

Analysis of Sheep Value Chain in Basona Werena District, North Shewa Zone, Amhara Regional State of Ethiopia

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Abstract: Ethiopia has large number of small ruminant resources, but its contribution to the national economy is far less than its potential. This study was undertaken to analyze sheep value chain actors and their roles, to examine market performance of actors and find out the existing constraints and opportunities of sheep value chain in Basona Werena District, North Shewa Zone, Amhara Regional State of Ethiopia. The primary data was collected from a sample of 366 farmers from five Kebeles and other 40 sheep value chain actors through structured questionnaires, focus group discussion, key informant interview and personal observation. The data was analyzed using descriptive statistics of mean, standard deviation, frequency, Value Chain Analysis and marketing margin. Results show that input suppliers, farmers, traders, processors, service providers and consumers were the main sheep value chain actors in the study area. The sheep production system was traditional that needs intervention to transform in to market-oriented one. Eight sheep market channels were identified in the study area and the share of farmers from final sheep price was 35% which was very low. Feed shortage, sheep diseases, lack of linkage between Debre Bribhan Blanket Factory and farmers, lack of improved sheep rams and low awareness of farmers' on market oriented sheep production were the major constraints of sheep production in the study area. On the other hand government's commitment to increase meat export, increment of export abattoirs, high demand of live sheep and sheep meat in both domestic and gulf countries and geographical location of the study area were the major opportunities. Therefore, farmers should have to form farmers' small ruminant cooperative; strengthen the linkages among them and other value chain actors to increase their bargaining power and to be more beneficiary from the marketing of their sheep. Moreover, policies and strategies aiming at supplying improved sheep breeds, veterinary drugs and feeds, providing financial support, creating awareness and giving training for farmers on market oriented sheep production system are recommended.

Keywords: Value Chain Analysis, Actors, Market Oriented and Marketing Margin

1. Introduction

Background and Justification of the Study

Agriculture is dominating the national economy of Ethiopia which accounts for 36.7% of overall GDP and 70% of foreign exchange earnings. It is a means of generating livelihood for 83% of the rural population and provides employment for 72.7% of the population [3, 13]. Ethiopia is one of the countries with largest number of livestock and small ruminant with an estimated population of 57.83 million cattle, 28 million sheep, 28.6 million goat, 1.23 million camels, 60.5 million poultry, 2.1 million horses, 0.4 million mules and 7.88 million donkeys [8]. The number of sheep has reached to 31,302,257 after two years [10].

The direct contribution of livestock to GDP is estimated at ETB 150.7 billion per year, which accounts to 17% of GDP and 39% of the agricultural GDP. This rises to about 21% of the national GDP and 49% of the agricultural GDP, if the contribution of processing and marketing (35.6 billion) is taken into account [24]. Small ruminant in general and sheep particularly is a major component of the livestock sector. Sheep and goat account for about 90% of the live animal/meat and 92% of skin and hide export trade value and 37% of meat consumption in Ethiopia [21].

Sheep is the second most important species of livestock with nine diverse breeds and ecotypes distributed across different agro-ecologies ranging from cool alpine climate of the mountains to the arid pastoral areas of the lowlands

(Solomon as cited in Eyob, 2018). Amhara Region is the leading region in sheep production with an estimated population of 11,086,083 sheep [10] and North Shewa Zone is the second potential zone with a projected population of 1,809,597 sheep [9]. Basona Werena district is one of the top five potential districts in sheep production in North Shewa Zone of Amhara Regional State.

Although Ethiopia has large and diverse livestock and small ruminant resources with favorable and conducive production environment, its contribution to the national economy at either the macro or micro level is far less than its potential [15, 18]. The marketing system of livestock and small ruminant is also so fragmented and disorganized with various actors which make the supply chain unnecessarily long. This increased the transaction costs without any significant value added activities along the chain [1]. Due to the limited value adding activities of livestock sector, exports remain dominated by live animals [15, 24]. Furthermore, smallholder farmers have not livestock market information that informs them about which animals are needed/required, who are the potential buyers and the prices of animals and hence they are not beneficiary as their effort [15, 18].

The current demand of meat in Ethiopia is mainly met domestically from cattle (63%), sheep (25%) and goats (12%) [21], however the projections over the next 15 years show that a deficit of about 1.3 million, 53% MT of meat in Ethiopia as a result of rapidly increasing population growth to 127 million people and rising per capita income [24]. On the other hand, there is huge demand for live sheep and sheep meat in the Gulf countries (Solomon as cited in [4]). Therefore, this gap requires a critical analysis of the livestock sector particularly small ruminants that includes the sheep in which the study is conducted. This is one of the reasons that initiate the researcher to conduct this study.

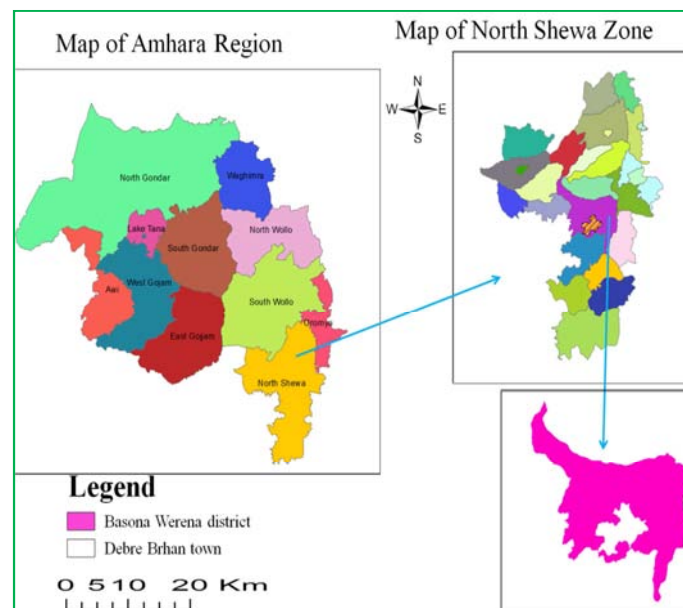
Value chain analysis is conducted in agricultural commodities to understand the causes for inefficiencies in the chain, to shows who add more value and to identify points of intervention which have the highest impact in upgrading of the value chain and benefit the poorest and the least powerful actors (Anandajayasekeram and Brihanu as cited in [15]). The value chain concept has been applied in both the crop and livestock sectors as an approach for identifying the problem and assessing potential interventions from a development perspective [17]. In Ethiopia, there are many studies which were conducted on sheep value chain analysis [2, 5, 6, 12, 17]. But they did not address the sheep value chain in Basona Werena District as the researcher's best knowledge.

