PRICE AND PERFORMANCE ANALYSIS OF INDIGENOUS SHEEP BREED MARKETING IN MENZ DISTRICTS OF ETHIOPIA

M.Sc. Thesis

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PRICE AND PERFORMANCE ANALYSIS OF INDIGENOUS SHEEP BREED MARKETING IN MENZ DISTRICTS OF ETHIOPIA

A Thesis Submitted to the Department of Agricultural Economics, School of Graduate Studies HARAMAYA UNIVERSITY

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BY

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APPROVAL SHEET

SCHOOL OF GRADUATE STUDIES
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As thesis research advisors, we here by certify that we have read and evaluated this thesis prepared, under our guidance, by Feven Tadesse entitled "Price and Performance Analysis of Indigenous Sheep Breed Marketing In Menz Districts of Ethiopia". We recommend that it be submitted as fulfilling the thesis requirement.

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DEDICATION

To my father, who has been a source of inspiration in all my life,

and my mother who showed me the way of being a WOMAN!

STATEMENT OF THE AUTHOR

First, I declare that this thesis is my solely work and that all sources of materials used for this thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for an advanced M.Sc. degree at the Haramaya University and is deposited at the University Library to be available to borrowers under rules of the library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate.

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BIOGRAPHICAL SKETCH

The author was born on January 23, 1981 in Mekelle, Tigray. She attended her elementary school at Lebe-Fana Primary and Junior Secondary School and her secondary school at Bole High School in Addis Ababa. In 1999/2000 she joined the Faculty of Business and Economics at Mekelle University, and graduated with B.Sc. degree in July 2004.

After her graduation, she was employed in Nile Private College (Mekelle branch) as Graduate assistant. Then after one year she joined the Relief Society of Tigray (REST) where she served as a gender officer until 2007. Finally, she joined the School of Graduate Studies of the Haramaya University in 2007.

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ABBREVIATIONS

ACSI	Amhara Credit and Saving Institute
ANRS	Amhara National Regional State
BOFED	Bureau of Finance and Economic Development
CSA	Central Statistical Authority
EEA	Ethiopian Economic Association
FAO	Food and Agriculture Organization
FGLS	Feasible Generalized Least Square Estimation
GDP	Gross Domestic Product
Ha	Hectare
HCSE	Heteroscedasticity Consistent Standard Error Estimation
IBC	Institute of Biodiversity Conservation
ICARDA	International Center for Agricultural Research in the Dry Areas
IFSP	Integrated Food Security Program
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
Kms	Kilometres
LMA	Livestock Marketing Authority
m.a.s.l	Meters above sea level
MEDAC	Ministry of Economic Development and Cooperation
MOA	Ministry of Agriculture
NGO	Non Governmental Organization
OLS	Ordinary Least Squares
SCP	Structure Conduct Performance
TGMM	Total Gross Marketing Margin
VIF	Variance Inflation Factor

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ABSTRACT

Sheep have multiple roles in the livelihood of resource poor farmers as source of income, meat, skin, manure, strong wool or long hairy fleece, and as buffer resources during crop failures. These important services and products of the sheep production sub-sector justify comprehensive look into the way sheep are marketed, as the services and products are the quality attributes that characterize sheep as such. Nonetheless, very few studies have been conducted so far to identify the determinants of indigenous sheep prices and performance of the marketing system. This study will therefore contribute by assessing the performance and by identifying factors that affect the price of indigenous Menz sheep in the markets of Menz District in Ethiopia. Data from primary sources were collected through market and traders' surveys. For market survey five markets (Mollale, Mehal meda , Bash, Geyi and Wejed) were included in the study, in addition to the five markets one terminal market from Addis Ababa (Sholla market) were included for traders survey. Market survey was conducted in three seasons (Holiday, normal and fasting) and a sample of 338 transactions level data were collected from sample markets. Traders' survey was carried out during two different periods, one during high transaction (festival period) and another during normal period. All traders who attended the market were included in the survey and sample of 186 traders were surveyed. Structure, conduct and performance approach was used to examine sheep marketing efficiency. Concentration ratio was computed to assess the concentration of the market and binary logit model was estimated to analyze market barriers. Marketing costs and margins were computed along with a multiple linear regression model to identify factors that determine gross margin. Composite index was used as well to judge efficiency of different sheep marketing channels. Hedonic price model was estimated with Heteroscedasticity consistent covariance matrices to estimate factors that determine price of sheep. Survey results show that the markets are underdeveloped and inefficient, characterized by lack of

marketing facilities and services. The value of concentration ratio indicated that traders operate in an inefficient market. The result of logit model confirm working capital, access to information, education and experience in trading business are significant explanatory variables, which have effect on the existence of market barriers. The result of Gross margin explains that full time traders and secondary farmer traders get high gross marketing margin, the higher gross margin indicates inefficiency in the marketing system. In addition, the result of multiple regression showed that variable cost, experience of traders, increased period between purchase and sale transactions and loss of sheep increased unit gross margin. On the other hand, unit gross margin significantly decreased as size of working capital increased besides trader who have access to price information and sale their animal to regular customer earned significantly lower margin than those who did not. The result of hedonic model show that price of sheep is affected by the characteristics of sheep such as sex and age based class of sheep, age, body condition, coat color of sheep and coat hair. Sheep price was also found to be influenced by season, market location, buyers' purpose and sellers' purpose. Hence, it is important to consider the preferred phenotypic attributes of sheep in designing appropriate policies so as to make livestock keepers benefited from increased production and productivity. Besides, improving marketing facilities and services, organizing and supporting marketing cooperatives, and improving marketing infrastructure would create favorable conditions for sheep marketing in the study area.

1. INTRODUCTION

1.1. Background

Like most Sub-Saharan countries, Ethiopia is heavily dependent on agriculture. Agriculture remains the single most important sector in the national economy. It accounts for over 45% of the national output, provides employment to 85% of the population, supplies raw materials for 7% of the country's industries and generates about 90% of the country's foreign exchange earnings (Nigussie, 2001, WB, 2004).

Livestock production is an integral sub-sector of the Ethiopian agricultural system. It contributes about 20% of the total GDP and 40% of total agricultural GDP (Yacob, 2002). The sub-sector also supports the livelihoods of an estimated 80% of the rural people (FAO, 2004).

Ethiopia possesses the largest livestock population in Africa with an estimated number of 40.3 million cattle, 20.7 million sheep, 16.25 million goats, 6.2 million equines, and 32 million poultry (CSA, 2006). These figures do not include the livestock population of the Afar and Somali pastoral regions, in which a previous study confirmed that there are 2.12 million cattle, 2.6 million sheep, 4.14 million goats, 1.02 million equines, and 100% of the country's camel population (CSA, 2004).

This wealth of livestock population and genetic diversity is attributed to favorable climate and topography of the country and its geographical proximity to the historical entry points of livestock populations from the surrounding countries (EEA, 2005).

Four major livestock production systems exist in Ethiopia (IBC, 2004; EEA, 2005). These are mixed crop-livestock, pastoral, agro-pastoral, and the urban and peri-urban systems. The mixed crop-livestock system is found in the high and mid altitude areas of the country. Favorable climate and less moderate prevalence of diseases help farmers to maintain the livestock population.

The pastoral system characterizes the nomadic populations of the arid and semi-arid areas of Afar, Somali, Borana (Oromia), and Southern regions. In this system, livelihoods entirely depend on livestock. The agro-pastoral systems are prevalent in areas where there is intermittent rainfall pattern, which varies between a rainfall sufficient enough to produce some crops and short enough to compel livestock keepers move their animals seasonally for search of feed and water. The urban and peri-urban production system is a newly emerging small constituent of the livestock sector of Ethiopian agriculture.

The topography of Ethiopia constitutes highlands and lowlands. The highlands are suitable for livestock production and characterized by high concentration of livestock per unit area in the country. It is in this area that large scales mixed farms are found (Banerjee, et.al, 2000). The highlands occupy 38 - 44% of the total land area of the country. About 88% of the human population, 72% of the cattle, 74% of the sheep and 34% of the goats of the nation are found in this agro-ecological zone (FAO, 1995).

Livestock play important roles in the livelihood of farmers engaged in mixed crop-livestock farming systems which are found in the highland areas. In these areas, livestock provide about 53% of the value of the total farm output and more than 80% of farmer's cash income (FAO, 2000).

Despite the importance of livestock production, the performance of the sector has been very low. Insufficient feed and nutrition, widespread diseases and poor breeding practices are the major factors behind the declining performance of the sector. In addition inadequate livestock development policies with respect to extension, marketing, and credit, and poor infrastructure have been cited as major constraints affecting livestock performance (Befekadu and Berhanu, 2000; EEA, 2005). In general due to policy, institutional, technical, marketing and socio-cultural constraints, livestock production contributes little towards the improvement of the welfare of the farmers as well as the national economy.

1.1.1. Sheep production in Ethiopian highlands

Livestock production, including flocks of sheep or a mixture of sheep and goats is an important part of the farming system in the highland regions of Ethiopia. Mixed crop-livestock system is the main farming system widely found in these regions. Within the mixed crop-livestock system, small ruminant production sub-systems are found associated with the different agricultural production systems that vary with the intensity of the mixed farming operation and the natural resources base including grazing land and livestock resources.

Sheep production systems in Ethiopia are primarily traditional. The prevailing sheep production systems have evolved in relation to the availability of land, overall pattern of crop production, area of uncultivated wasteland, and density of animal populations.

Sheep production, in the mixed farming highlands, relies on native pasture grazing on communal lands and fallow plots, occasionally supplemented with straws, crop residues, stubble grazing, and household by-products. Marshy lands and crop stubble is grazed during the dry season (December-April). During the cropping season, sheep are largely dependent on hillsides, field verges and roadside grazing.

Sheep graze in mixed groups for 10-11 hours daily. With the exception of few cases where sheep are supplemented with hay and straw, farmers in general prefer to feed crop residues and hay to cattle than sheep. Sheep mating is usually uncontrolled with one to three young rams running together with the flock throughout the year, which results in year round lambing with a peak in certain periods. Castration and fattening of rams is common among the majority of farmers.

In the high altitude regions of the country (>3000 m a.s.l.), agricultural production is constrained by cold climatic conditions and steep land topography. Mixed crop-livestock production system that consist mainly barley and sheep characterize those regions. The majority of farm households (about 62%) maintain between 10-40 sheep, the cattle population, however, is generally very small because of the scarcity of pasture. 87.5% of the farmers keep

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either none or one to five heads of cattle (Gryseels, 1988).

On the other hand, the highland regions that generally lie between 2200-3000 m.a.s.l are characterized by barley-livestock sub-systems and they are well suited for woolen sheep production. Flock sizes in these regions vary markedly with regard to cropping intensity. Larger flocks are common in less crop intensive areas (Zelalem and Fletcher, 1993). In some parts of these regions, the rainfall pattern is bimodal with two distinct growing seasons (*Meher* and *Belg*).

1.1.2. Socio-economic importance of sheep

Farmers breed sheep to meet basic needs of life, to generate cash to cover non-farming expenses and to provide guarantee against tough times such as drought or famine. Sheep therefore have several advantages. They provide meat for immediate family consumption, and are easier than cattle to buy and sell, hence they are better suited to meeting small and frequent cash requirements. Sheep and goats can also thrive in extremely dry areas (Mearns, 1996).

The role of sheep for income generation, food supplies and financial security for the rural population is well recognized by different studies conducted in different areas of the world (Zelalem and Fletcher, 1993; Gryseels, 1988). Sheep are kept for various purposes by farmers and are considered as one of the most dependable form of wealth. They can be easily sold off at times of economic difficulty such as crop failure and are used for varieties of economic reasons including income generation, food supply, savings and investment, security, and social functions. They are also sources of other valuable non-food products like skins and wool, which are used as raw materials for various local or industrial manufactures.

In the mixed crop-livestock system, sheep represents less than 10% of the farm capital invested in livestock, yet contributes as much as 22-63% to the net cash income and 19-23% to the food subsistence value derived from livestock production (Zelalem and Fletcher, 1993). In addition to mutton, sheep provide skins, manure and coarse wool. Estimates by the Ethiopian Ministry of Agriculture for the year 2000 indicated that the skin removal rate of

sheep is 33%, which translates into an output of 8.3 million sheepskins per annum. On average, Ethiopia has the capacity to supply 16 to 18 million pieces of hides and skins to local tanneries. For example, out of the 12 million annual total skins supplied to tanneries, 7 million were sheepskins (LMA, 2001).

In Ethiopia, sheep and goat provide 25% of the domestic meat consumption, nearly 50% of the domestic wool requirements, about 40% skins and hides production and 92% of the value of semi-processed skins and hides export trade. The annual mutton and goat meat production of the country is estimated at 78 and 69 thousand metric tons, respectively (FAO, 2005).

As compared to large ruminants, sheep and goats require small investments, have shorter production cycles, faster growth rates and greater environmental adaptability, and hence have a unique function in smallholder agriculture. They are important protein sources in the diets of the poor and help to provide extra income and support survival for many farmers in the tropics and sub-tropics.

