 Sheep value chain analysis

3.2.1 The major sheep value chain actors and their roles

According to the value chain assessment (VCA) framework, ‘actors’ in the value chain refers to those individuals or entities who engage in a transaction which moves a product from inception to end use. They must exchange money (or an equivalent service) as well as a product, which generally increases in value with each transaction (Campbell, 2008).

The primary actors in the sheep value chains in the study areas are producers (farmers), brokers, collectors, small and large-scale traders, hotels/restaurants and individual and domestic consumers.

Analysis of the characteristics of these actors and their marketing strategies helps in designing intervention measures to overcome the causes of unnecessarily high transaction costs and other factors that depress the proportion of the final price producers get. The characteristics of each of the actors are described below.

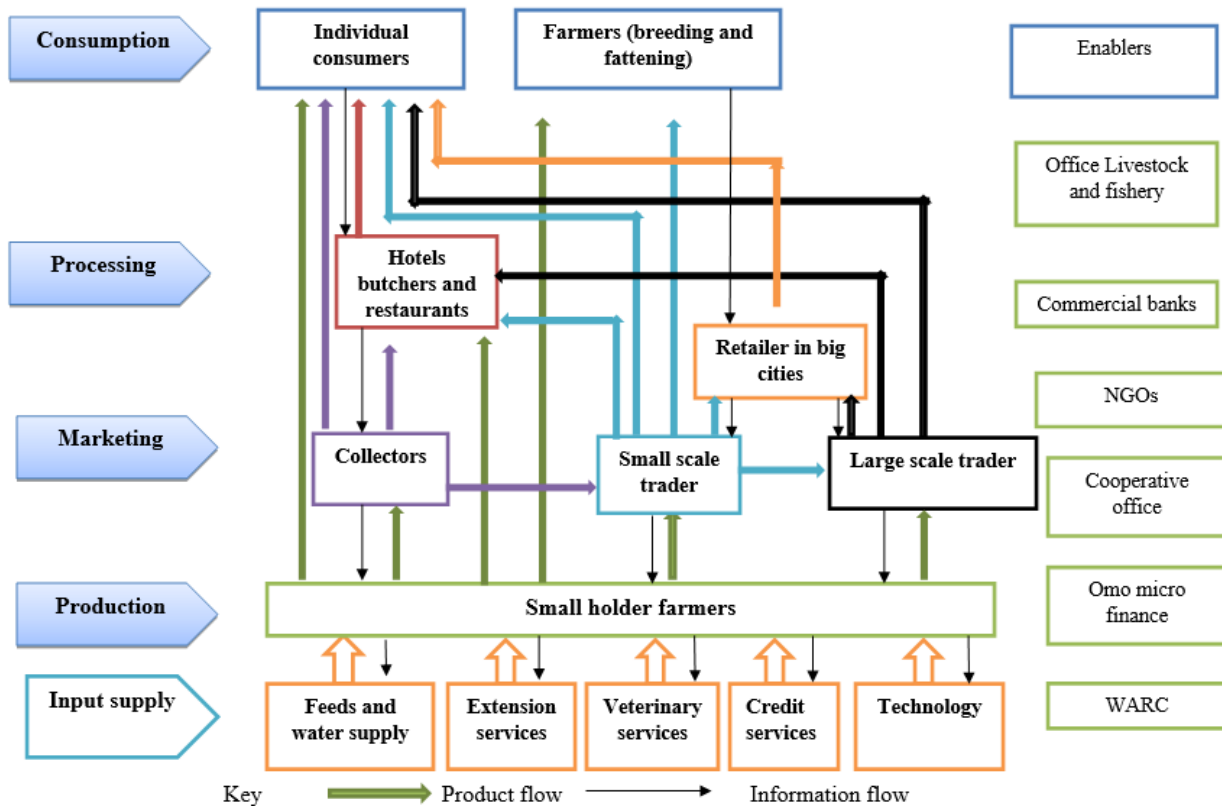


Figure 1: Sheep value chain mapping of Gumer Woreda

3.3 Market channels

Marketing of sheep in the study area starts with the collection of sheep of different classes and ages from production areas moving on to the end markets. In the process, animals pass successively through different market actors before reaching the end users. The number and type of market participants are different along the different market channels. In order to indicate the distribution of marketing costs and

margins, some major marketing channels linking producers with the end users are identified. The different channels represent available outlets in the areas through which sheep moves from different directions of the production areas to the terminal markets and to meet end-users’ needs.