Therefore, the study was conducted in order to identify sheep value chain actors and their role, to examine market performance of actors and to find out existing constraints and opportunities of sheep value chain in Basona Werena District of Amhara Regional State of Ethiopia.

2. Methodology

2.1. Description of the Study Area

Basona Werana is one of the 23 districts in North Shewa Zone of Amhara Regional State. This district was originally named Debre Brihan Zuria. It is found at 130 km from Addis Ababa town at latitude of 9°30'00" and longitude of 39°30'00" E. It is bordered on the south by *Angolalla Tera*, on the southwest by the Oromia region, on the west by *Siyadebrina Wayu*, on the northwest by *Moretna Jiru*, on the north by *Mojana*, on the northeast by *Termaber*, and on the east by *Ankober* district (Figure 1).



Source: Basona Werena District Agricultural and Natural Resource Development office, 2018

Figure 1. Map of the study area.

The district has a total population of 120,930 of whom 61,924 are men and 59,006 women; 1,219 or 1.01% are urban inhabitants. With an area of 1,208.17 square kilometers, Basona Werana has a population density of 100.09, which is less than the Zone average of 115.3 persons per square kilometer. A total of 27,753 households were counted in this district, resulting in an average of 4.36 persons per household. The altitude ranges from 1,300-3,650 m.a.s.l; temperatures is 6-20 °c and monthly rain fall 1200-950 mm [7].

2.2. Types and Sources of Data

The study used both qualitative and quantitative types of data. Regarding to the source of data, both the primary and secondary data were used. The primary data collected from sheep producing farmers, participants of FGD, development agents (DAs), sheep traders, hotels and butchers, Debre Brihan Blanket Factory, Addis Ababa abattoirs enterprise and consumers. Different official documents and records were used as secondary sources of data.

2.3. Sampling Methods and Procedures

The study used two-stage sampling approach to select representative sample household heads. In the first stage, five Kebeles were selected purposively out of 31 Kebeles based on their sheep producing potential and considering their distance from the administrative town of the district. In the second stage, household heads were selected using simple random sampling method. The sample size of farmers was determined using Yamane (1967) formula.

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

Where n is the sample size sheep producing farmers,

N is the total population size of sheep producing farmers, and e is the desired level of precision which range from 0.05 - 0.1 [20]. When the value of e decreased to 0.05, the sample size becomes large and it is difficult to manage them. So, the study used e = 5.1% of precision level to reduce the sample size.

According to office of BWDLRD, there are about 7,956 sheep producing household heads in the sampled Kebeles. Then, the sample size of sheep producing household heads became;

$$n = \frac{7,956}{1+7,956(0.051^2)} = \frac{7,956}{21.7} = 366 \quad (2)$$

Table 1. Proportion of sampled farmers.

Name of Kebeles	Total number of sheep producers	Proportion (%)	Sample size
Bakielo	2,190	28	101
Angolela	1,623	20	75
Goshe Bado	1,545	19	71
Debelie	1,334	17	61
Gudo Beret	1,264	16	58
Total	7,956	100	366

Source: Basona Werana District Livestock Resource Development Office, 2018

In addition to farmers, the study tried to consider other sheep value chain actors who participated along the chain. However, the total number of sheep traders in the study area is not known due to the existence of non-licensed sheep traders (especially local collectors). Likewise, small and big sheep traders who participated in the study area are not only from Basona Werena district, but also came from different Districts, Oromia Region and Addis Ababa. The exact number of local collectors, small and big traders is not found in Basona Werena District Trade and Market Development office. Hence, the study used convenience sampling method which allows selecting easily accessible traders at the market place.

Therefore, 40 sheep value chain actors (6 local sheep collectors, 8 small and big traders, 8 hotels and butcherries, 5 DAs, 1 Head of District Livestock Resource Development Office, 1 Production Manager of Debre Birhan Blanket Factory, 1 Manager of Addis Ababa abattoirs enterprise, 6 individual consumers and 4 sheep retailers in *Kara* and *Shola*) were used in this study.

2.4. Methods of Data Collection

The primary data was collected from December 22, 2018 – March 15, 2019. Before the data collected, the questionnaires were pre-tested on five farmers (one from each sampled Kebele) and it was modified accordingly. The data was collected using structured questionnaires, focus group discussion (FGD) and Key informant interview with a guiding checklist. It was collected with trained enumerators and direct involvement of the researcher.

Three FGD were carried out with a group of 10 farmers in each Kebele. Participants of FGD were allowed to discuss thoroughly on each points of the checklist. The final consensus of each group was taken as the best information regarding to sheep value chain in the study area.

Key informant interviews were conducted with head of Basona Werena Livestock Resource Development office (BWLDRDO), Development Agents of each Kebele, Production Manager of Debre Birhan Blanket Factory and Manager of Addis Ababa abattoirs enterprise. Sheep retailers at *Kara* and *Shola* were also interviewed as key informant interviewees. The secondary data were collected from records BWLDRDO, Debre Brihan Blanket Factory as well as from other published and unpublished sources.

2.5. Methods of Data Analysis

Descriptive statistics such as mean, standard deviation, frequency, percentage, value chain analysis and marketing margin were employed for descriptive statistics.

2.5.1. Value Chain Analysis

There is no 'correct' way to conduct a value chain analysis [16] and the researcher used the approaches that were suggested by [23] in analyzing agricultural commodities with four aspects of value chain analysis:

Value chain mapping: Value chain analysis systematically

maps the actors, basic functions, activities of each actor, product flows, end markets, and other relevant details. The map can be drawn using quantitative and qualitative data from primary and secondary sources of data.

Analyzing the distribution of actors' benefits: VCA identifies the distribution of benefits of actors i.e. who benefits and by how much and who will benefit from any additional support to be provided in the chain. This involves analyzing the margins and profits within the chain and therefore determined who benefits from participating in the chain and who would need support to improve performance and gains.

2.5.2. Market Performance Analysis

The market performance of different channels can be evaluated by analyzing marketing costs and margins of actors along the chain [19].

Marketing Cost: According to Holloway and Ehui as cited in [4] marketing costs includes handling cost (labor, loading and unloading, costs of damage, transportation) to reach an agreement, transferring the product the end consumers.