There are a number of advantages of having sheep as an integral component of the farming system. The small size of sheep has distinct economic, managerial, and biological advantages. They have low individual values, because they require a small initial investment and have small risk. In addition, they can be herded by children or women, and occupy small housing space.

1.2. Statement of the Problem

In Menz District, smallholder mixed farming is the dominant mode of production. Cultivation is rain-fed, where irregular rainfall pattern complicates the farming system. Water logging occurs due to heavy rain between late June and end of August whereas frost injury occurs starting from mid September through November/December. The study areas are drought-prone. There is increasing climatic variability that contributes to low output of crop production.

The study areas, however, have great potential for sheep production. Since sheep are a readily convertible source of cash farmers consider sheep more dependable form of wealth than other options. Despite the potential for sheep production, the existing income generating capacity of livestock keepers is not encouraging.

The principal reason is the inability of smallholder farmers to access markets, which in turn reduces farmers' incentive to participate in the economic transactions of the sheep market. This results in subsistence rather than market-oriented production system. The absence of an efficient, integrated and responsive market mechanism can be cited also as a major reason for the poor performance of the livestock market. This renders the introduction of improved production technology ineffective, and hampers the possible increment in output, rural income and foreign exchange (Beneberu, 2003).

Development interventions in the areas focused mainly on distribution of crossbred rams with the aim of improving productivity of indigenous sheep. These interventions include combinations of improved management, feeding, genetic selection and health care. The ultimate goal of such interventions is to improve the welfare of producers through increased production and income. Interventions addressing increased production need also to consider the market aspect simultaneously.

Farmers benefit from efficient markets that transmit information and ensure minimum marketing margins. Farmers need to be aware of the preferred characteristics of animals as well as price patterns so that they can plan breeding and fattening programs and breed selection consistently with the best seasonal prices and consumers' preferences (Ayele *et al.,* 2005).

The role and significance of the sheep production sub-sector in the livelihoods of farmers justify a comprehensive look into the way sheep are marketed. Nonetheless, very few studies have been conducted so far to identify the determinants of indigenous sheep prices and performance of the marketing system. Earlier studies (Andargachew, 1990; Andargachew and

Brokken, 1993; Getachew, 2002; Beneberu, 2003; Ayele *et al.,* 2005) report investigations conducted on marketing chain and price analysis.

This study is part of the community-based project for indigenous sheep breeds of smallholder farmers in Ethiopia. It is designed by the International Livestock Research Institute (ILRI) in cooperation with the Austrian University of Natural Resource and Applied Sciences (BOKU) and International Centre for Agricultural Research in the Dry Areas (ICARDA). By conducting analysis of the marketing of indigenous Menz sheep, the study will provide further insight for the future implementation of the objectives of the project.

1.3. Objectives of the Study

The objective of the study is to analyze the price and performance of indigenous sheep marketing in the districts of Menz. The specific objectives of the study are to –

- Assess the marketing efficiency of indigenous sheep, and
- Identify factors that influence the prices of indigenous sheep

1.4. Research Questions

In order to investigate the objectives listed above, the thesis is conducted in the framework of the following research questions:

- What are the main market entry barriers?
- Which marketing channel is the most efficient?
- Who gets most of the marketing margin?
- What factors determine gross margin?
- What factors influence variation in sheep prices?
- Do sheep characteristics or attributes have effect on sheep prices?

1.5. Scope and Limitations of the Study

The scope of the study includes the determination of price and analysis of marketing efficiency of the indigenous Menz sheep. The study is conducted on only five sheep markets in two districts of Menz; Menz Mama and Menz Gera. A small amount of data is also included from the terminal market at Shola, Addis Ababa, in order to identify the market margin between primary producers and final consumers.

The main constraints of the study are related to time and resource. With regard to time, the market data is collected during particular periods of the year, hence the market data does not include a year-round analysis of price determinants. The study is restricted to indigenous sheep marketing. A primary data of sheep attributes and buyers and sellers characteristics were collected in three seasons (holiday, normal and fasting season) of the year. Trader's surveys were conducted in two seasons one in normal sheep transaction period (i.e. a period that was not affected by festivals) and the other was during major festival periods.

Due to budget and time constraints, other sheep markets that could provide further data for the price analysis were not included.

1.6. Significance of the Study

The importance of sheep in the rural livelihoods necessitates a thorough analysis of the preferred characteristics of the sheep. The present study, through analyzing the various factors that influence sheep prices and performance of the marketing system, will assist the community-based breeding project for indigenous sheep breeds of smallholders in Ethiopia. Specifically, the study will provide basic information required to make relevant decisions to intervene in the development of indigenous Menz sheep marketing.

The study will also have significance for the designing of appropriate policies that consider the marketing potential of the breed in order to transfer the full benefit of the increased productivity to the livestock keeper. In addition, governmental and non-governmental

organizations that are intervening through their programs in the development of the livestock sub-sector would benefit from the result of this study. The findings of this study are also useful to sheepherders, traders, and marketing agents to make their respective decisions.

1.7. Organization of the Study

This paper is organized into five chapters. The first chapter includes the introduction, objectives, and, scope and limitations of the study. Chapter two will briefly discusses concepts used in the present study along with a review of the past works. Chapter three describes the study area with socio-economic conditions and development activities together with methodology applied and the tools of analysis. Chapter four presents the interpretation and discussion of the results obtained in the analysis. Summary of findings, conclusions and implications are described in chapter five.

2. LITERATURE REVIEW

2.1. Basic Concepts

Market and livestock marketing

The concept market is linked to the degree of communication among buyers and sellers, and the degree of substitutability among goods. A market is thought of as a meeting of buyers and sellers: a place where sellers and buyers meet and exchange takes place, an area where price determining forces (supply and demand) operate, an area where there is a demand for good (Kotler , 2003). But a market is more than a physical place. It is a mechanism or an institution through which buyers and sellers exchange information and transact. No need to meet physically for a market to operate especially in today's era of information and communication.

Livestock marketing involves the sale, purchase or exchange of products such as live animals, milk, wool and hides for cash or goods in kind. When sales (or purchases) are made in cash, the price paid to (or by) the producer is known as the market price. This price may be set by a government-appointed marketing agency (e.g. a marketing board), or negotiated by the free interaction of buyers and sellers at formally recognized market centers, or it may be agreed upon informally. Informal marketing also occurs when livestock or livestock outputs are exchanged for goods in kind (Yacob, 2002).

Marketing system

Marketing system comprises several, usually; stable, interrelated structures that, along with production, distribution, and consumption, underpin the economic process (Mendoza, 1995). More concisely, marketing system is a collection of channels, middlemen and business activities, which facilitate the physical distribution, and economic exchange of goods (Kohls and Uhl, 1985).

2.2. Methods of Evaluating Efficiency of Marketing System

The meaning of marketing efficiency ranges from the seemingly simple notation of the ratio of output to input to the complex esoteric notion of the maximization of total welfare allegedly flowing from an economy meeting the conditions of the perfect market idea (Shaffer, 1987).

However, efficiency of agricultural marketing according to Lele and Jain (1997) refers to the efficiency with which resources are used in marketing, in terms of physical input and output ratios. An efficient firm or market produce the maximum possible output from the input used, given location and environmental constraints, and it minimizes resource inputs for any given output.

Efficiency is an important index of performance of agricultural marketing. The usefulness of a particular method to estimate marketing efficiency mainly depends upon the purpose for which evaluation is being made (Cramers and Jensen, 1982). Marketing efficiency is usually measured in two ways, technical efficiency and pricing efficiency.

Technical efficiency is attained when goods and services are provided at optimal average cost that is, when the least cost combination of marketing activities are employed and it is achieved through technical improvement.

Pricing efficiency is concerned with the price–making role of the market system. It concerns how accurately, how effectively, how rapidly, and how freely the marketing system makes price, which measure product values to the ultimate consumer and reflects these values through the various stages of the marketing system to the producer (Andargachew, 1990). Analyzing prices of commodity markets are important methods to study efficiency because they can reveal a lot of other information about markets and marketing (Scarborough and Kydd, 1992).

There are three methods of analyses for evaluating pricing efficiency of a marketing system. These include: price trend in different markets; market integration where price movements price in one market are considered to be closely related to price movements in another market; and the price spread or marketing margin in the marketing channel. In this study, the marketing efficiency of indigenous sheep marketing is analyzed using the marketing margin.

2.3. Structure, Conduct and Performance (SCP) Model

The structure-conduct-performance approach was developed in the United States of America as a tool to analyze the market organization of the industrial sector and it was later applied to assess the agricultural marketing system. It was initially designed by Edward S. Madson in 1939, and followed by Bain, Clark, Claves and Scherer (Reid, 1987; cited in Wolday, 1994).

The S-C-P approach analyzes the relationship between functionally similar firms and their market behaviors as a group and provides a broadly descriptive model of the nature of various sets of market attributes, and the relationship between them and performance. Its basic tenet is that, "given certain basic conditions", the performance of particular industries depends on the conduct of its sellers and buyers, which in turn is strongly influenced by the structure of the relevant market (Scarborough and Kydd, 1992).

The SCP framework has been criticized for being too abstract and deterministic. Some of the criticisms are that its price integration and price performance analyses are static and suffer from spatial arbitrariness or are entirely excluded (Harriss-White, 1999); its market segmentation concepts with respect to margins and transfer costs are faulty (Scarborough and Kydd, 1992); and it does not explain how competition among traders may affect consumer welfare. As a result, the approach fails to explain the causal links between structure, conduct and performance and is, therefore, unable to predict (real) performance from (real) structures and vice versa (Harriss-White, 1999).

Once these limitations are recognized, the SCP framework still remains the conventional approach for studying market efficiency (Magrath 1992; Scott 1995). In this study, it will

serve as a building block for examining whether marketing margins charged by various actors in the marketing system are consistent with costs and whether the degree of market concentration is low enough (i.e. the number of operators in the markets are high enough) to ensure competition and drive down costs as much as possible.

Structure: It is determined by the number and size of firms in the market, the degree of product differentiation and the conditions for entry of new firms into the market. The number of participants operating in a particular market or related markets can be indicative of the extent to which buying and selling power is concentrated amongst them. A few large firms can dominate a market and control prices. The concentration ratio, which measures the proportion of total sales in a market by a given firm, can be used to indicate the level of concentration of market share (Scarborough and Kydd, 1992).

Barriers to market entry or exit are defined as being any inhibition to the entry to and leave the markets. This may refer to the process of getting a license or professional qualification or skill, or to the need for having a minimum amount of capital or other resources in order to operate successfully. Lack of available capital could effectively restrict entry of new firms if a large initial outlay is required (Scott, 1995).

Structure can also include the nature of information transfer in the market, which might require an examination of the institutional and other facilities available for acquiring and transmitting market information. This could include weigh scales, an auction system, trader registration and accessible information on prices at which deals are concluded (Scott, 1995; Meijer, 1994).

Conduct: Refers to the strategies that firms pursue with regard to price, product and promotions, and the linkages/relationships between and among firms. The market behavior of firms will determine whether or not they compete and whether they are acting innovatively to improve market efficiency. Informal association between even a small numbers of firms (collusion) can cause price distortions, and seemingly independent firms can have joint ownership (Wolday, 1994).

Performance: Refers to the composite of end results which firms in the market arrive at by pursuing whether lines of conduct they espouse-end results in the dimensions of price, output, production and selling cost, product design, and so forth, performance is exhibited by trends and stability of prices, margins and profits (Getachew, 2002).

2.4. Marketing Costs and Margins

A common means of measuring market efficiency is to examine marketing margins. This is an attempt to evaluate economic or price efficiency. The overall marketing margin is simply the difference between the farm-gate price and the price received on retail sale. That difference can then be considered to be the cost of marketing and all that is entailed in getting the product from the producer to the consumer in the desired form. The question to be evaluated is whether the marketing services being provided are "worth" the cost of this margin (Islam *et al*., 2001).

Results of analysis of marketing costs and margins are used to determine whether there are excess profits and serious inefficiencies or whether wide margins are due to technical constraints (such as transportation bottleneck).

Like in any agricultural marketing, in sheep marketing, there are several participants in the marketing chain; the participants include sheep full time traders, producer traders and part time traders. The relative share of the different market participants will be estimated using the marketing margin analysis. The total marketing margin in the marketing system constitutes the marketing costs plus profit earned by the different participants in the system. Marketing costs include those incurred for feed, laborers working in the collection and feeding activity, costs of transportation to the market, taxes, interest on capital and miscellaneous expenses (Wolday, 1994).

In an efficiently operating market, the competitive environment should keep the marketing margin to a minimum. Market prices should then reflect two elements: the actual costs of marketing plus normal profit margin. A normal profit is one that provides returns to

investment comparable to available rates of interest plus some compensation for the risk borne by the marketer.