There are ten major market channels for sheep produced in the study districts and moving to different markets

Channel 1: Producers → Hotels/restaurants → Consumers

Channel 2: Producers → Collectors → Hotels/restaurants → Consumers

Channel 3: Producers → Collectors → Small scale trader → Consumers

Channel 4: Producers → Collectors → Small scale trader → Large scale trader → Consumers

Channel 5: Producers → Consumers (farmers for breeding purpose)

Channel 6: Producers → Small scale trader → Hotels/restaurants → Consumers

Channel 7: Producers → Small scale trader → Consumers

Channel 8: Producers → Small scale trader → Large scale trader → Retailers → Consumers

Channel 9: Producers → Large scale trader → Hotels/restaurants → Consumers

Channel 10: Producers → Large scale trader → Retailers → Consumers

3.4 Distribution of costs and margins

Costs of production

Cost of production is the total cost incurred for production of a yearling sheep. In the study area the major cost of production is feed cost. A farmer may also use different inputs to rear sheep. Those inputs needed to grow yearling sheep may include labor and medication (veterinary). Farmers use different types of locally available feed types, the major one being grass. During focus group discussion, farmers estimated the cost of grass which can feed a single animal for one year. Grass is purchased by negotiation based on a subjective judgment of grass density on a given paddock of land.

Marketing costs

Marketing costs are the total costs incurred in marketing produce by each agent (Table 3). The proportion of average costs that have been estimated by respective market participants are indicated in the table, indicating the significance of each cost item against other marketing cost components. Data collected from the surveyed markets and from key informants were used to analyze marketing costs. The major costs for sheep producers are feed costs and herding costs. Sheep producers marketing cost is

considered to be zero, since their animals trek to the nearby markets by themselves or are using family labour. However, some cost items (e.g. search cost) which were found difficult to estimate by key-informants, were taken from the literature of previous similar studies (Legese and Hordofa 2011).

Distribution of costs and margins was calculated for four of the ten marketing channels identified using information generated from the field study. The highest marketing cost is incurred by hotels (ETB 500) followed by larger trader (ETB 112) and small scale trader (ETB 75). Hotels/butchers and restaurants incurred the highest cost on Injera & processing (spices, fire wood, oil and other inputs), followed by labour and slaughtering. Transportation followed by feed are the major marketing costs for small traders. Transportation costs are a major cost for large scale trader.

Hotels/restaurants need relatively skilled labour for slaughtering and splitting the different carcass parts. Thus labour cost is estimated at 16% for hotels/restaurants. In the study areas hotels/restaurants sell 'tibs' (roasted or fried meat),

‘dulet’ and spiced boiled meat called ‘kikil’ for consumption on their premises.

Table 3: Marketing costs for per head sheep for market participants

Cost category	Producers		Local collectors		Small scale traders		Large scale traders		Hotels and restaurants	
	Cost	%TC	Cost	%TC	Cost	%TC	Cost	%TC	Cost	%TC
Feed cost	250	41.6	15	27.3	12	16	10	8.9		
Labour cost	300	50			10	13.3	15	13.4	80	16
Drug purchase	10	1.6			3		2	1.8		
Slaughtering Cost									50	10
Cost of Injera& processing(spices,firewood,oil and other inputs)									340	68
Herding cost			15	27.3			-		-	
Tax	10	1.6			10	4	10	8.9	10	2
Transportation	20	3.3	20	36.4	25	33.3	45	40.2	-	
Brokers	10	1.6			10	13.3	15	13.4	20	4
Other costs(ropes & others)			5	9	5	6.6	5	4.5		
Total cost/head(in ETB)	600	100	55	100	75	100	112	100	500	100

Source: Own computation of survey data, 2019.

3.4.1 Margins and value additions

The analysis of cost and margins which is flow of benefits among actors is another aspect of the value chain. In the current study, the first channel is the one that leads sheep to the hotels. In this channel, the sheep producers obtain only about 50% of the final price of the processed sheep meat sold by the hotels (Table 4). On the way through the marketing channel, value is added to the product. The value added to the product is shared among the value chain actors. As indicated in Table 4, producers and hotels/restaurants take equal share of the value added which is 50% by each actor.

Table 4: Costs and margins of the actors involved in selling sheep to hotels/restaurants

	Producers	Hotels/restaurants
Production or purchase cost	560	1300
Total marketing cost	40	500
Total cost	600	1800
Selling price	1300	2500

Marketing margin		1200
Net margin		700
Value added	700	700
Share of value added (%)	50	50
Producer's share of final price (%)		50

Source: Own computation of survey data, 2019.

The other important channel which passes sheep to hotels/restaurants through collectors. The value added to the product is shared among the value chain actors. As the results indicate hotels/ restaurants take the largest share of the value addition which is 48.4% followed by producers (45%), and collectors (6.6%). In these channels producer share of the final price is very low which is (48%) (Table 15).

Table 3: Costs and margins of the actors involved in selling sheep to hotels/ restaurants through collectors

	Producers	Collectors	Hotels & restaurants
Production or purchase cost	560	1250	1400
Total marketing cost	40	55	500
Total cost	600	1305	1900
Selling price	1250	1400	2600
Marketing margin		150	1200
Net margin		95	700
Value added	650	95	700
Share of value added	45	6.6	48.4

(%)
 Producer's share of final price (%) 48

Source: Own computation of survey data, 2019.

As indicated in Table 6, calculations of margins and value addition were also made for the Channel which transports sheep to the hotels/restaurants through involvement of collectors and small scale trader. In this channel there are different types of actors involved in the sheep value chain. As indicated in the table, hotels/ restaurants take the largest share of the value added which is 45.3%, followed by small scale trader (7%), and collectors (5.5%). Producers' share of final price is low, which is estimated as 45.4%.