Marketing margin: is a commonly used measure of the performance of a marketing system. It is defined as the difference between the price the consumer pays and the price that is obtained by producers; or as the price of a collection of marketing services which is the outcome of the demand and supply of such services (Holt as cited in [22]). The size of market margins is largely dependent upon a combination of the quality and quantity of marketing services provided, the cost of delivering/providing such services, and the efficiency with which they are undertaken and priced. For instance, a big margin may result in little or no profit or even a loss for the seller involved depending upon the marketing costs as well as on the selling and buying prices [19]. The marketing cost and margins of actors were calculated and estimated to indicate the efficiency of the channel using the following formulas.

$$\text{Marketing margin} = \text{Selling price} - \text{Buying price} \quad (3)$$

$$\text{Net marketing margin} = \text{Marketing margin} - \text{Total cost} \quad (4)$$

$$\text{Total cost} = \text{Standard marketing cost} + \text{Transaction costs} \quad (5)$$

$$\text{Proportion of value added (i}^{\text{th}}\text{) actor b} = \frac{\text{Value added by (i}^{\text{th}}\text{) actor}}{\text{Total value added in the channel}} * 100 \quad (6)$$

$$\text{Producers' Share of final price} = \frac{\text{Farmers selling price}}{\text{Selling price of (i}^{\text{th}}\text{)actor}} * 100 \quad (7)$$

3. Results and Discussion

3.1. Demographic and Socio-economic Characteristics of Respondents

Table 2. Demographic and socio-economic characteristics of sheep producers.

Variable	Mean	Std. Dev.	Min	Max
Age of household heads (Years)	45.78	12.02	19.00	77.00
Education status household heads (Years)	3.60	2.88	0.00	10.00
Family size (Adult equivalent)	3.75	1.54	0.75	7.65
Total land owned (Hectares)	1.54	0.79	0.00	5.00
Experience in sheep production (Years)	19.73	6.23	7.00	38.00

Categorical/Dummy Variables	Category	Frequency	Percent (%)
Sex of household heads	Male	320	87.43
	Female	46	12.57
	Single	14	3.83
Marital status of household heads	Married	316	86.34
	Divorced	5	1.37
	Widower/d	31	8.47

Source: Survey result, 2019

The results show that out of the 366 sampled sheep producing household heads, 87.4% were male headed and the remaining 12.6% were female headed. The average age of the household heads was 45.78 with a standard deviation of 12.02. The distribution of the household heads by marital status shows that 3.8% of them were single, 86.3% of them were married, 1.4% of them were divorced and the remaining 8.5% were widower/d.

Farmers attained formal education on average for 3.6 years with a standard deviation of 2.89 which has a positive effect on sheep feeding, housing, fattening and health management

and in choosing best sheep market outlets. Farmers had 1.54 hectare of land with a standard deviation of 0.79 and crop residuals are the most important sources of feed for sheep. The average year of farmers' experience in sheep production was 19.73 years with a standard deviation of 6.23. This helps farmers to improve the overall sheep production management and to identify the best sheep marketing outlets which give them good rewards.

3.2. Institutional and Infrastructural Services

The survey result (table 6) shows that 48.9% sheep

producing farmers accessed the extension services regarding to livestock production and sheep production and its managements. The frequency of extension contact between sheep producing farmers and DAs was 2.72 days per year on average with a standard deviation of 2.01 (table 6). This indicated that farmers and DAs contacted and discussed on animal husbandry for short time. Participants of FGD in all Kebeles said that this extension service mostly delivered on annual farmers' meeting and when farmers become tired. Generally, the small ruminant sector particularly the sheep production farm has given less attention than crop production.

The result shows that farmers have to travel two and half hours of distance on average to reach to the nearest small ruminant markets. Moreover, *Gosh Bado*, *Angolela* and *Bakielo* haven't their own local markets for small ruminants and hence farmers forced either to sell their sheep for the local collectors at their farm gate or to go to other far distant markets like Debre Brihan market. Around 45.9% of sampled farmers were accessed sheep related market information mostly from local collectors in the study area (table 6). This indicated that most farmers have supplied their sheep to the market without having enough information on the price and types of sheep required by sheep traders and consumers at the market place.

3.3. Main Sheep Value Chain Actors and Their Activities in Basona Werena District

Input suppliers: Input supply includes the selection and distribution of sheep breeding rams (*Dorper* and *Awassie*), supply of credit services, feeds, veterinary services and giving training on improved sheep husbandry practices, feeding and health management. Debre Brihan Sheep Multiplication Center and Debre Brihan Agricultural Research Center work on improved sheep rams (*Dorper* and *Awassie*) and distribute to the farmers. But its distribution was limited both in its number and scope. Regarding to feed supply, few farmers' primary cooperatives (in *Angolela* and *Bakelio* Kebele) supplied supplementary feeds (Beer byproduct, *Frushka* and *Fagulo*) for member farmers while few farmers bought from Debre Brihan. Around 21.9% of the respondent farmers used supplementary feed (Beer byproduct *Frushka* and *Fagulo*) for their cattle and sheep with bran, hay, *Atela* and grain in the study area. They used these supplementary feed only for milking cows, fattened oxen and fattened sheep which supplied to market.

Farmers: Basona Werena is one of highland area which characterized by crop livestock mixed farming system and sheep production is an integrated practice. When this study conducted, sampled household heads have on average 7.1 livestock and 10 sheep (2.9) in TLU with a standard deviation of 1.95 and 1.24 respectively (table 6). Almost all farmers in the study area were practiced traditional sheep production which entirely depends on traditional methods of sheep feeding (free grazing of natural pasture and crop residuals), poor health caring and housing and using local sheep breeds. They focus on quantity of sheep rather than giving attention on producing quality sheep which required in

the market.

Although sheep were the main source of income for farmers, almost all farmers not tethered and fattened their sheep for market supply in the study area. The result shows that farmers supplied 3.98 \approx 4 heads of sheep on average per year to the market (table 6).



Source: Captured photos during field survey, 2019

Figure 2. Sheep production with free grazing.

Traders: Farmers, local collectors, small and big traders, hotels and butcheries and individual consumers were major sheep marketing actors in Basona Werena district. Sheep were traded by 'eye-ball' estimation and price was fixed through negotiation and individual bargaining in the study area. As the traders said, the price of sheep mainly depends on its supply and demand which was heavily influenced by religious and cultural festivals.

The survey result revealed that male sheep sold from ETB 400-4000 while the price female sheep ranges from ETB 350-2,500. On average, male and female sheep were sold with ETB 1552.35 and 959.47 (table 6). Small and big traders collected sheep from Debre Brihan market and supply to retailers, hotels, butchers and individual consumers in Debre Brihan and Addis Ababa. As small and big traders said, fattened male sheep and sterile ewes were the most preferred sheep type in Addis Ababa. Retailers who found at *Kara* and *Shola* bought from small and big traders who bring from Debre Brihan market and they sold to hotels, butchers and individual consumers in Addis Ababa.

Processors: It is one of the core functions of sheep value chain. In the study area, hotels and butchers were the major processors of sheep. They bought the sheep either from producers, local collectors, brokers and small and big traders.