At different stages in the marketing system the "product" (animal) is sold and bought. Normally, at each successive stage, the price per unit bought/sold is higher and we say that value has been added. This refers to the fact that some marketing service has been provided, whether transport, feed or one of the other marketing functions, and the value of that service is now included in the product price (and presumably the desirability of the product has been likewise increased). Again, at each successive stage the value added at that stage can be split into two categories: the part which is reflected in the real additional costs of adding value and the part which reflects the extra "profit" made (Wolday, 1994).

Some of the additional costs incurred at each marketing stage are obvious, for example: taxes and market fees, transport costs (e.g. hiring a truck or paying trekkers accompanying the sheep), food purchases for the animals, any interest paid on a loan taken to finance the purchase, loss of weight, loss of sheep before sale and animal upkeep.

Some further costs tend to be more controversial. Suppose opportunity cost of the capital invested in the animal before selling. The trader's own time (or family members' time if family labor is used) spending couple of days for trekking the animals to the resale market as well as time spent between purchase and sale. Such costs then should be counted as "cost of trading" rather than as "trader's profit" (Cramers and Jensen, 1982).

2.5. Structure and Performance of Livestock Markets in Ethiopia

According to Ayele *et al.,*(2003) the livestock marketing structure of Ethiopia follows a four-tier system (Figure 1). The main actors of the 1st tier are local farmers and rural traders/rural assemblers who transact at farm level. Those small traders from different corners bring their animals to the local market (2nd tier). Traders/wholesalers purchase a few large animals or a fairly large number of small animals for selling to the secondary markets.

In the secondary market (3rd tier), both smaller and larger traders operate and traders (wholesalers or retailers) and butchers from terminal markets come to buy animals. In the terminal markets (4th tier), big traders and butcher (wholesalers or retailers) transact larger number of mainly slaughter type animals.

Livestock markets are generally under the control of local authorities. Market locations in primary and secondary markets are usually not fenced; there are no permanent animal routes and no feed and watering infrastructures. Yet buyers and sellers are subjected to various service charges by the local authorities as well as other bodies (Ayele *et al.*, 2003).

Market information is crucial to producers, wholesalers and consumers to help them make decisions on what and whether to buy and sell. In general, information is required on prices, traded or available quantities, forecasts of future supplies and demand, and general market conditions. Information must be relevant, accurate and timely and reflect all sectors of the market, especially consumer demand (ILRI, 1995). Nearly in all parts of the country, there is no regular market information on prices and supplies, nor formalized grades and standards of sheep and goats and other livestock (Kebede and Ray, 1992; Ayele *et al.*, 2003).

Markets are dispersed with remote markets lacking price information. Generally, there is excess supply of animals over demand that effectively suppresses producer prices. The more mobile trader is better informed on market prices and this, combined with excess supply, places the trader in a better position during price negotiation.