Table 4: Costs and margins of the actors involved in selling sheep to hotels/restaurants through collectors and small-scale trader

	Producers	Collectors	Small scale trader	Hotels & restaurants
Production or purchase cost	560	1180	1310	1480
Total marketing cost	40	55	75	500
Total cost	600	1235	1385	1980
Selling price	1180	1310	1480	2600
Marketing margin		130	170	1180
Net margin		75	95	620
Value added	580	75	95	620
Share of value added (%)	42.3	5.5	6.9	45.3
Producer's share of final price (%)				45.4

Source: Own computation of survey data, 2019.

Calculations of margins and value addition were also made for the Channel, which transports sheep to the Addis Abeba market retailer through involvement of collectors, small scale trader and large scale trader. As indicated in the table 7 below, share of value added for Addis Abeba retailer is 11.1 % which is

relatively larger than others. Producers' share of final price is larger than other channels, which is estimated as 64.6%.

Table 5: Costs and margins of the actors involved in selling sheep to Retailers at Addis Abeba

	Producers	Collectors	Small scale trader	Large scale trader	Retailers
Production or purchase cost	560	1130	1255	1400	1620
Total marketing cost	40	55	75	112	30
Total cost	600	1185	1330	1532	1650

Selling price	1130	1260	1400	1620	1750
Marketing margin		130	145	220	130
Net margin		75	70	88	100
Value added	570	75	70	88	100
Share of value added (%)	63.1	8.3	7.8	9.7	11.1
Producer's share of final price (%)					64.6

Source: Own computation of survey data, 2019.

3.5 Opportunities and constraints in sheep value chain

production, processing, marketing and consumption are summarized below.

Value chain actors have given their responses on most important constraints affecting sheep

Table 8: Major constraints in sheep value chain

Stage of value chain	Major constraints	Reported problem (%)	Rank
Input supply	Lack of improved rams (breed improvement)	65	2
	Shortage of forage seeds	40	3
	Limited access to credit	34	4
	Shortage of land for grazing and feed production	96	1
	Lack of supplementary feeds	29	5
Production	Low feed quality	72	1
	Inadequate training	51	2
	Lack of sheep market extension services	35	3
Marketing	Low bargaining power of producers and limited access to market information.	60	2
	Seasonality in supply and demand for sheep	48	3
	Poor livestock marketing infrastructure	97	1
	Unlicensed (informal) traders	23	4
Processing	Inadequate local market (customer)	75	2
	Low quality animals (pregnant ewes)	29	3
	Backyard slaughtering of animals.	80	1
Consumption	Inconsistent in supply of animals	100	1

Source: Own computation of survey data, 2019.

Opportunities

The major opportunities for value chain actors are suitability of the area for sheep production, increasing demand for sheep meat in local markets, large population of sheep, existence of many local sheep markets, increased intervention by government and NGOs (GIZ and ICARDA) in sheep improvement, farmers awareness increasing, short distance to central market and transport access to the main market

IV. CONCLUSION AND RECOMMENDATIONS

The major actors are producers, collectors, small traders, large traders, hotels/restaurants consumers and farmers who buy sheep for breeding and fattening. Domestic prefer young animals in good condition (fattened). However, the animals supplied can be poor in quality, and that supply is also inconsistent. Our study results show that there are weak vertical linkages among producers and other

actors along the value chain. For instance, producers sell their animals to different traders in the same market. The horizontal linkages among traders were also weak. But good horizontal linkages were observed among farmers in the study areas, as they exchange breeding rams and market information.

Ten marketing channels were also identified. Under each function, a number of constraints were identified. For input supply, the priority problems were a shortage of land, high feed prices and a lack of improved forages, whereas the constraints on production were a lack of farmers' awareness of opportunities, the limited number of rams and inbreeding problems. Shortage of working capital, multiple taxation and transportation problems were the constraints of the marketing core function. While for the processing core function, the constraints were limited markets, quality of sheep and the absence of credit services. Finally, the constraints of the consumption core function were a low quality product (sheep) and inconsistent supply.

Even though there are opportunities and potential for production of sheep in the study area, the production is not market-oriented: there are poor animal health services and facilities (shortages of drugs, skilled staff, local health posts, buildings, laboratory facilities and equipment, and vehicles to provide a mobile animal health service). Moreover, feed production and productivity were very poor and given less priority by producers; there was a poor extension system with regard to improved forage development and use; and a proper breeding strategy was missing. By overcoming the obstacles in each actors it is possible to develop profitable sheep production and marketing that can benefit all actors in the value chain.

Based on the finding of the study, different constraints of the sheep value chain were identified. Based on the priority of these constraints, the following recommendations have been made to government policy- and decision-makers, donors and the wider development community:

- Support genetic improvement of the Gummer sheep breed based on other experience of community- based breeding programs
- Provide improved forage technologies and feeding practices

- Strengthening animal health posts (materials and human capacity)
- Provide training to farmers, development agents and experts
- Disseminate seasonal market information system
- Strengthening vertical and horizontal linkage among actors

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