On average, they bought a male sheep at ETB 1863 and 2200 directly from farmers and small and big traders respectively. Butchers and hotels at Debre Brihan and Addis Ababa slaughter and prepare different dishes like Fry up meat, *Kikil*, Stews (*Key Wot*) and *Dulet* (a chopped and spices mixture of meat) from sheep meat. Butchers also retail meat on a kilogram basis as take away. When this study conducted, the average price of one kilogram of roasted meat at Debre Brihan and Addis Ababa was ETB 287.5 and 312.5 respectively.



Source: Captured photos during field survey, 2019

Figure 3. Butchers and hotels at Debre Brihan and Abattoir in Addis Ababa.

Addis Ababa Abattoir Enterprise: It is one of sheep value chain actors which give the slaughtering services for hotels, butchers, super markets and individual customers at Addis Ababa. Slaughtering, skinning, and removing unnecessary part, transporting, processing the by-product were the major activities of the enterprise. But it is the old, outdated and labor intensive abattoir. The manager of the abattoir said that the enterprise charges ETB 115 and 300 per sheep for the slaughtering and transportation services respectively.

Consumers: Sheep is consumed mostly at Debre Brihan town and Addis Ababa city. Consumers could buy either sheep meat as take away from butchers or consume different processed meat such as roasted meat, boiled meat, *Dilot*, stew (*Key wot*).

Individual consumers (including farmers) slaughtered and consumed sheep at home for holidays and religious festivals (Ethiopian New Year, Ed-Alfetir Christmas, Easter and wedding ceremony) and cultural scarifies. The participants of FGD said that black sheep with white leg and reddened colored sheep were highly demanded on May and July to slaughter for *Borentcha* and *Atetie* cultural scarification respectively. Hence, the selling price of these sheep relatively increased during May and July. As the result showed, farmers slaughter on average 2 sheep per year with a standard deviation of 1.4.



Source: Captured photos during field survey, 2019

Figure 4. Individual consumers of sheep in the study area.

3.4. Sheep Value Chain Supporters in Basona Werena District

Extension service providers: In the study area, DAs

provide technical support and advice to improve the overall sheep production management of farmers. But its scope and coverage was limited. The result revealed that only 48.91% of sampled sheep producers accessed extension services on sheep breed improvement, feeding, housing management and fattening.

As key informant interviewees (DAs) said, the training on over all livestock production management was delivered mostly at quarter, semi-year and annual meeting of farmers at Kebele level. It delivered at end of the meeting when farmers became so tired, hunger and they didn't give full attention. When we compared to crop production, the extension service as well as the input supply service for livestock production is very limited in the study area.

Financial input suppliers: ACSI and *Bkat* Farmers' Savings and Credit Cooperatives (BFSCCs) were identified as credit services suppliers for smallholder farmers in the study area. However, only 17.2% of the respondent farmers were the user of credit service. As the result (table 6) shows, 8.5% of farmers took the credit from (BFSCCs)¹ and 7.7% from ACSI. The remaining 1% funded by NGOs (FAO and Save the children fund (SCF)).

FAO funded ETB 0.5 Million for two zones and two districts of Amhara regional state for whom participated in animal feed production and sheep rearing practice. *Angolela*, *Bakilo* and *Goshe Bado* Kebeles were the users of this fund. In addition to FAO, SCF also participated in the study area through funding the pro-poor women to improve the lives of children through better education and health care. It gave ETB 3,000 for 18 mothers of each Kebele for buying of improved sheep rams (*Awassie* sheep). It has a significant contribution on improvements of sheep production and farmers' livelihood of the study area.



Source: Captured photos during field survey, 2019

Figure 5. Sheep vaccination in the study area

Animal health provision: In the study area, foot rot, *Angb*², *Fasciola*/Liver Fluke, *Pasteurellosis* and Sheep-Pox were the common and serious sheep diseases. So, animal health provision is one of the most important services to increase the productivity of sheep. The veterinary medicines/drugs were supplied by private clinical shops and governmental animal health clinics. The result shows that 98.9% of the respondent farmers were accessed animal health clinics at their Kebele. However, the result showed that sampled

¹ *Bkat* farmers' savings and credit cooperatives (BFSCCs): It is locally established financial institution that gives a credit and saving services for members and communities of the Kebele.

² *Angb* is a local name given to a sheep disease which hasn't any known medication. It happened when sheep graze marshy land. It is common at *Debele*, *Angolela* and *Bakelio* Kebele.

farmers lost on average $3.58 \approx 4$ heads of sheep per year due to shortage of drugs at their kebele's clinic and high incidence and outbreak of sheep diseases in the study area.

On the other hand, veterinary doctors (Key informant interviewees) complained that farmers used the same drug repeatedly from different private drug store which results in medical adaptation of disease especially.

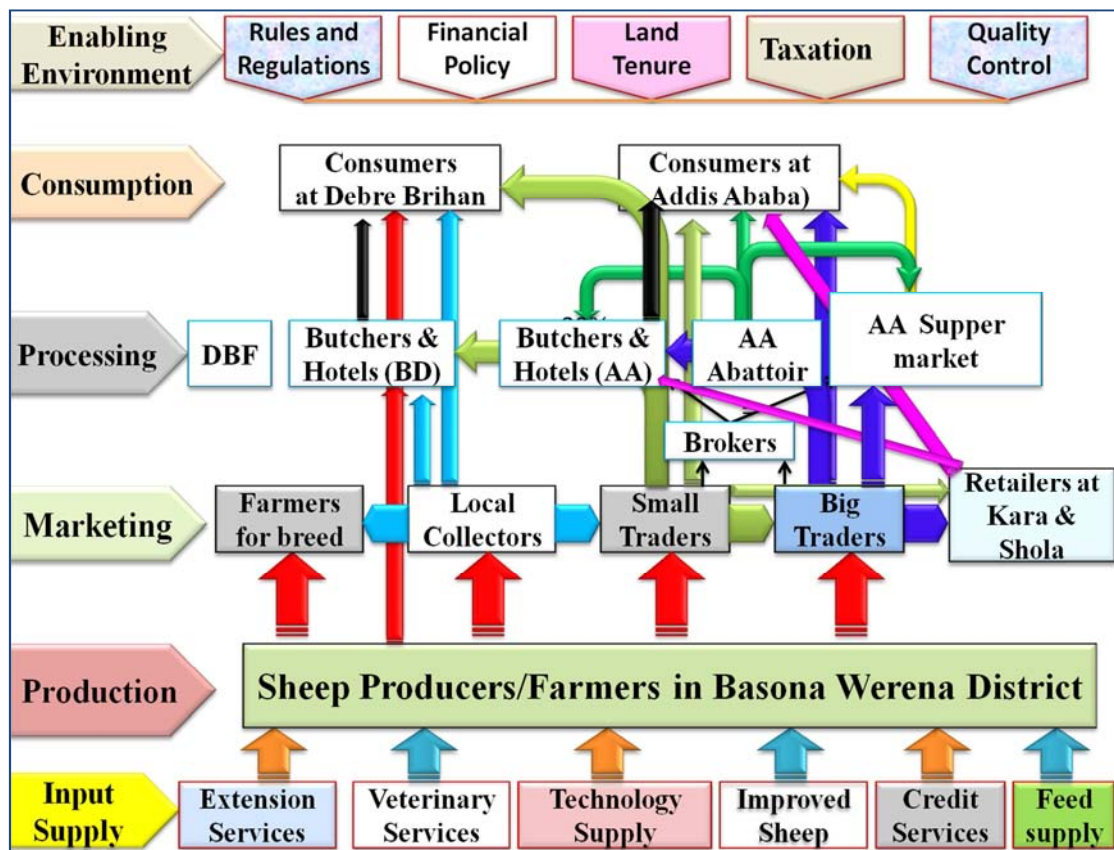
Transportation services: Almost all farmers truck their