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┌─────────────────────────────────────────┐
│ Farm gate sales                           │
│ Players: Farmers and rural traders        │
│ Animals: Cattle, goat, sheep              │
│ Volume: Nominal, usually 1-2, typically 5 │
│ Location: Farms and rangelands            │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│ Local/Primary Markets                     │
│ Players: Farmers and rural traders        │
│ Animals: Heifers, young bulls, replacement│
│         for breeding, and draft Minimal   │
│     consumption                           │
│ Volume: <500 head/week                    │
│ Location: Market centers in rural area    │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│ Secondary Markets                         │
│ Players: Small traders and farmers (sellers)│
│ Big traders and butchers (buyers)         │
│ Animals: slaughter, breeding and draft stock│
│ Volume: 500-1000 head/week                │
│ Location: Regional towns                  │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│ Terminal Markets                          │
│ Players: Big traders (sellers), Butchers (buyers)│
│ Animals: slaughter types, culled for age, Oxen│
│ and barren cows                           │
│ Volume: >1000 head/week                   │
│ Location: Principal cities                │
└─────────────────────────────────────────┘
```

Source: Ayele *et al*., (2003)

Figure 1. Typical structure of Ethiopian livestock market

2.6. Price Analysis

Factors determining the price of sheep marketing

Kohl and Uhl (1985) put factors influencing farm prices into four groups. The first one is supply side factors that include production decision, weather, disease, harvested acreage, etc. The second one is demand side factors that include income, prices, tastes and preferences, population, etc. The third one is marketing system related factors that include value addition, price and cost behavior, and procurement strategies. Finally, government may influence price through price support, supply control, trade policies or policies influencing domestic demand.

According to William and Robinson (1990), under a given demand and supply condition, the products have attributes that confer utility and the values of those attributes contribute to the price of the product Therefore, a composite of the implicit prices of the product's attributes is reflected in the observed price of a product, hence the mix of products attributes as well as attributes of the buyers and sellers determine the implicit prices (Andargachew and Brokken, 1993; Ayele *et al.*, 2005; Girma, 2007).

In a competitive market an implicit price will be a function of the product attributes alone and not of individual consumer or supplier attributes (Ockowski, 1994). This implies that only products are differentiated, while their markets, buyers and sellers are not. However, most empirical studies found that price was also related to attributes of the buyers and sellers, implying some non-competitiveness in the market (e.g. Rodriguez *et al.*, 1995; Andargachew and Brokken, 1993; Parker and Zilberman, 1993; Williams, 1993; Francis, 1990).

In the central highlands, as in nearly all other parts of the country, there is no regular market information on prices and supplies, nor formalized grades and standards. Agreement on price is reached by a long one-on-one bargaining between a seller and a buyer. Animals are sold on a per-head basis. Under such circumstances, prices paid will reflect buyers' preference for various animal characteristics (sex, weight, age, condition, breed, color), the purpose as to whether the animals are purchased for consumption, breeding, the season of the year and the

bargaining skills of buyers and sellers (Andargachew, 1990; Andargachew and Brokken, 1993;).

By applying multiple regression model to both quantitative and qualitative variables, Andargachew and Brokken (1993) determined factors affecting pricing of sheep in the central Ethiopian highlands. Apart from producers' response to the increased demand for sheep during religious festivals, seasonality of supply is affected by producers need for cash, lambing pattern, and variation in quantity of grazing in relation to rainy and dry seasons. In addition to the above-mentioned factors, they have found that the major animal characteristic affecting price per kg body weight were animal weight, sex, age, and color. Price per kg varies among markets partly reflecting consumers' preferences.

In their study of small ruminant pricing, Jabbar (1998) in the southern Nigeria emphasized the importance of religious festivals promoting ceremonial animal slaughter in stimulating demand and therefore small ruminant prices. In another study, Jabbar (1998) argued that there are strong buyer preferences for specific species/breeds for specific purposes at different times of the year and the buyers are willing to pay different prices according to their preferences. He concluded so based on results on small ruminants in southern Nigeria by conducting a survey covering on traded animals for which data were collected on price, species, breed, sex, age, live weight, seller type and sex, reason for sale, and intended use of the animal after purchase.

Using hedonic price function Jabbar and Diedhiou (2001) related the price per animal to its various attributes and characteristics. In this analysis the focus was on the importance of breed relative to other attributes likely to affect the price. The maintained hypothesis of implicit price analysis is that products have attributes that confer utility and the values of those attributes contribute to the price of the product. The observed product price is therefore a composite of the implicit prices of the products attributes (Ockowski, 1994). The hypothesis tested was as follows: everything else equal, there were no differences in price per animal due solely to breed.

In addition, Jabbar and Diedhiou (2001) found that there was a preference of animal breeds by farmers of West and Central Africa. Moreover, they argued that the significant negative effect of weight in their model indicates that less premium is paid for heavier animals. Other significant results were that: (a) cows fetched significantly lower prices than males, while heifers fetched significantly higher prices than males; (b) condition of animals did not significantly influence price paid by farmers, perhaps because if other desirable characteristics were present, the condition of the animal could be improved through rearing and appropriate management.

Beneberu (2003) showed that there was a considerable week-to-week variation throughout the year in sheep live-weight prices, these variations could relate to variations in the overall supply and demand as well as in characteristics of sheep offered for sale. Sheep characteristics that affect price were weight, sex, age, body condition and color, and factors affecting the number offered for sale include high demand during festivals, lambing season, as well as cash needs for crop inputs and later for food purchases just before harvest.

After controlling the effects of different attributes of the animals, the buyers and the sellers in central highlands of Ethiopia, to determine seasonal and inter-market differences in prices, Ayele *et al.,* (2005) reported that seasons and markets are important factors influencing prices of small ruminant. Seasons in which farmers faced severe cash shortages exhibited the lowest adjusted prices for animals they sold, indicating that although livestock may provide a fallback position for cash in times of crisis, terms of trade may be worst when farmers need cash the most.

The above review of literature on basic concepts and past works provided the basis for the development of empirical model and method of analysis for the present study.

3. METHODOLOGY

3.1. Description of the Study Area

Menz district is located about 350 km north of Addis Ababa in Semien Shewa Zone of the Amhara Region of Ethiopia. According to the new organizational structure of Amhara region, the previous Menz district is subdivided in to four districts, namely Gera Mider, Mama Mider, Keya Gebriel and Lallo Mider.

Menz Gera Mider and Mama Mider were selected as pilot sites by ILRI/ICARDA/BOKU for their indigenous sheep population and high size of sheep transaction. ILRI/ICARDA/BOKU selected these sites as part of its nation-wide community-based breeding projects which aims to improve the livelihoods of poor sheep keepers in Ethiopia.

Topography

The general topography of the districts is shown in Table 1. It is composed of undulating landform, plain, mountains and gorges.

Table 1 Topography of the study area

No	District Name	Districts Area Km 2 (%)	Plain (%)	Mountain (%)	Gorge (%)	Undulated (%)	Water Cover (%)
1	Menz Gera	1644.32	39	25	12.8	23	0.2
2	Menz Mama	1054.08	42.7	22.7	12.3	17.3	

Source: ZAD (2006)
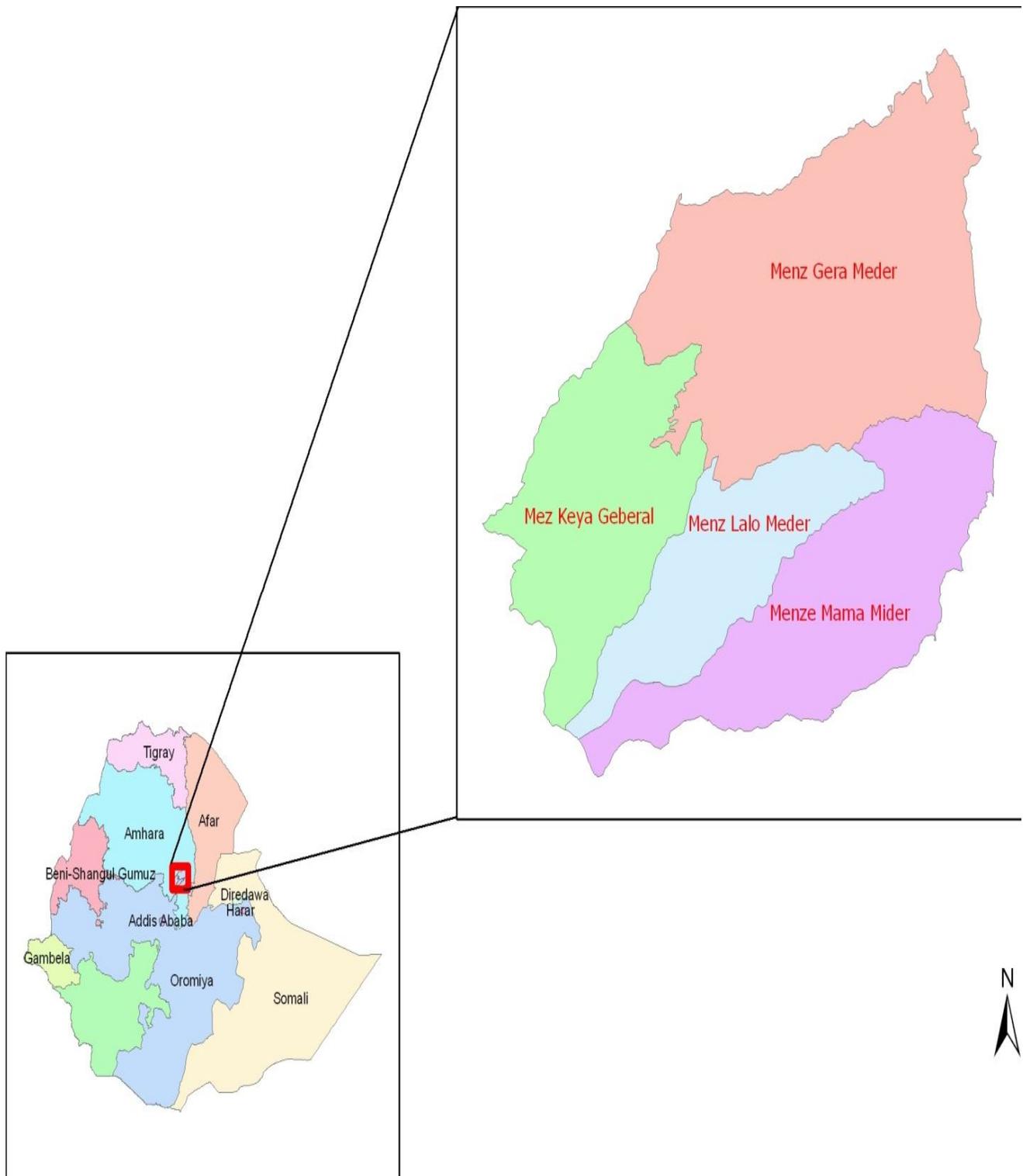
Figure 2. The study area (Menz Mama Meder, Menz Gera Meder)

Climate

The districts have an altitude ranging from 1300-2800 meters above sea level. The rainfall is bimodal with long rainy season from June to September and short rainy season from February to March. Based on the meteorological data obtained from Debre Berhan Agricultural Research Centre from the year 1985 to 2005, the annual rainfall at Mehal Meda town, the capital of the Menz Gera, is about 900 mm and the minimum and maximum average temperatures are 6.8^oC and 17.6^oC, respectively (ZAD, 2006).

Population

Based on figures published by the CSA, 2005, the demographic features of the districts are summarized in Table 2. The male-female ratio is higher in Menz Gera than Menz Mama, while the former has less population density.

Table 2. Area coverage, population size and density by districts

No	Districts	Districts Area Km 2 (%)	Population size and density as of 2005			
			Male	Female	Total	Dty*
1	Menz Gera	1,644.32	63,707.00	57,905.00	121,676.00	74.00
2	Menz Mama	1,054.08	52,176.00	54,016.00	106,192.00	100.74

*Dty: Population density per square km

Source: CSA, 2005

Regarding the occupation of the population 95.5% is engaged in agriculture, and 2.5% in petty trading. Labourers account for 1.25% and civil servants 0.75%. Majority of the population (99.5%) belongs to the Ethiopian Orthodox Christianity. Protestants and Muslims constitute the remaining 0.5%.

Agriculture

More than 95% of the population of the Districts and more than 97% of the rural population is engaged in agriculture (both in crop production and livestock rearing). The farming system of the districts is largely characterized by mixed crop-livestock production system, the average farm and grazing land holding for the districts are presented in Table 3. The average amount of cultivated and grazing lands in the two districts do not vary for the three consecutive years, there is, however significant variation between them. In general, the Menz Mama district has less cultivated and more grazing land, than the Menz Gera district.

Table 3. Average cultivated and grazing land holding

	2004		2005		2006	
District	Average cultivated /ha	Average grazing /ha	Average cultivated /ha	Average grazing /ha	Average cultivated /ha	Average grazing /ha
Menz Gera	2.7	0.6	2.7	0.5	2.5	0.5
Menz Mama	1.53	1.6	1.53	1.6	1.53	1.6

Source: CSA, 2007

Crop production

The major types of crops grown in the districts are barley (52%), wheat (23%), beans (15%) and others (10%) (ZAD, 2006).

Crop production is limited due to interrelated problems of unfavourable climatic condition, degraded and low fertile soil, irregular pattern of rainfall accompanied by with frequent high-intensity rainfall, which causes erosion of the topsoil and water logging problems. Water logging is particularly common in the clayey soils types, locally called *Keyatie* and *Tikur Merere* soils, which are common in the districts.

Livestock production

Livestock species found in the districts include sheep, cattle, goat, horse, mule, donkey, chicken and bee. The data from Development Agent's office indicates that sheep are the dominant farm animals in the area. As indicated in table 8, the population of sheep is much higher than other livestock in both study areas. Goat rearing and bee keeping are largely practised in the mid-altitude, *woina dega,* parts of the districts. Cattle are kept mainly for crop production activities: ox for ploughing and threshing, and cows for reproduction and dairy products.

Live animal sales (especially small ruminants) generate most of the cash farmers need during normal and drought periods. During periods of food shortage, male sheep and goats are sold first, and then followed by other male and female animals. If conditions remain severe, farmers often opt to sale the last pair of oxen they possess. Income from the sale of milk products, chicken and egg and sheep hair/coarse wool sale is also used for daily household expenses. It is women, who usually control the sale of and income from such small items.

Table 4. Livestock Population as of 2007

No	Livestock	Menz Gera	Menz Mama
1	Sheep	351,794	288,710
2	Goat	28,408	22,956
3	Cattle		
	Ox	16,650	19,715
	Cow	15,804	13,670
	Heifer	8,218	8,373
	Calves	7,687	7,550
	Bull	7,486	9,527
4	Chicken	97,748	71,387
5	Horse	3,786	1,761
6	Donkey	12,559	7,143
7	Mule	1,163	3,080

Source: ZAD, 2008

Although the role of livestock in supporting the rural livelihood has increased over the years, its production and management has largely remained traditional and very old. Introduction of improved management has been hindered by unfavourable natural environment, cash shortage for inputs and subsistence level of production. Very little management input is provided for feed production, health maintenance and breeding.

For most of the year, all the stocks are kept on degraded communal grazing. There is no communal grazing management practice. In high altitude areas of the districts seasonal grazing management is practised in protected hilly areas locally called *Guassa. Guassa* hills are normally closed areas. However, grazing is allowed during long dry periods and closed during the main rainy season. Oxen and cows are preferentially grazed on reserved private household grazing lands and grass hay.

Replacement-breeding animals are selected based on tail size and coat colour for sheep, and milk production for cattle. Sheep with large tail and with white, deep and light brown coat colours are preferred as breeding animals for their high live and fleece market demands. Sheep with black coat colour are known by farmers to yield more fleeces but rams are not selected because of less market demand for black sheep.

Replacement animals are mostly obtained through farmer-to-farmer sales, and animals are selected based on honest information provided by the seller farmer. Livestock culling is determined by cash needs. Sick animals are culled but replacement depends on whether the cash is needed for other purposes. Better-conditioned animals are culled and sold during seasons of high prices.

Cattle are housed in one corner of the living room or in the ground room of the traditional two-storied house. While goats are kept in roofed separate house and sheep are housed in open kraals.

Credit sources

There are formal and informal credit sources in the study area that help farmers to meet their immediate cash needs. The formal credit institutions that provide rural credit are MOA, ACSI and Wisdom Micro-Finance Institution. Informal non-commercial credit sources include friends, relatives and neighbours. The interest rate charged depends on the source of credit and extent of relationship. Moreover, traditional money lending (Locally known as *arata bidir*) is also the most common informal commercial source of credit for many farmers. Social institutions such as *idir, equb* and *mahiber* are also used as informal non-commercial sources of credit for farmers. The informal credit sources are unregulated and operate outside the banking systems.

The demand for credit depends on the wealth of farmers. Most of the poor farmers lack money to cover their basic expenses and hence require credit mainly for consumption. On the other hand, farmers with good wealth require credit to purchase important inputs to increase their production. When farmers take credit from formal sources, the preconditions oblige them to own land, oxen, and productive labour. They are also expected to pay a down payment of about 25% of the total credit. High rates of interest charged also by the informal commercial moneylenders are reported as a major problem by most of the farmers.

Agricultural institutions and development activities

Governmental institutions in the districts execute agricultural development programs and provide various extension services through Development Agents (DA), supervisors and Subject Matter Specialists (SMS). The objective of the district's Office of Agriculture (WAO) is promoting rural development in order to increase agricultural productivity at smallholder level. The services provided include promoting improved crop production techniques and livestock management. WAO also undertakes supervising verification and demonstration of trials, crop protection, and natural resource management, providing training to the farmers and DAs, promoting improved home management practices, and providing credit facilities.

Non-Governmental Organisations (NGOs) - Among NGOs, World Vision operates in Menz Gera Meder, while Agri-Service Ethiopia undertakes projects in Menz Mama Meder. USAID operates in both districts. These NGOs emphasize on natural resource conservation and development, agricultural extension, rural credit and income generation promotion, infrastructure development and small-scale irrigation.

Social institutions

There are several social institutions that facilitate production activities and social affairs. Labour arrangements such as *debo, wonfel* and *mekenajo* are employed as mechanisms to overcome labour shortages at peak periods of farming activities. Other types of social institutions include *equb, idir, and mahiber*.

Marketing of agricultural products

In the study areas, farmers diversify crops used either for cash generation or consumption. Among the crops, lentil, linseed, chickpea, faba bean and field pea are mainly grown for sale, while other food crops (barley and wheat) are mostly consumed. Livestock are also kept for sale and other purposes such as, traction and production of meat, milk, wool and eggs.

Farmers who possess certain wealth mostly sell cash crops and livestock. They do not sell food crops unless it is in excess of consumption and cattle unless they face desperate situations. Since they have enough cash for household consumption, they prefer to sell at a later season when prices rise up. On the other hand, poor farmers do not grow cash crops. Moreover, in case of shortage of cash most of these farmers sell food crops immediately after harvesting at cheap prices.

Farmers of the study area do sale their agricultural products in local markets located in their vicinity. Farmers also visit markets located at *Mehal Meda and Mollale* towns, which are wholesale markets for both crops and livestock. Different markets have different market days

which brings an opportunity for traders, producers (farmers) and consumers to visit many markets per week especially when there is price variation.

3.2. Data Requirements

In this study, information has been collected for different variables. These variables include sheep price, purpose of buyers and sellers, phenotypic characteristics of sheep and frequency of market visit. The phenotypic characteristics of sheep are coat color, coat hair, horn, age, class based sex and body condition for all completed indigenous sheep transactions in selected markets.

Moreover, data on the number of sheep offered and sold in the sample markets, market participants, marketing functions, facilities and services, number of buyers and sellers, market fees, marketing facilities, transaction costs and marketing channels are also collected. Other parameters like access to credit, transportation and marketing information, buying and selling behavior, and market barriers were also collected.

3.3. Sampling and Method of Data Collection

In Menz *Gera Meder* there are three primary livestock markets (*Geyi, Wejed* and *Segno Gebeya*) and one secondary market (*Mehal meda*), whereas Menz *Mama Meder* have one secondary market (*Mollale*) and two primary livestock markets (*Bash* and *Kollo Margefia*). Among these markets, two secondary and three primary livestock markets (*Geyi*, *Wejed* and *Bash*) are selected as sample markets. The primary markets, as feeder markets to secondary markets, are selected based on their location, distance from secondary markets, amounts of transaction and volume of sheep supply. In addition one terminal market (Addis Ababa *Sholla* market) is added to follow the marketing route and market channel.

The data for this study is collected from primary and secondary sources. Data from primary sources are generated through market survey and traders' surveys. Reconnaissance surveys were initially conducted to acquire information on general features of the sheep production

and marketing, major phenotypic attributes of sheep observed by buyers and sellers, sheep marketing channels, market actors, major and feeder markets, and physical access to markets.

Market surveys were conducted in all sample markets except *Sholla* market. Data were generated on a random sample of 20 transactions in each of the five sample markets. These transaction level surveys were undertaken in three periods of the year. The first round of the survey was during normal season in which normal transactions were undertaken, the second survey was conducted during fasting period and the last season was on Easter holiday. The market survey focused on the phenotypic characteristics of sheep, price of sheep, market location, and buyer's and seller's characteristics.

Traders' surveys were carried out in all of the six markets in two different periods; i.e., during high (Easter holiday) and normal transaction periods. Individual interviews are conducted using pre-tested structured questionnaires. The questionnaires are used to gather details about marketing channels, transaction costs, buying and selling price of sheep, mode of transportation, and opportunities and constraints related to sheep trading. A total of 195 traders were contacted for interview and 186 traders complied to answer the questions. All sheep traders but 9 (7 full time and 3 secondary producer traders), approached in the market were willing to be part of the survey. Among the respondents 67 of the traders are secondary producer, 62 full time traders, 38 producer trades and 19 part time traders.

Moreover, data on the number of sheep supplied and sold in two secondary markets (*Mehal meda* and *Mollale* markets) are collected following traders survey for two periods. In addition secondary data related to market fees, facilities and services were collected from the respective agricultural offices of the districts. Eight enumerators were also recruited and trained on techniques of interviewing and other relevant topics.

3.4. Methods of Data Analysis

The study employs descriptive and econometric methods of data analysis. The data were coded using effect-coding method and the analyses were done using STATA 10.

3.4.1. Analysis of market structure

The structure of the market refers to the characteristics of the organization of the markets that have significant influence on the nature of competition and pricing within the market (Pomeroy and Trinidad, 1995).

3.4.1.1. Market concentration

Concentration Ratio(C)

Market concentration is defined as the number and size distribution of sellers and buyers in the market. It plays a large part in the determination of market behavior within an industry because it affects the interdependence of action among firms (Pomeroy and Trinidad, 1995).

$$C = \sum_{i=1}^{r} S_i, \quad i = 1, 2, .., r \tag{1}$$

Where C is concentration ratio, S_i percentage share of the i^{th} firm (based on the number of sheep bought and sold) and r is number of largest firms for which the ratio is going to be calculated. That is,

$$S_i = \frac{V_i}{\Sigma V_i} \tag{2}$$

Where S_i is market share of buyer i, V_i is amount of product handled by buyer i and ΣV_i is total amount of product handled in the market.

According to Kohls and Uhl (1985), concentration ratio of 50% or more is indicative of strongly oligopolistic industry, 33-50% is of a weak oligopoly, and less than that an un-concentrated industry. This is the number and size distribution of sellers and buyers in the market.

3.4.1.2. Market barriers

Market barriers are classified into barriers to entry and barriers to exit. Barriers to market entry have been analyzed and discussed in this study. Analyzing different barriers faced by traders that can potentially involve in sheep trading business identified these barriers.

Models, that include a yes or no type dependent variable, are called dichotomous or dummy variable regression models in which determinants of an event happening or not happening are identified. These include the linear probability function, linear discriminate function, logistic distribution function (logit), and normal distribution function (probit). These functions are used to approximate the mathematical relationship between explanatory variables and dependent dummy variable, which is always assigned qualitative values (Gujarati, 2003; Verbeek, 2000)

Gujarati (2003) pointed out that in principle one can substitute the Probit model for logistic model, as their formulations are quite comparable; the main difference being that logit has slightly flatter tails than Probit and Probit curve approaches the axes more quickly than the logistic curve. Though Logit and Probit models produce similar parameter estimates, the logistic distribution model is preferred (Verbeek, 2000) and has advantage over the others in the analysis of dichotomous outcome variables, because it is extremely flexible and easily used model from mathematical point of view and results in meaningful interpretations.

In this study, we have investigated the relationships between market barriers and its determinants by using the binary logit model. The dependent variable is whether the traders are facing market barriers taking a value of 1 if the traders face market barriers and zero otherwise. The specification of the model is:

$$P_i = \frac{e^{z_i}}{1 + e^{z_i}} \qquad (3)$$

where P_i is the probability that the trader faces barriers, and e is Euler's number. Z_i is a linear combination of the explanatory variables and random term give as:

$$Z_i = \sum_{k=1}^{K} a_k X_{ik} \tag{4}$$

Equation 3 can be specified in terms of probability of not facing market barriers as:

$$1 - P_i = \frac{1}{1 + e^{zi}} \tag{5}$$

where k is the number of explanatory variables; and a denotes parameters to be estimated. The above model can be represented in terms of logarithms as follows:

The above model can be represented in terms of logarithms as follows:

$$L_i = \ln\left(\frac{P_i}{1 - P_i}\right) = \ln\left(e^{Z_i}\right) \tag{6}$$

Where, the odds ratio is simply the ratio of probability of facing market barriers to probability of not facing. Therefore, to get linearity both in variable and in parameters we take the natural logarithm of the odds ratio and the coefficient of the logit model presents the change in the log of the odds associated with a unit change in the explanatory variable.

Managerial know how (age of the trader, education and business experience in sheep trading), financial status (working capital and access to credit), information access, number of known traders or brokers, number of workers involved in trading and risk associated with number of sheep loss are taken as explanatory variables in determining market barriers.

Before estimating the logit model, it is necessary to check if multicollinearity exists and verify the associations among the variables. The reason for this is that the existence of multicollinearity affects seriously the parameter estimates. Accordingly, Variance Inflation Factor (VIF) technique was employed to detect the problem of multicollinearity for continuous explanatory variables (Gujarati, 2003). Each selected continuous variable is

regressed on all the other continuous explanatory variables. A popular measure of multicollinearity associated with the VIF is defined as:

$$VIF(X_j) = (1 - R_j^2) \tag{7}$$

A rise in the value of R_j^2, that is an increase in the degree of multicollinearity, does indeed lead to an increase in the variances and standard errors of the OLS estimates. A VIF value greater than 10 (this happens if R_j^2 exceeds 0.90), is used as a signal for existence of severe multicollinearity (Gujarati, 2003).

Definition of variables and hypothesis

The dependent variable in this study is the level of market barriers faced by traders. It is a dichotomous variable taking a value of 1 if the traders face market barriers and zero otherwise. Factors which are expected to have significant impact on determining market barriers were selected and hypothesized as follows.

Age of trader: It is continuous variable measured in number of years. As age increases, traders are expected to acquire more knowledge and experience in livestock trading. As a result the chance facing market barrier for such traders is less. On the other hand, aged sheep traders with less experience may face high market barrier. Thus in this study, age of trader is expected to take any sign as our field observations did not show any pattern to expect otherwise.

Level of Education: This variable entered the model in five categories; illiterate, read and write, elementary school and secondary school. It is hypothesized that traders that are literate have a better knowledge of how to make a business, thus traders with higher schooling face less barrier than illiterate. It is hypothesized that education has negative relationship with level of market barrier facing by trader.

Experience in sheep trading: It is continuous variable measured in number of years which the trader spent in sheep trading. It is expected that traders with higher experience in sheep trading face less market barrier than traders with less experience. This means the probability that a trader faces market barriers decreases as the experience of trader in sheep trading increases. Hence, negative relationship is expected among the variable and facing market barrier.

Working capital: It is expected that the probability of market barriers faced by traders is less as working capital increases, which means traders who have more working capital are less likely to face market barriers. The variable is continuous and it is measured by the amount of money traders have to run sheep trading business.

Access to credit: This is a dummy variable which takes the value 1 if the trader has access to credit and 0 otherwise. Access to credit would enhance the financial capacity of the trader to perform the sheep transaction. Therefore, it is hypothesized that access to credit would have negative influence on the likelihood of facing market barriers.

Access to market information: It is a dummy variable which takes the value 1 if the trader has access to market information and 0 otherwise. The variable is expected to have negative influence on the probability of facing market barriers. This implies that as traders access information the market barrier they are going to face will be reduced.

Loss of sheep: This is a continuous variable measured in the number of sheep lost during transportation and theft, showing the risk of operating sheep trading. Thus, it is hypothesized that risk associated with loss of sheep have positive influence on likelihood of facing market barriers.

Known traders\brokers: It is a continuous variable measured in number of traders and brokers known by the trader who could be a source of market information, credit as well as business advice. Hence it is hypothesized that as number of known traders and brokers

increases, the level of market barriers faced by traders decrease, which implies negative relationship between the variable and market barrier.

Number of workers: It is obvious that as number of workers increases in sheep trading, the level of market barriers faced by traders decreases. This happens because those who participate in sheep trading insure security and protect the loss of sheep, help each other in making better transaction as well as sharing market information. Thus, the variable is expected to negatively influence the probability of facing market barrier.

3.4.2. Analysis of market conduct

There are no uniform procedures for analyzing the elements of market conduct. Rather, few points are considered to systematically detect indications of unfair price setting practices and conditions under which such practices are likely to prevail. The points include checking the existence of formal and informal producing and marketing groups; the availability of price information and its impact on prevailing prices; and the feasibility of utilizing alternative market outlets (Cramers and Jensen, 1982Wolday, 1994).

3.4.3. Analysis of market performance

Market performance refers to the impact of structure and conduct on prices, costs, and volume of output (Bressler and king, 1970; cited in Scott, 1995). By analyzing the level of marketing margin and their cost components, it is possible to evaluate the impact of the structure and conduct characteristic on market performance. The two approaches to measure marketing performance are the analysis of marketing margin and market channel efficiency (Scott, 1995).

Marketing Margin

It includes the analysis of marketing costs and margins and it measures the share of the final selling price that is captured by a particular agent in the marketing chain (Mendoza, 1995).

The total gross marketing margin is given by the following formula

$$\text{TGMM} = \frac{\text{End buyer price} - \text{First seller price}}{\text{End buyers price}} \times 100 \qquad (8)$$

Where, TGMM = Total Gross Marketing Margin

It is useful to introduce the idea of 'producer's participation', 'farmer's portion', or 'producer's gross margin' (GMMP) which is the portion of the price paid by the consumer that goes to the producer. The producer's margin is calculated as a difference:

$$\text{GMM}_p = \frac{\text{End buyer price} - \text{Marketing Gross Margin}}{\text{End buyer price}} \times 100 \qquad (9)$$

Where GMMp denotes producers' share in consumer price

3.4.4. Determinants of gross margin

Gross margin analysis is one way in which marketing efficiency can be assessed. According to Timmer *et al.,* (1983) large gross margin may co-exist with inefficient use of resources; low labor, capital and management productivity, poor coordination and consumer satisfaction; and disproportionate profit elements. Conversely, higher margins result from increased services, including better coordination, may leave producers and consumers better off, and low margins may be due to low productivity. Therefore, in using market margin analyses to assess the marketing efficiency, it is preferable to analyze factors that determine the gross margin.