sheep to the market while small and big traders used ISUZU truck to transport to Addis Ababa and other markets. Few local collectors and traders loaded sheep on the Minibus to transport to Debre Brihan market and Addis Ababa. On average 2-3 ISUZU of sheep is transported from Debre Brihan market to Addis Ababa. The result shows that big traders of sheep rented ISUZU together and they paid ETB 10 up to 15 per head when they transported to Addis Ababa.



Source: Captured photos during field survey, 2019

Figure 6. Live and slaughtered sheep transportation service.



Source: Own sketch based on collected data, 2019

Figure 7. Sheep value chain map of Basona Werena district.

3.5. Map of Sheep Value Chain in Basona Werena District

The basic structure of sheep value chain in the study area was drawn using the data collected at different stages (Figure 6). Farmers have linkage with different actors. But they haven't any linkage with Bebre Brihan blanket factory even

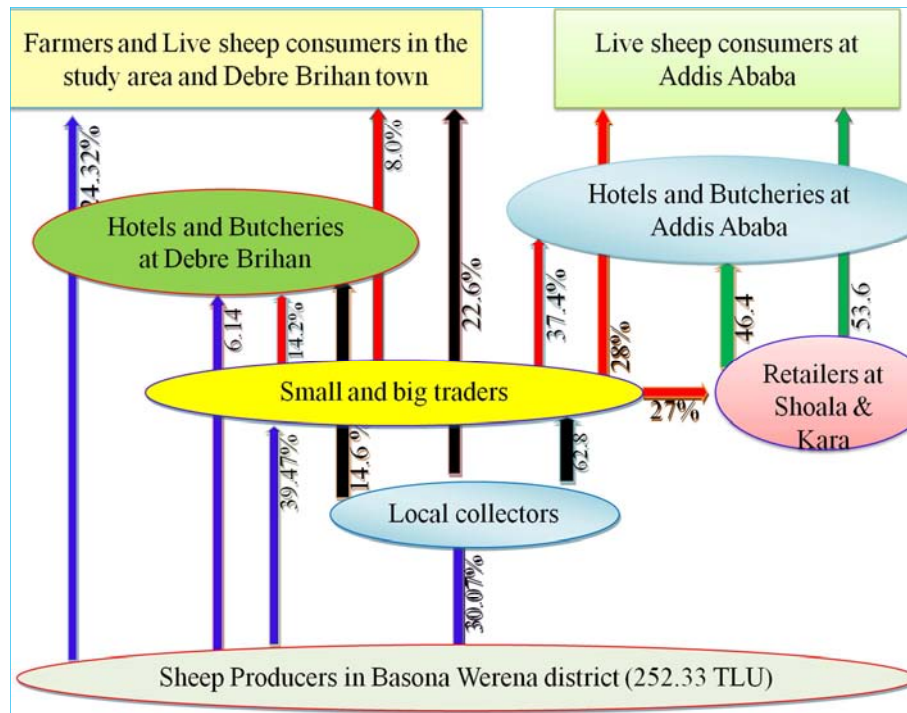
if the factory needed wool supply from farmers.

3.6. Major Marketing Channels of Sheep in Basona Werena District

Debre Brihan market is the common and the largest sheep market in the study area. Sheep in this market came from not

only Basona Werena district but also from the surrounding districts directly by producers, collectors and small traders. The collected sheep pass to different actors via different

channels. The flow of sheep was estimated for identified channels in figure 7.



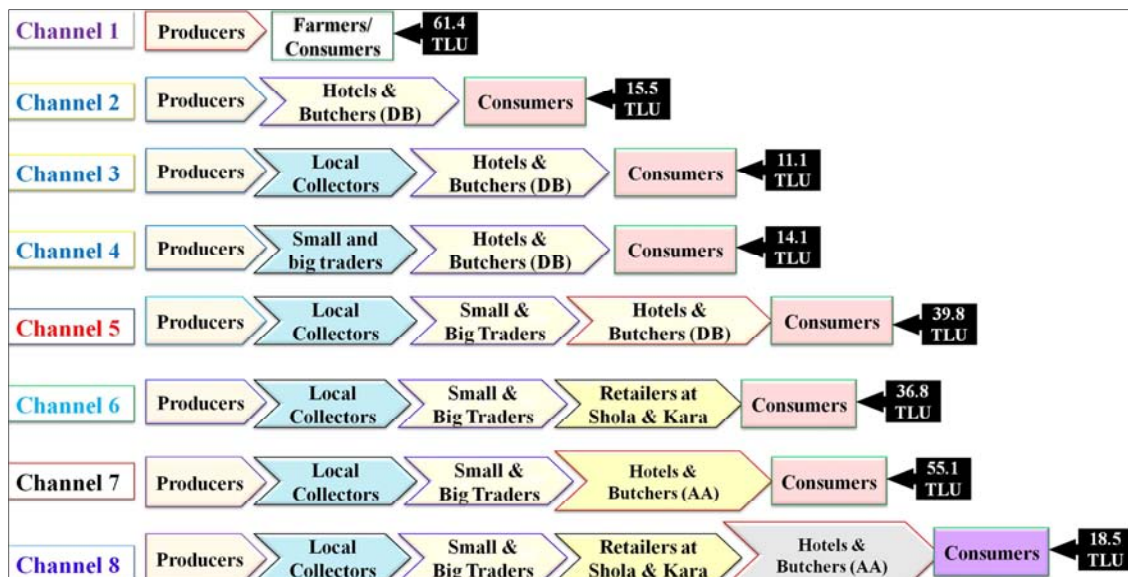
Source: Survey result, 2019

Figure 8. Estimated flow of sheep in Basona Werena district.