Variables that can determine gross margin can be observable or unobservable. Only the observable variables; i.e., asset variables (human, financial and social capital), variables representing trading practices and other general variables were used for this analysis. Natural logarithm of the gross margin as the dependent variable was applied to have direct estimates of elasticity (Jabbar *et al.*, 2006) which is given by:

$$\ln(\mathrm{GM}) = \mathrm{X}\beta + \varepsilon \qquad\qquad\qquad (10)$$

Where, X is vector of independent variables (asset variables, trading practice and other variables), β is vector of parameters to be estimated and ε is the error term.

Asset variables include education, business age or experience, occupation other than livestock trading, number of workers engaged in livestock trading including family and hired hands, working capital, number of other traders and brokers in purchase and sale markets known who could be relied up on for information, advice or credit, access to credit, access to information and variable costs incurred during transaction.

Variables related to trading practices include trading system, use or non-use of brokers for selling livestock, whether conducted purchase and/or sale transactions with regular suppliers and buyers and number of days between purchase and sale transactions which included travel time between markets as well as temporal arbitrage behavior. Risk associated with loss of sheep was also included as an explanatory variable.

Definition of variables and hypothesis

In determining factors that affect gross margin, the first step is to analyze factors that influence gross margin and how. Thus, potential variables which are expected to have an effect on gross margin need to be explained. Accordingly, the major variables expected to have influence gross market margin are explained as follows:

Dependent Variable

Gross margin: which is a measure of return on own labor and capital, is a continuous variable which represents dependent variable; the actual gross margin per animal is selected for regression analysis takes of positive value.

Independent Variables

Asset variables

Education level of trader: refers the formal schooling of a respondent during the survey period. Those traders who had higher level education have better skill and know how on how to handle sheep trading than those traders with lower level education. It was hypothesized that as schooling year of traders' increases, it is expected to have positive influence on gross margin than the base variable - illiteracy.

Experience or business age in sheep trading: a study conducted by Jabbar *et al.,* (2008) indicated that experience or business age in animal trading has a significant effect on gross margin. That is as number of years increased, the more experience traders have in conducting sheep trading business which makes them to increase their profit by raising their gross margin. Hence it is hypothesized that experience of trader has positive effect on gross margin. This variable is a continuous variable measured in number of years, but it is categorized in different years so as to see the difference in years and to compare with base variable.

Occupation other than livestock trading: It is a dummy variable that show income obtained by the trader other than livestock selling. This income may strength traders to enlarge gross margin expecting higher profit. On the other hand, traders depending only on livestock trade for livelihood may need quicker turnover of transactions and be less able to cope with market uncertainties and use trading practices that will reduce transaction costs hence settle with lower profit margins. Thus, it is hypothesized that this variable is positively related with gross margin.

Number of workers engaged: this is a continuous variable which shows the number of workers engaged in livestock trading including family and hired hands. It is obvious that as the number of workers increases, it will increase the cost of trading, hence positive relationship is hypothesizes among the variable and gross margin.

Working capital: Theoretically large working capital would normally be expected to permit larger volume of business and economy of scale and specialization in livestock trade would be expected to generate better profits as well as higher gross margin due to better knowledge and skills in trade negotiations. Therefore, the coefficient of this variable is expected to have positive sign.

Known traders and brokers: this variable refers to the number of traders and brokers known in purchase and sale, who could be relied up on for information advice or credit (representing social capital). According to Jabbar (2006), large network of traders\brokers enables traders to minimize cost and maximize profit and gives the space to raise gross margin so as to earn better price. Therefore, it is expected that as known traders\brokers and gross margin are positively related. It is a continuous variable measured in number of persons.

Access to credit: it is hypothesized that accesses to credit and gross margin have positive relationship, as access to credit would enhance the financial capacity of the trader to make business transaction. The variable is entered in the model as a dummy variable (it takes a value 1 if the trader has access to credit service and 0 otherwise).

Access to information: this is a dummy variable. Traders' marketing decisions are based on market price information, and poorly integrated markets may convey inaccurate price information, leading to inefficient product movement. Access to market information helps traders to minimize their transaction cost which leads to reduce gross margin. On the other hand, when information is asymmetric; it makes some traders (who have access to information) better off by raising gross margin so as to earn higher profit. Hence, access to information is assumed to have direct or inverse relation with gross margin.

Trading practices

Trading system: this variable entered the model in two categories; private and partnership trading system. It is hypothesized that traders who perform their trading business privately have lower gross margin than those in partnership.

Use of brokers for selling livestock: It is a dummy variable taking a value 1 if traders use broker and 0 otherwise. It is expected that using the service of brokers lowers gross margin by reducing transaction costs through providing better information and lesser time for contract negotiation and enforcement. Hence, there is negative relationship between the variable and gross margin.

Sale to regular customer: It is a dummy variable that refers to traders whether they conduct their transaction with regular customer or not. Lower margin per animal is normally expected for those traders who undertake all or most of transactions with regular buyers as compared to those who do not do so; as long-term business relations based on trust, reliable information on price and supply, and assured delivery of products in a timely manner usually reduce transaction costs and minimize unit gross margin. Thus, negative relationship between sale to regular customer and gross margin is hypothesized.

Days between purchase and sale: longer arbitrage days have positive effect on gross margin, as increase in numbers of days between purchase and sale usually raises costs of feeding, watering and keeping the animals. This variable is continues and measured in number of arbitrage days.

Other variable

Loss of sheep: which shows risk associated with loss of sheep in the form of theft or during transportation is a continuous variable; expected to have positive relation with gross margin. As the number of sheep lost increases, traders will increase gross margin by raising selling price so as to compensate the loss.

Marketing channels

The analysis of marketing channels is intended to provide a systematic knowledge of the flow of the goods and services from their origin (producer) to their final destinations (consumers) (Mendoza, 1995).

The efficiency of alternative marketing channels was judged on the basis of the following indicators following Ramakamar:

      1. Net price received by producers

      2. Total cost of marketing

      3. Price mark-up

Price mark-up is the difference between the price paid in purchasing the commodity and price received when the commodity is sold. It is expressed as a percentage of the price paid while purchasing.

Based on each efficiency indicator, the marketing channels have been ranked and finally efficiency of different channels has been judged on the basis of a composite index:

$$R = \frac{R_i}{N_i} \qquad\qquad (11)$$

where R is an overall rank of a channel (all performance indicators), R_i is rank of a channel per a single indicator and N_i is the number of performance indicators (volume handled, rate of return, producers' share, and marketing margin).

3.4.5. Price analysis

It is hypothesized that products have utility bearing attributes and that the values of those attributes contribute to the price of the product. The observed price of the product is, therefore, a composite of the implicit values of the product's attributes (Jabbar, 1998;

Ethridge, 2002). As sheep can be considered as quality-differentiated good, the prices sheep sellers receive are reflections of buyers' utility derived from the attributes of the product.

This research focuses on the main phenotypic attributes that buyers inspect when buying an animal. The external features buyers look at and attach value are class (based on age and sex), age, coat color, and coat hair, horn formation, and body condition. Both buyers and sellers know the different levels of the attributes that differentiate sheep. The levels considered in this analysis are those perceived by the buyers, despite the possibility of imperfect knowledge and differences in measurement.

Several empirical studies have shown that prices are related to the product attributes as well as attributes of the buyers and sellers, season and market location (e.g. Andargachew and Brokken, 1993; Jabbar, 1998; Jabbar and Diedhoudu, 2001; Girma, 2007). Thus, education level of buyers and sellers, purpose of buying /selling, frequency of market visit, season, and market location were included in the models estimated in this research.

Generally supply and demand forces determine the general level of prices in any given period, but the mix of other product attributes determine the implicit prices of these attributes. Unlike general pricing models where price is determined by supply and demand variables, hedonic models determine implicit prices of specific attributes embodied in a product on the basis of the value (utility or productivity) end-users ascribe to these attributes (Brown and Ethridge, 1995, Jabbar 1998).

An important issue in estimating hedonic functions is the identification of the appropriate functional form and estimation procedure. In general, the functional form of the hedonic price equation is unknown (Haab and McConnel, 2002). The estimation strategy followed in this study is adapted from Girma (2007) and uses restrictive basic linear model which is the natural logarithm of price as dependent variable makes the estimated coefficients approximations of the percentage price change associated with a unit change in the independent given by.

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$$\ln(P) = X\beta + \varepsilon \tag{12}$$

where X is vector of independent variables including characteristics of sheep and the socioeconomic variables considered, β is a vector of parameters to be estimated and ε is an independent and identically distributed (iid) error term.

The iid assumption for the error term implies that the conditional distribution of the errors given the matrix of explanatory variables has zero mean [E{ε} = 0], constant variance [V{ε} = σ^2], and zero covariance [V{ε} = σ^2I], where I is the identity matrix. These assumptions and hence the reliability of the estimates based on such assumptions hardly hold in analyzing survey data.

In choosing a functional form and the set of explanatory variables, the problem associated with collinearity is considered, as high collinearity makes the choice of a flexible functional form less attractive.

Hedonic price model is subject to the problem of heteroscedasticity and omission of important variables. Hence the basic models were tested using Ramsey's RESET test for omitted variables and specification error, while White and Breusch-Pagan tests were used to test the presence of heteroscedasticity.

To obtain more reliable standard errors the study employed heteroscedasticity consistent covariance matrices (HC_1, HC_2 and HC_3) suggested by MacKinnon and White (1985) and Davidson and MacKinnon (1993). White's formula (White, 1980) has generally been used in the empirical literature to obtain heteroscedasticity consistent (HC) standard errors. However, White's estimator (HC_0) is believed to be less useful in small samples because the squared OLS residuals tend to underestimate the squares of the true disturbances. The alternative covariance matrix estimators of the error term, OLS and HC_0, are specified as:

$$OLS = \frac{\sum e_i^2}{n-k}(X'X)^{-1} \tag{13}$$

$$HC_o = (X'X)^{-1} X' diag\left[e_i^2\right] X(X'X)^{-1} \tag{14}$$

$$HC_1 = \frac{n}{n-k}(X'X)^{-1} X' diag\left[e_i^2\right] X(X'X)^{-1} \tag{15}$$

$$HC_2 = (X'X)^{-1} X' diag\left[\frac{e_i^2}{1-h_{ii}}\right] X(X'X)^{-1} \tag{16}$$

$$HC_3 = (X'X)^{-1} X' diag\left[\frac{e_i^2}{(1-h_{ii})^2}\right] X(X'X)^{-1} \tag{17}$$

where **n** is number of observation, **k** number of parameters estimated, and h_{ii} is $x_i'(X'X)^{-1}x_i$

The other option to deal with heteroscedasticity employed in this study is the feasible generalized least squares. The general specification of the covariance matrix of the error term given as $V\{\varepsilon\}=\sigma^2\psi$, where ψ is a positive definite matrix that might depend on **X** and which can have known or unknown form. It is apparent that HC standard errors can be obtained either by using OLS estimator and adjusting the standard errors to make them robust (the first option discussed above) or by deriving an alternative estimator that is efficient (Verbeek, 2004).

For the heteroscedasticity is detected and unknown ψ, the Feasible or Estimated Generalized Least Squares (FGLS or EGLS) can be employed, first to estimate ψ and then to estimate the parameters. Hence, FGLS model was estimated as an alternative way of dealing with the heteroscedasticity observed in the error terms.

4. RESULTS AND DISCUSSION

4.1. Organization of Sheep Marketing System

4.1.1. Types of markets

Livestock markets are classified into primary, secondary, and terminal markets based on types of major market participants, volume of supply per unit of time and the accompanying reason for buying (Solomon and Nigussie, 1983; Yacob, 2002). Primary markets are village-level markets where primary producers sell small number of animals to small traders, other farmers and in some cases to consumers. In these markets, reproduction and resale are the main purposes of buying.

The most important objectives of buying in secondary markets are resale and consumption. These markets are dominated by traders and are mainly located in regional capitals. In the terminal markets, however, consumption is the main purpose of buying and these markets are located in large urban centers like Addis Ababa. In these markets, medium to large-scale traders dominate the market. In this study, sample markets are classified based on distribution of buyer purpose (Table 5).

Based on the above classification criterion, the markets at *Bash*, *Geyi* and *Wejed* areas are classified as primary markets whereas *Mehal meda* and *Mollale* markets are secondary. The market in Addis Ababa (*Sholla*) is a terminal market.

4.1.2. Market yard facilities

Livestock market facilities include feed and water troughs, livestock scales, loading rumps, crushes and fences. All of the markets sampled for this study do not have a complete facility required for livestock marketing. The secondary and terminal markets are enclosed by fences but essentially for the purpose of tax collection: *Sholla* (Addis Ababa) terminal market is

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fenced by gabion, *Mehal meda* and *Mollale* markets are fenced with wood and gabion, while the rest of the markets at *Bash, Geyi* and *Wejed* have no fences at all.

Table 5. Sheep market characteristics

Type of Market	Main sellers	Main buyers	Purpose
Primary market (*Bash, Geyi* and *Wejed*)	Producers	Other producers Consumers Primary farmer traders	Replacement, reproduction and fattening Slaughter Collecting for resale in secondary market
Secondary market (*Mehal meda* and *Mollale*)	Producers Primary farmer traders Collectors	Other producers Consumers Secondary farmer traders Collectors Fulltime traders	Replacement, reproduction and fattening Slaughter Collecting for resale in same market and terminal market
Terminal market (*Sholla*)	Secondary farmer trader Collector Fulltime traders	Consumers Collectors	Slaughter Collecting for resale in the same market

4.1.3. Mode of transportation