The figure shows that farmers sold 39.5% of market supplied sheep to small and big traders while 30, 24.3 and 6.1% of market supplied sheep sold to local collectors, individual consumers and hotels and butcheries at Debre Brihan town respectively. This implies that farmers supplied only small proportion of their sheep directly to

individual consumers and hotels and butcheries in which they could fetch good price.

The study has identified eight major sheep market channels in the study area (Figure 9). These channels show us the flow sheep from Basona Werena district to the end destination/reach to consumers at Debre Brihan and Addis Ababa.



Source; Survey result, 2019

Figure 9. Sheep market channels in Basona Werena district.

Channel 1: Sheep purchased by individual consumers/farmers at Debre Brihan

This channel is the shortest sheep market channel in which individual consumers directly bought sheep from the farmers in the study area. The result shows that around 24.32% (61.4 TLU) of supplied sheep reached to individual consumers at Debre Brihan town through this market channel. Both farmers and consumers are beneficiaries while using this channel because there were no any intermediaries between them i.e. farmers fetch good price and consumers pay fair price than other market actors. Farmers bought lambs and female sheep for fattening and breeding from well-known geographical area and individuals.

Channel 2: Sheep purchased by Hotels and Butchers at Debre Brihan town

This is also the second shortest sheep market channel in the study area. Farmers sold only 15.5 TLU (6.14%) of their supplied sheep directly to the hotels and butcheries at Debre Brihan town. In this channel, farmers are more benefited through obtaining good sheep price even though small number of sheep supplied to them. Hotels and Butcheries processed the sheep meat into different traditional dishes for consumers at Debre Brihan town.

Channel 6: Sheep purchased by hotels and butchers at Addis Ababa

This is the longest channel through which sheep is reached to end consumers in Addis Ababa. Sheep are collected by big traders from the major sheep-producing areas including the study area and transported to Addis Ababa. The sheep which were collected from Debre Brihan market by small and big traders finally reach to hotels and butchers at Addis Ababa. About 73.6 (29.16%) of market supplied sheep reached to hotels and butchers of Addis Ababa passing through different actors. As the sampled traders said, the sheep that are supplied to Addis Ababa were mainly composed of fattened male and few sterile ewes.

3.7. Market Performance of Sheep Value Chain Actors

The study has analyzed the marketing cost and margins of actors along the chain to identify who were more benefited from participating in sheep value chain of the study area.

3.7.1. Cost of Sheep Production in Basona Werena

During focus group discussion, farmers allowed to estimate the average production cost (feed, veterinary drugs, herding, fur shearing service and others) of a sheep until they supplied to the market. They estimated the average cost of hay, chaff/bran, salt, natural pasture, crop residuals, supplementary feeds (Beer byproduct, *Fagulo*, *Atela* and *Frushika*). The result shows that feeding cost was the major

cost (ETB 513.8) of farmers in sheep production which followed by herding and fur shearing cost (ETB 70). Farmers incurred on average ETB 35.00 for sheep health caring services i.e. veterinary medicine/drugs.

3.7.2. Marketing Costs in Sheep Value Chain

The major sheep marketing costs (including processing cost) were identified and estimated based on the data collected from farmers, surveyed traders and processors. The average costs and its proportions were estimated (in the table 8) for each actor along the chain. The proportions indicate the significance of each cost item against the total marketing costs. Almost all of sampled farmers were trekking their sheep to the markets themselves or by using their family and the transportation cost sheep for farmers was approximately zero.

As the survey result indicated (in table 8), barn rent, *Keret* and tax payments, feed, transportation and labour cost were the major marketing cost of sheep traders while *Injera* and processing cost were the major cost sheep processors in the study area. Hotels and butcheries in Addis Ababa and Debre Brihan incurred the largest cost (marketing and processing) of ETB 1781.38 and 1256.88, while local collectors and small traders incurred the smallest marketing cost of ETB 41.13 and 79.73 respectively. The result is in line with the finding of [2, 11, 17, 25] who found that hotels incurred the highest marketing cost. Labor (butcher men, kitchen workers) and processing costs are the major marketing costs for butcheries and hotels at Debre Brihan and Addis Ababa in that order.

3.7.3. Marketing Margins and Value Addition

In this study, marketing cost and margins of actors were calculated for channel five and seven (figure 9) through which most sheep reached to consumers at Debre Brihan (39.8 TLU) and Addis Ababa (55.1 TLU). In the first channel, the largest net margin was obtained by hotels and butchers which followed by small and big traders. The least margin was obtained by local sheep collectors. The result in table 8 below shows that, hotels and butchers, farmers, small and big traders and local collectors took 40.44%, 39.09%, 13.15% and 7.32% of the total value added respectively. Farmers obtain about 87.87, 70.56 and 35.17% of the final sheep price from local collectors, small and big traders and hotels/butcherries of Debre Brihan town respectively. The producers' share of final price was 35.17% which was low. The result is in consistent with [17] who reported that farmers' have low share of final price.

Table 3. Costs and margins of actors in market channel five.

Description of items	Sheep Producers	Local collectors	Small and big traders	Hotels and butchers
Selling price	1552.35	1766.67	2200.00	4413.75
Marketing cost		41.13	122.25	1256.88
Marketing margin		214.32	433.33	2213.75
Net margin		173.19	311.08	956.88

Description of items	Sheep Producers	Local collectors	Small and big traders	Hotels and butchers
Total cost	627.40	1593.48	1888.92	3456.88
Value added	924.95	173.19	311.08	956.88
Proportion of value added	39.09	7.32	13.15	40.44
Producers' share of final price		87.87	70.56	35.17

Source: Survey result, 2019

The marketing margins and distribution of benefit in channel seven were also estimated in Table 4. The largest net margin was obtained by hotels and butchers at Addis Ababa

and followed by big traders; and the least margin was obtained by small traders.

Table 4. Costs and margins of actors in market channel seven.

Description of items	Farmers	Collectors	Small traders	Big traders	Retailers	Hotels & butchers
Selling price	1552.35	1766.67	1950.00	2275.0	2612.5	5492.25
Marketing cost		41.13	79.73	122.25	165.63	1781.38
Marketing margin		214.32	183.33	325.00	337.50	2879.75
Net margin		173.19	103.61	202.75	171.88	1098.38
Total cost	627.40	1593.48	1846.39	2072.3	2440.6	4393.88
Value added	924.95	173.19	103.61	202.75	171.88	1098.38
% of value added	34.58	6.48	3.87	7.58	6.43	41.06
Producers' share of final price		87.9	79.6	68.2	59.4	28.3

Source: Survey result, 2019

Hotels and butchers in Addis Ababa took the largest (41.06%) share of value added which was followed by farmers (34.58%), big traders (7.58%), collectors (6.48%), retailers (6.43%) and small traders (3.87%). The producers' share of final price was 28.3% which indicated the proportion of the final price share that reaches to farmers was very small/minimum. The possible explanation is that the existence of many intermediaries along the marketing chain and far distance between producers and consumers at Addis Ababa.