For all of the primary producer traders, trekking sheep is a preferred mode of transportation across the market regions. However, 23% and 79% of the respondents (secondary and full time traders) surveyed have used trucking to transport their animals to the terminal market in Addis Ababa (*Sholla*). Some traders, to minimize cost and guarantee security, combine their sheep into one large flock for trekking. In such cases, traders identify the sheep by painting different parts of the body. A minimum of three sheep drivers are required for sheep trekking but sometimes the number might increase if security is assumed to be a problem.

The average number of sheep trekked to the sampled secondary and terminal markets is 48 and 77 heads of sheep per flock, respectively. On average, the sheep are trekked about 17 to 45 kms to reach secondary markets, and about 50 to 75 km per day (6 days on average) to terminal markets. Seventy percent of the respondents trekked their sheep to secondary markets by themselves and family members, while the rest employed sheep drivers. The

opposite is true for terminal markets; 70% of the traders employed sheep drivers, while the rest trekked their sheep by themselves.

The payment for sheep drivers ranges from 15 to 20 birr per day to terminal markets, but sheep drivers to secondary markets are mostly herders and the payment is included in their salaries. Those traders who use trucks to transport sheep from secondary to terminal markets, rent trucks, either individually or in groups, at the end of market days. The trucks carry 350-400 heads of sheep per trip and the cost ranges from 2.5 to 4 Birr per sheep, the cost of trucking rises up to 4 Birr per sheep on major festive periods of the year.

4.1.4. Participants and channels of sheep marketing

In this study, different sheep market participants are identified in the exchange functions between producer and final consumers. These are producers, primary producer traders, secondary producer traders, part-time traders, fulltime traders, brokers/commission men and consumers. Similarly, different sheep marketing channels are also identified.

Producers

Producers are farmers who engage in livestock production and supply small number of sheep to primary and secondary markets. In the secondary markets; namely *Mehal meda* and *Mollale*, the total number of sheep supplied by farmers is 73% and 76%, respectively. The rest are supplied by producer traders.

Primary Producer Traders

Primary producer traders live in rural areas and their main occupation is farming and livestock production. . They engage in sheep trading only during peak transaction periods and religious festivals. They buy sheep at the farm gates and primary markets and sell to primary and secondary markets that are found nearby. They also buy and sale sheep following the price pattern to benefit from temporal arbitrage within the same market. Market survey data have

shown that the number of sheep supplied during the survey period by primary producer traders in *Mehal meda* and *Mollale* markets were 773 and 537, respectively.

Secondary Producer Traders

In the study area, secondary producer traders are similar with primary producer traders except that they transport animals from primary and secondary markets to *Sholla* (Addis Ababa), i.e. terminal market. According to the survey data during the sample periods, the total number of sheep bought by Secondary producer traders is 754 from *Mehal meda* and 592 from *Mollale* markets. These figures account for 30% and 33% of the total number of sheep sold in *Mehal meda* and *Mollale* respectively.

Fulltime Traders

Fulltime traders are those permanently engaged in sheep trading throughout the year. These traders buy sheep from secondary markets and sell them at terminal markets of Addis Ababa (*Sholla*). The market survey result indicated that full time traders purchased 3042 heads of sheep which accounted for 65.4% of the total number of sheep bought from the sample secondary markets.

Part-time Traders

These traders are found in secondary and terminal markets. They buy from and sell in the same markets. The total number of animals bought and sold during the survey period by part time traders were 531, accounting for 12 % of the total supplied in the markets.

Brokers

Brokers, locally called '*delalas*', are found in terminal markets. Their income is the difference between the 'sellers' and 'buyers' price and a commission voluntarily paid by buyers. Brokers add their own margin on top of the seller's price when negotiating with buyers.

Sheep marketing channels

Different sheep marketing channels are identified in this study. The major channels are:

Channel I   Producer → primary producer trader → secondary producer → consumer

Channel II   Producer → primary producer trader → fulltime trader → consumer

Channel III   Producer → secondary producer → consumer

Channel IV   Producer → fulltime trader → consumer

Channel V   Producer → part-time trader → secondary producer → consumer

Channel VI   Producer → part-time trader → fulltime trader → consumer

Channel VII   Producer → primary producer trader → part-time trader → secondary producer→ consumer

Channel VIII   Producer → primary producer trader → part-time trader → fulltime trader → consumer

Channels that involve part-time traders in terminal markets are not included in the analysis since these traders collect and sell sheep that come from different districts. Direct channels from secondary and fulltime traders to final consumer are considered to determine the consumer price in the terminal market. Hence, Channel VII and VIII are not included in the analysis.

Regarding the marketing route, there are two main sheep marketing routes to Addis Ababa (*Sholla*) market. One is from *Mehal meda* and the other from *Mollale*. The number of sheep transported from *Mehal meda* to the terminal market in Addis Ababa is higher than those of *Mollale*. During the market survey, the numbers were 2461 and 1923 sheep, respectively.

4.2. Market Structure

The structure of the sheep marketing is evaluated in terms of the degree of market concentration, market barrier and the degree of transparency (Pender *et al.*, 2004).

4.2.1. The degree of market concentration

Analysis of the degree of market concentration is carried out only for secondary markets (*Mehal meda* and *Mollale*). Since primary markets are not fenced, it creates difficulties to count or even to estimate the number of sheep supplied and sold in the markets. The degree of concentration for the terminal market in Addis Ababa is not evaluated since the number of sheep traders involved is too large and there is no sufficient data about the amount, location and breed of sheep supplied to the terminal market.

The degree of market concentration is measured by the percentage of sheep handled by the largest four traders. The result shows that in *Mehal meda* and *Mollale* secondary markets sheep traded are relatively concentrated in the hands of a few traders. The four largest traders handled 34% and 33% of the total volume of sheep traded in *Mehal meda* and *Mollale* markets, respectively (Table 6).

Table 6. Buyers/sellers concentration ratio for sample markets

Sample market	Concentration index for four traders/ firms (%)
Mehal meda Market	34.31
Mollale Market	33.09

4.2.2 Market barriers

Traders who are involved in sheep trading business face different barriers in the market. These barriers are related to availability of capital, experience in sheep market, access to information and risks associated with sheep trading. Barriers hinder traders from making important transactions and complicate their future involvement in the sheep market. Binary logit model is fitted to estimate the effects of the explanatory variables on the probabilities of facing barriers or not.

Prior to the estimation of the model parameters, it is important to identify the problem of multicollinearity or association among the potential candidate variables. The variance inflation factor (VIF) is used to test the degree of multicollinearity among the continuous variables.

Table 7. Type of explanatory variables and reference level

Variables	Type	Levels	Reference level
Age of trader	Continuous		
Experience in sheep trading	Continuous		
Working capital	Continuous		
Number of workers participate	Continuous		
Number of trades/brokers known	Continuous		
Number of sheep lost	Continuous		
Education	Discrete	Illiterate Read and write Elementary Secondary	Illiterate
Access to credit	Discrete	Yes No	No
Access to information on price	Discrete	Yes No	No

To avoid the problem of multicollinearity, variables with VIF value of 10 and more are omitted from the logit analysis. But, the values of VIF for continuous variables were found to be less than 10 (Table 8), hence no multicollinearity between the variables. As a result, all the 6 continuous explanatory variables were retained and entered into the logistic regression analysis.

The dependent variable is a dichotomous variable; with an expected mean value 0.5, whereby 1 indicating the probability of facing barrier and 0 otherwise. The model eventually included a set of 9 explanatory variables (6 continuous and 3 discrete), and it is estimated using the method of Maximum Likelihood method. In this method all the above-mentioned variables were entered in a single step. Through estimation of the logistic regression model, some of the

explanatory variables that improved the model result were selected and included in the model analysis.

Table 8. Variance Inflation Factors (IVF) of the continuous explanatory variables

Variables	VIF	1/VIF
Age of trader	1.08	0.930
Experience in sheep trading	1.08	0.929
Working capital	1.2	0.832
Number of workers participate	1.5	0.949
Number of trades/brokers known	1.17	0.852
Number of sheep loss	1.04	0.965

Four of the nine variables considered in the logit model, are significant factors among the market barriers. These variables include experience of traders, working capital, access to market information and Secondary education school. The remaining explanatory variables were found to have no significant influence on the likelihood of facing market barriers (Table 9). The significant explanatory variables, which have effect on the existence of market barriers, are discussed below.

Working capital appeared to be significant in determining the existence of a barrier in the market. This variable is significant at 10 percent probability level and has negative association with the existence of barriers in the market. The negative relationship indicates that as working capital increases probability of facing barriers in the market deceases. The odds ratio of 0.986 for working capital implies that, other things being constant, the odds ratio in favor of barriers decreases by a factor of 0.986 as working capital of the trader increases. Hence, this is in agreement with the theory that the working capital is likely to play a role in easing barriers to enter in the market. The result revealed that the probability of barriers faced by traders is less as working capital increases. The estimation also implied that working capital discourage the entry of new traders. This clearly shows the importance of access to finance for traders (who are already in the business) as well as for new potential traders who want to start sheep trading in the study area.

Table 9. Econometric results of the Logit model estimation

Variables	Coefficient	Robust St.Error	Odds ratio
Constant	5.452	1.398	
Age of trader	0.001	0.019	0.999
Read and write	-0.23	0.384	0.795
Elementary school	-0.573	0.37	0.564
Secondary school	-0.691**	0.341	0.501
Experience in sheep trading	-0.145*	0.046	0.865
Working capital	-0.003*	0.013	0.986
Access to credit	-0.308	0.22	0.735
Access to market information	-0.735*	0.223	0.48
Loss of sheep	0.009	0.088	1.009
Known traders or brokers	-0.249	0.139	0.779
Number of workers	-0.086	0.152	0.918

N= 186

LL= -70.75

Pseudo R2   =   0.4604

LR chi2(11)   =   115.99

Note: *** , ** and * significant at   α=1% , α= 5 %, α= 10% , respectively

Among education dummies, secondary school education is found to be statistically significant at 5 percent level in determining the probability of facing market barriers. The result revealed that the probability of facing barriers for who have reached secondary school level is lower compared to that of illiterate traders (the base variable). Although, the magnitude of the coefficients for read and write and elementary school levels is not statistically significant, the negative sign of the coefficients implies the probability of facing barriers is less compared to illiterates. Hence illiterate traders could face market barriers in operating sheep trading business.

Experience of traders in sheep trading is found to be significant in determining the probability of facing barrier in the market. The result shows that the variable has negative impact on the probability of face barriers in the market. This means the probability that a traders face market barriers decreases as the experience of trader in sheep trading increases. The possible explanation can be those traders with less years of experience could face market barriers

because of limited know how on the business. This also implied that relatively younger traders tend to face market barriers than the relatively older and experienced traders. On the other hand, this shows that as a trader gets older and more experienced, the probability that he/she will face market barriers is pretty low. This is also true for new traders who want to enter in to the business; hence, lack of experience in sheep trading is apparently an important entry barrier. This shows differences in capacity because of relative differences in age. Thus, it is crucial to build the capacity of traders' regardless of the age.

Access to market information is also another factor, which has a negative influence on the probability of facing market barriers than the base reference. It implies that the probability of participation with market barriers decreases as traders have market information compared with traders who do not have information access (information on price, demand and supply). The odds ratio of 0.48 for the access to the market information reveals that other things kept constant, the odds ratio in favor of participation with market barrier decreases by a factor of 0.48. The effect of access to market information is not only for traders who are already in the market but it is also entry barrier for potential traders who want to enter in to the market. The implication is that obtaining and verifying information helps traders to operate sheep trading without market barriers and helps new traders to enter in to the market.

With regard to the main problems in sheep trading business in the study area, 42.7% of the sampled traders reported that transportation was their main problem in the business. About 22.1% of the interviewed traders have replied that their main problem in sheep trading activity was shortage of working capital and the remaining 19.3% of the traders complained about the risk associated with theft and lose of sheep. About 11.2 % of the sampled traders complained about loss of weigh during trekking and the remaining 4.7% respond unstable market demand as a main problem.

Legal and policy constraints

As a rule, a trader who has a license in one business is not allowed to perform any other business other than the business for which he is licensed. According to the Ethiopian chamber

of commerce, sheep trading in the municipality, like any other business, needs trade license, and traders involved in this business need to be licensed. In practice, however, this is not the case, except two full time traders all the other traders had no license, even those traders who live in Addis and transport sheep to Addis Ababa *Sholla* market. Therefore, it seems that sheep trade license was not a barrier to enter into sheep trading business in the study market. It is apparent that the enforcement of the law is weak.

4.2.3. Degree of market transparency

The degree of market transparency refers to the timeliness and reliability of market information that the traders have for their marketing decision. The existence of a large number of buyers and sellers does not guarantee competition and efficiency of the market unless the traders and producers have a proper knowledge about the functioning of the market. In a transparent market, participants have adequate information on regarding their source of supply and buying prices of their competitors that is used for better decisions.

There is system of dissemination of market information. However, it is not transparent among sheep traders in sample markets and farmers. About 71% of the traders stated willingness to pay for information if there were well-organized and transparent information centers. In the sample markets, all traders had information through different sources anyhow. Sheep traders rely on contact with other traders to obtain market information regarding price in Addis Ababa.

Moreover, information on price in the nearby market is unevenly distributed among all sample traders indicating that they have asymmetric access to information. Survey results indicated that 36% of the sample traders got price information through the combination of telephone, personal observation and other traders and brokers. About 47% and 17% of the traders knew price by personal observation and from other traders, respectively.

4.3. Market Conduct