3.8. Constraints and Opportunities of Sheep Value Chain

The study has summarized the existing constraints and

opportunities of sheep value chain based on the consensus of FGD, response of key informant interviewees and surveyed actors.

3.8.1. Major Constraints in Sheep Value Chain

Lack of linkage between farmers and DBBF in sheep wool production and supply: Although all farmers sheared their sheep 2-3 times per year, only 13% of them used the sheared fur for preparing local mattress and pillow (figure 10 B). Most farmers (87%) threw the wool/fur anywhere as shown in the figure 10 A.

Table 5. Major constraints in input supply and sheep production.

Major constraints	Response	Frequency	(%)
Linkage with Debre Brihan Blanket factory by sheep wool/fur supply	Yes	0	0
	No	366	100
Lack of improved sheep rams	Yes	316	86.3
	No	50	13.7
High incidence of sheep diseases	Yes	301	82.2
	No	65	17.8
User of credit services	Yes	63	17.2
	No	303	82.8
Shortage of veterinary drugs at Kebele	Yes	252	68.9
	No	114	31.1
Grazing land/feed shortage	Yes	201	54.9
	No	165	45.1
Lack of local small ruminant market	Yes	98	26.8
	No	268	73.2

Source: Survey result, 2019

But the production manager of DBBF said that the factory used 97% manmade fur/wool (figure 10 C) due to shortage of wool supply. Only 3% original fur/wool was used in the factory that supplied by Debre Brihan sheep breeding and multiplication center and Debre Brihan agricultural research center. In the study area, no one farmer was supplying the fur/wool to the factory due to non-existence of linkage

between the factory and the farmers.

The study has identified that low awareness of farmers on the usage of sheep fur and lack of linkage between sheep producing farmers and Debre Brihan Blanket factory were the major problems regarding to wool production and marketing in the study area.



Source: Captured photos during field survey, 2019

Figure 10. Sheep wool/fur at Bakielo and Angolela Kebele.

Lack of improved Sheep rams: It is an important problems/constraints regarding to sheep production in the study area. Although 13.7% of the respondent farmers were accessed improved sheep rams (*Awassie* and few *Dorpher*), 86.3% were not accessed and they used local sheep breeds which have low productivity.

High incidence of Sheep disease: The result (table 7) shows that most farmers (82.2%) faced sheep diseases problem. They lose on average 4 sheep head due incidence of *Pasteurellosis*, foot rot, sheep pox, *Fasciola*/liver fluke, and *Angb* diseases. Among these diseases, *Angb* and sheep-pox (table 7) were a serious problem that killed a flock sheep within a short period of time. Key informant interviewees (veterinarian doctors of *Debelie* and *Angolela Kebele*) explained that *Angb* is a serious sheep disease in the study area.

Low awareness of farmers on credit usage: Although ACSI at district level and BFSCCs at *Bakielo* and *Goshe Bado Kebele* were existed, 82.8% of the farmers were not user of credit services. This is mainly because of their high interest rates and group collateral requirements and low awareness of farmers on the usage of credit. During FGD, some participant farmers named the credit services as entering cliff while seeing (*Eyayu Gedel*) which shows their deep fear to use this service in sheep production activities.

Shortage of Veterinary drugs: Around 68.9% of sampled farmers explained that there was a shortage of drug at their kebele and hence they forced to travel long distance and pay high price for private animal drug shop. DAs (veterinary doctors) at *Debelie*, *Goshe Bado* and *Angolela Kebele* also assured the presence drugs and equipment shortage at animal health clinics. Veterinary drugs were not supplied on time to the clinics and the transportation system was not appropriate for drugs. When this data collected, *Gudoberet* and *Bakelio Kebele* hadn't veterinarian doctors in addition to drug shortage. This contributed for expansion of contagious diseases and increment of the number of died sheep in the

study area.

Shortage of grazing land and feed: It is also one of the main problems in *Basona Werena* district. Around 54.9% of the farmers had a problem of feed and grazing land shortage. They hadn't forage crops because of accessing forage seeds in the market was impossible.

Processing and Marketing constraints: These constraints were summarized based on the response of sheep traders and processors and Key informant interviewees. Double taxation (*Keret*), high cost of transportation, lack of reliable market information, seasonal demand and supply and were the major constraints of sheep traders. Lack of small ruminant abattoirs at *Debre Brihan* town and outdated abattoir in *Addis Ababa*, seasonal demand and supply of sheep were the major constraints for sheep processors.

3.8.2. Major Opportunities in Sheep Value Chain

Geographical Location: *Basona Werena* district is comfortable area for sheep and wool production. It is found near to the *Debre Brihan* town which has many demanded hotels, butcheries, traders and individual consumers. Even if there was no any linkage between *Debre Drihan* blanket factory and farmers of the study area, the factory's location motivated the farmers to breed more sheep and generating extra income from supplying sheep wool/fur to.

Commitment of government to increase meat export: The Government of Ethiopia aims to increase the total meat production from 1,321 thousand tons in GTP I to 2,103 thousand tons by the end of GTP II. It also plans to increase the foreign currency from hide and skin exports. From cattle and meat export, the governments projected to generate 673.8 and 374.1 Million USD respectively at the end of GTP II [17]. Thus, it is committed to supporting the private sector involved in the export of these commodities. This encourages the farmers to produce more sheep in the study area and it

could create better market opportunities for them.

Increasing demand for sheep meat in domestic and abroad markets: High human population and urbanization has considerable impact on the demand for livestock products. Consumers at Debre Brihan and Addis Ababa have also realized that highland sheep meat has certain unique taste since sheep feed thyme (*Tosign*).

Increase the number of export abattoirs with large investment opportunities: In addition to the existing export abattoirs, there are new export abattoirs under development and will begin processing in the near future. This increases the completion among abattoirs for sheep demand which intern motivate farmers to give more attention in sheep production practice.

4. Conclusion and Recommendation

The result shows that input suppliers, farmers, traders, butcheries and hotels, ACSI, FAO, BFSCCs and consumers were the major sheep value chain actors in the study area. Farmers carried out the whole activities of sheep production management although it depended on grazing of natural pasture, local breeds and poor health care. Debre Brihan market was the common and the largest sheep market in the study area. The study has identified eight major sheep market channels through which sheep reached to end consumers. The marketing costs and margins of actors were analyzed for two channels and the result revealed that farmers' share of final price was very small. They obtain

about only 35.2% and 28.3% of the final sheep price of hotels and butcheries in Debre Brihan town and Addis Ababa respectively.

Sheep disease, shortage of drugs, lack of improved sheep ram and non-existence of linkage between farmers and DBBF and lack of awareness on market oriented sheep production are the major input supply and production constraints in the study area. Commitment of government to increase meat export, increasing demand for sheep meat, increase the number of export abattoirs and geographical location of the study area are the major opportunities of sheep value chain in the study area.

Therefore, office Basona Werena Livestock Resource Development and DAs should create awareness for farmers on market oriented sheep production and it should supply the required veterinary drugs and improved sheep breeds in collaboration with Debre Brihan Sheep Breeding and Agricultural Research Center. NGOs have to support the farmers through providing financial support and giving training on market oriented sheep production. Farmers should have to shift the traditional sheep production system to the market oriented production system, form farmers' small ruminant cooperative, strengthen the linkages among them and other value chain actors to increase their bargaining power and to be more beneficiary. Furthermore, DBBF and Basona Wrena district Livestock Resource Development office should work together on creating of awareness for farmers regarding to sheep fur/wool production and its utilization.

Appendix

Table 6. Demographic and socio-economic characteristics of respondents.

Variables	Mean	Std. Dev.	Min	Max
DISTMAR (Hrs)	2.52	1.05	0.16	6.00
EXPRI (Years)	19.73	6.23	7.00	38.00
SELINGPRIC~E (ETB)	1552.35	607.82	400.00	4000.00
SELINGOSFE~E (ETB)	959.47	341.24	350.00	2500.00
EXTCON (Freq)	2.72	2.01	0.00	8.00
TOTALV (TLU)	7.10	1.95	3	12
SHEEP (TLU)	2.85 (10.64 heads)	1.25	0.64	8.45
NSSTM (TLU)	0.69 (3.98 heads)	0.018	0.06	4.03
DIED (TLU)	0.47 (3.59 heads)	0.43	0.00	2.60

Categorical Variables	Category/Measure	Frequency	Percent (%)
Sources of credit	ACSI	28	7.7
	NGOs	4	1.1
	BFSCCs	31	8.5
	Non-users	303	82.8
Access of market information	No	198	54.1
	Yes	168	45.9

Source: Own computation from survey result, 2019

Table 7. Common sheep diseases in Basona Werena District.

Types of diseases	Category	Frequency	Percent (%)
Angh diseases	Ye hampering s	306	83.6
	No	60	16.4
Sheep-pox diseases	Yes	238	65.0
	No	128	35.0
Pasteurellosis diseases	Yes	192	52.5
	No	174	47.5
Foot rot diseases	Yes	139	62.0
	No	227	38.0

Source: Own computation from survey result, 2019

Table 8. Production and marketing costs along sheep value chain in the study area.

Cost Category	Producers		Rural Collectors		Small Traders		Hotels and Butchers		Big Traders		Retailers at Addis Ababa		Hotels and Butchers ³	
	Costs	%TC	Cost	%TC	Cost	%TC	Cost	%TC	Cost	%TC	Costs	%TC	Cost	%TC
Feed cost	513.80	0.82	10.00	0.24	23.60	0.30	0.00	0.00	23.75	0.19	53.75	0.32	0.00	0.00
Slaughtering	0.00	0.00	0.00	0.00	0.00	0.00	67.50	0.05	0.00	0.00	0.00	0.00	115.00	0.06
Rope Cost	0.00	0.00	4.17	0.10	3.00	0.04	0.00	0.00	2.50	0.02	6.00	0.04	0.00	0.00
Vet. Drug	35.10	0.06	4.38	0.11	5.50	0.07	0.00	0.00	8.88	0.07	9.25	0.06	0.00	0.00
Barn Rent/cost	0.00	0.00	0.00	0.00	3.25	0.04	3.75	0.00	7.50	0.06	12.00	0.07	7.50	0.00
Labor/&Shear	70.00	0.11	0.00	0.00	4.25	0.05	375.00	0.30	2.25	0.02	8.00	0.05	512.50	0.29
Search cost	0.00	0.00	2.75	0.07	5.75	0.07	0.00	0.00	5.75	0.05	10.00	0.06	3.75	0.00
Processing	0.00	0.00	0.00	0.00	0.00	0.00	353.75	0.28	0.00	0.00	0.00	0.00	367.50	0.21
Injera	0.00	0.00	0.00	0.00	0.00	0.00	269.38	0.21	0.00	0.00	0.00	0.00	251.38	0.14
Transportation	0.00	0.00	4.50	0.11	11.75	0.15	15.00	0.01	12.50	0.10	7.25	0.04	350.00	0.20
Keret Payment	3.50	0.01	2.33	0.06	5.00	0.06	5.00	0.00	5.00	0.04	5.00	0.03	2.50	0.00
Tax payment	0.00	0.00	7.50	0.18	8.00	0.10	43.75	0.03	38.75	0.32	38.75	0.23	55.00	0.03
Loading	0.00	0.00	0.00	0.00	3.38	0.04	0.00	0.00	2.88	0.02	3.13	0.02	0.00	0.00
Packaging	0.00	0.00	0.00	0.00	0.00	0.00	47.50	0.04	0.00	0.00	0.00	0.00	30.00	0.02
Other costs	5.00	0.01	5.50	0.13	6.25	0.08	76.25	0.06	12.50	0.10	12.50	0.08	86.25	0.05
Total costs	627.40	1.00	41.13	1.00	79.73	1.00	1256.9	1.00	122.25	1.00	165.63	1.00	1781.4	1.00

Source: Own computation from survey result, 2019

Table 9. Conversion factor used to calculate adult equivalent family size.

Age group (Years)	Male	Female
Less than 10 Years old	0.6	0.6
Between 10 and 13 years	0.9	0.8
Between 14 and 16 years	1	0.75
Between 17 and 50 years	1	0.75
Greater than 50 years old	1	0.75

Source: Samuel and Sharp as cited in Addisu (2018)

Table 10. Conversion factors used to calculate tropical livestock unit.

Livestock category	Tropical Livestock Unit (TLU)
Horse	1.1
Ox and Cow	1
Heifer	0.75
Calf	0.25
Donkey	0.70
Adult Sheep	0.13
Young Sheep	0.06

Source: Storck as cited in Addisu (2018)

³ Hotels and butchers at Addis Ababa

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