Producers normally bring their sheep to markets that are 5 to 20 km away from their villages by trekking. Sheep sales by producers in markets beyond 20 km are infrequent. Regarding their motives for selling, about 42% of producers are forced to sell their animals in order to meet their urgent cash need, 31% of them reported that they sell their animal for consumption purpose, 16% for commercial purpose, and the rest for replacement.

All traders indicated that the price at which they bought sheep at the primary and secondary markets is determined by deducting miscellaneous costs and a net profit margin from the prevailing sale price in the terminal market at Addis Ababa. This shows that the primary and secondary market prices are largely determined in relation to the prices in Addis Ababa. However, the margin between the primary, secondary and Addis Ababa market prices fluctuate if the trader, who has already purchased animals in primary and secondary markets, cannot secure quick trekking. Thus, the problem in securing timely transportation introduces substantial risk in the operations of sheep marketing.

The survey indicates how prices fluctuate rapidly between the time traders inquire about the sale price in Addis Ababa and the time they transport and sell their animals in the terminal markets. Consequently, the sales in Addis Ababa market incorporate an added 'risk premium' into their marketing margins, which may account for why margins appear higher than costs in some cases.

4.4. Marketing Cost and Margins

4.4.1. Marketing cost and profit

Analysis of marketing costs and margins aims at determining if there are excess profits and serious inefficiencies. When there are different participants in the marketing chain, the margins are calculated by finding the price variations at different segments and then compare these with the final price to the consumer.

In the study of marketing channels, two sheep marketing routes are considered. These routes are *Mehal meda* to Addis Ababa (*Sholla*) terminal and *Mollale* to Addis Ababa (*Sholla*) terminal market. Price per sheep was used for the calculation.

The different types of marketing cost related to the transaction of sheep trader are presented in Appendix 4 and 5. Table 10 indicates the summary of average marketing cost and profit of primary producer traders, secondary producer traders, part-time traders and fulltime traders in different marketing channels.

The structure of marketing cost reveals that all, but part-time traders from *Mollale* market, incur high costs than traders from *Mehal meda* market. This is due to the location of *Mollale* market. Among sheep traders, fulltime traders have the highest marketing costs in all channels where as part-time trades have the lowest marketing cost because they buy and sell sheep at the same market place.

Marketing profit of traders in Table 10 shows that primary producer traders and part-time traders in *Mollale* market receive higher profit than *Mehal meda* market. Profit of secondary producer traders and fulltime traders is highest in channel III and IV. In both channels, the high profit is related to the bypassing of primary producer traders and part-time traders.

Table 10. Average price and marketing costs of sheep supplied to Addis Ababa (*Sholla*) terminal market

Agents	Average Price	Channels from *Mehal meda* market to Addis Ababa (*Sholla*) market								Channels from *Mollale* market to Addis Ababa (*Sholla*) market							
		I	II	III	IV	V	VI	VII	VIII	I	II	III	IV	V	VI	VII	VIII
Primary Producer trader	Buying price	207.8	207.8					207.8	207.8	197.8	197.8					197.8	197.8
	Marketing cost	15.5	15.5					15.5	15.5	25.4	25.4					25.4	25.4
	Selling price	264.8	264.8					264.8	264.8	259.8	259.8					257.8	257.5
	Marketing profit	41.5	41.5					41.5	41.5	36.6	36.6					34.6	34.4
Part time trader	Buying price					261.5	261.5	264.8	264.8					248.8	248.8	259.8	259.8
	Marketing cost					8.5	8.5	8.5	8.5					7.5	7.5	7.5	7.5
	Selling price					288.7	288.7	288.7	288.7					264.5	264.5	271.0	271.0
	Marketing profit					18.7	18.7	15.4	15.4					8.2	8.2	3.7	3.7
Secondary Producer trader	Buying price	264.8		261.5		288.7		288.7		259.8		248.8		264.5		271.0	
	Marketing cost	89.8		89.4		92.9		92.9		102.0		103.2		101.1		101.1	
	Selling price	510.0		510.0		510.0		510.0		510.0		510.0		510.0		510.0	
	Marketing profit	155.5		159.1		128.5		128.5		148.3		158.1		144.4		137.9	
Itinerant Traders	Buying price		264.8		261.5		288.7		288.7		259.8		248.8		264.5		271.0
	Marketing cost		113.2		113.2		118.0		118.0		122.7		123.0		124.3		124.3
	Selling price		635.0		635.0		635.0		635.0		635.0		635.0		635.0		635.0
	Marketing profit		257.1		260.3		228.4		228.4		252.5		263.3		246.2		239.7

4.4.2. Marketing margins

The results of marketing margin analysis showed that for Addis Ababa (*Sholla*) terminal market, the highest total gross marketing margin is for sheep supplied from *Mollale* market (68.9%) followed by *Mehal meda* market (67.3%) in channel II. Full time traders get high gross marketing margin in channel IV worth of 59.1% (*Mollale*) and 58.9% (*Mehal meda*) of consumer's price (Table 4.7).

Regarding producers' portion, which is the portion of the price paid by the end consumer that goes to the producers, the highest percentage was found in channel VII for *Mehal meda* market (51.9%) and *Mollale* market (50.9%), followed by channel III and V with gross margins of 41.2% and 48.8% for both markets, respectively (Table 11).

Table 11. Marketing margins for sheep supplied to Addis Ababa *Sholla* terminal market

Marketing Margin	Channels from *Mehal meda* Market to to Addis Ababa (*Sholla*) market								Channels from *Mollale* Market to to Addis Ababa (*Sholla*) market							
	I	II	III	IV	V	VI	VII	VIII	I	II	III	IV	V	VI	VII	VIII
TGMM	59.3	67.3	48.7	58.8	48.7	58.8	48.1	58.3	61.2	68.9	51.2	60.8	51.2	60.8	49.1	59.1
GMM $_{PFT}$	11.2	11.2					11.2	11.2	12.2	12.2					12.2	12.2
GMM$_{CT}$					5.3	4.3	4.7	3.8					3.1	2.5	2.2	1.8
GMM $_{SFT}$	48.1		48.7		43.4		43.4		49.1		51.2		48.1		46.9	
GMM $_{IT}$		58.3		58.8		54.5		54.5		59.1		60.8		58.3		57.3
GMM $_P$	40.7	32.7	51.3	41.2	51.3	41.2	51.9	41.7	38.7	29.5	48.8	39.2	48.8	39.2	50.9	40.9

Source: own computation, 2009

4.4.3. Determinants of gross margin

Gross margin analysis is one way to assess marketing efficiency. Timmer *et al.,* (1983) stated that large gross margin may co-exist with inefficient use of resource; labor, capital and management productivity, and poor coordination and consumer satisfaction and disproportionate profit elements. They also noted that higher margins can also result from increased services like better coordination, and may leave producers and consumers better-off. According to them, low margins can also be caused by low productivity. Therefore, in using market margin analyses to

assess the marketing efficiency, it is preferable to analyze factors that determine the gross margin.

Variables that can determine gross margin can be observable and unobservable. Only the observable variables: asset variables (human, financial and social capital), variables representing trading practices and other general variables were used for this analysis. Natural logarithm of gross margin was applied as the dependent variable to have direct estimates of elasticity (Jabbar *et al.*, 2006).

Table 12 Variables included in analysis and reference level.

Variables	Levels	Reference level
Education	Illiterate	Illiterate
	Read and write	
	Elementary	
	Secondary	
Experience in sheep trading	< five years	< five years
	Five to ten years	
	Ten to fifty years	
	> fifty years	
Occupation other than sheep trading	Yes	No
	No	
Trading system	Alone (private)	Partner ship
	Partner ship	
Use of brokers to sale sheep	Yes	No
	No	
Working capital	< five thousand	< five thousand
	Five to ten thousand	
	> ten thousand	
Access to credit	Yes	No
	No	
Number of workers participate	Number of workers	
sale to regular	Yes	No
	No	
Number of trades/brokers known	Known traders/brokers	
Days between purchase and sale	Number of days	
Access to market information	Yes	No
	No	
Number of sheep loss	Number of sheep	

The model was tested for specification error and heteroscedasticity. Ramsey's RESET test of the hypothesis of no-omitted variables generated F (3, 106) = 1.53 value which is below the critical value of 2.11 at α = 10%, shows no-omitted variables. Both White and Breusch-Pagan tests show the presence of heteroscedasticity. We have employed Feasible Generalized Least Squares (FGLS) is employed to deal with the problem of heteroscedasticity.

Table 13. Regression result of OLS and FGLS Estimations

ln(Gross Margin)	OLS		FGLS	
	Coefficient	St.Err	Coefficient	St.Err
Constant	3.3349*	0.279	3.1922*	0.1803
Asset Variable				
ln(Variable cost)	0.0953**	0.0493	0.1192*	0.032
Read and write	0.0028	0.0077	0.0083	0.0057
Elementary	0.0044	0.0085	0.0085	0.0057
Secondary	0.0144	0.0092	0.0009	0.0074
Five to ten years	0.0041	0.008	0.0061	0.0048
Ten to fifty years	0.0123	0.0078	0.0175**	0.0047
Above fifty years	0.0280*	0.0087	0.0371*	0.006
Five to ten thousand	-0.0106***	0.0067	-0.0157***	0.0041
Above ten thousand	-0.0191**	0.0071	-0.0251*	0.0047
Occupation other than	0.0275*	0.0067	0.0277*	0.0043
Known traders/brokers	0.0029	0.0025	0.0021	0.0017
Number of workers	0.0027	0.0032	0.0026	0.0023
Access to credit	-0.0003	0.0045	-0.0014	0.0033
Access to information on price	-0.0166**	0.0059	-0.0163*	0.0037
Trading Practice				
Trading system	-0.004	0.005	-0.0034	0.0033
use of broker	0.0047	0.0046	0.0065	0.0032
Sale to regular customer	-0.0221**	0.0056	-0.0330*	0.0036
Days between purchase and sale	0.0030**	0.0013	0.0035*	0.0008
Other variable				
Loss of sheep	0.0151*	0.0011	0.0253*	0.0008
R2	62.53		65.83	
Adjusted R2	61.23		63.36	

Note: *** , ** and * significant at α=1 percent, α= 5 percent, α= 10 percent, respectively

The econometric estimations (Table 13) indicate that variable cost, experience of traders, increased period between purchase and sale transactions and loss of sheep increased unit gross margin. Livestock traders who had additional occupations(s) and use brokers to sale animals have significantly larger gross margin per sheep than those who had livestock trade as the only occupation and did not use brokers. On the other hand, unit gross margin significantly decreases as size of working capital increases. Moreover, traders who have access to price information and those who sell their sheep to regular customers have significantly lower margin than those who did not.

It is obvious that an increase in variable cost leads to an increase in selling price of sheep. Hence to maintain profit margin which in turn results to increase gross margin, variable cost is found to be important determinant of gross margin. Based on the result of FGLS keeping other variables constant, 1% increment in variable cost leads to an increase of gross margin by 11 percent.

Experience in livestock trading business was found to be an important determinant of gross margin, trader with more than fifty years experience have larger gross margin of about 4 percent over those traders with less than five years experience, the base variable. Even those traders with experience of ten to fifty years had a better gross margin that were about 2 percent higher than experience of less than five year.

An increase in gross margin rate with increase in the period between purchase and sale transactions would be normally expected, as longer temporal arbitrage involves extra costs of feeding, watering and keeping the animals and if a price gain from such arbitrage is small, marginal profit rate may decline. Thus the longer time period results the larger gross margin, as evidence from the result of FGLS, 1 day increase in transactions results in raising the gross margin by around 3%.

Loss of sheep due to theft and death (during transportation and disease) was also another important variable in determining gross margin. It is normal that traders increase their selling price premium on animals so as to compensate their loss due to various reasons, hence increase in loss of sheep leads to increased gross margin.

Traders who have alternative sources of income other than sheep trading show positive impact on gross margin. The result of FGLS estimation implies traders with alternative source of income results with higher gross margin than traders who depend on sheep trading business only. This can partly be inferred from the fact that specialization in livestock trade was expected to generate better profits due to better knowledge and skills in trade negotiations. However, small rural traders depending only on livestock trade for livelihood may need quicker turnover of transactions and be less able to cope with market uncertainties and use trading practices that will reduce transaction costs hence settle with lower profit margins and gross margin compared to traders with a diversified income sources.

The higher margin of traders who used brokers in selling operations than those who did not was revealed in the result of FGLS estimation. Normally broker-use as a trading practice would be expected to lower gross margin by reducing transaction costs by providing better information and lesser time for contract negotiation and enforcement. However, it is unclear what exact services and benefits derived from brokers in this study, thus this variable might not fully capture the true extent of variation in transaction costs saved due to broker-use. In contrast traders earn additional cost to settle brokers' payment in the form of commission, hence, traders who use broker have higher gross margin of about 0.6% than those who did not.

Working capital was found to be important determinant of gross margin. As evidence from the result, traders with greater than ten thousand birr of working capital for sheep trading had lower gross margin than those with less than five thousand working capital. Theoretically larger working capital would normally be expected to permit larger volume of business and economy of scale and specialization in livestock trade would be expected to generate better profits due to better knowledge and skills in trade negotiations. Therefore the coefficients of these variables were contrary to expectations.

Although gross margin rate decreased as the size of working capital increased, absolute volume of margin could be significantly higher for such businesses compared to smaller traders. In fact, the larger working capital may permit larger volume of business and cost economy, so such

traders may earn lower profit per animal but larger amount of total profit, hence, they may be more competitive in the market.

Lower margin per animal for those traders who made all or most transactions with regular buyers as compared to those who did not do so would be normally expected as long-term business relations based on trust, reliable information on price and supply, and assured delivery of products in a timely manner usually reduce transaction costs and minimize unit gross margin. Traders' use of regular buyers to sell animals reduces the gross margin by more than 3% (using FGLS) than those traders who did not.

Similarly traders who have access to market information (on price, demand and supply) had lower gross margin than those who did not have access to information. This is because price information minimizes transaction costs. Quick access to price information also reduces the span of time sheep are kept before selling. In a similar way, traders who sale their sheep to regular customers have significantly lower margin than those who did not.

Among other variables, education level, access to credit, trading system and number of workers involved in sheep trading had no significant effect on unit gross margin although in some cases the sign of the coefficient was as expected. For example, education level had a positive but non-significant effect in both the estimations, and number of workers involved had a positive impact in gross margin. Trading system had negative sign as privately owned business reduce gross margin than partnership, and access to credit exhibits negative sign but not significant effect on gross margin.

4.4.4. Marketing channel efficiency

Efficiency parameters are employed to determine the most efficient sheep-marketing channel. The result of the analysis shows that producers received prices of 261.5 birr/sheep (*Mehal meda*) and 248.5 birr/sheep (*Mollale*), by selling in all channels for both markets. The producers' relative share of consumers' price was the highest in channels III followed by Channel V and I

for the two markets. At the same time channel III, V and I incurred lower marketing cost from consumer's price (Table 14).

From the 'price mark-up' point of reference, channel III is most efficient involving the least ' price mark-up' of 48.1% (*Mehal meda*) and 49.5% (*Mollale*). The sum of price mark-up made by intermediaries in channel VII and VIII is comparatively much higher owing to involvement of part-time traders and itinerant traders that charge high profit margin.

The overall efficiency of different marketing channels based on composite index has been presented in Table 14. The result shows that channels III for *Mehal meda* and *Mollale* market were the most efficient channels in the overall parameters.

Table 14. Efficiency of different marketing channels of sheep sample markets

Performance indicator	Channels from *Mehal meda* market to Addis Ababa (*Sholla*) market								Channels from *Mollale* market to Addis Ababa (*Sholla*) market							
	I	II	III	IV	V	VI	VII	VIII	I	II	III	IV	V	VI	VII	VIII
Producers net price	261.5	261.5	261.5	261.5	261.5	261.5	261.5	261.5	248.8	248.8	248.8	248.8	248.8	248.8	248.8	248.8
Producer's share (%)	44.2	35.5	52.0	41.6	49.1	40.0	38.4	29.6	45.3	35.4	50.5	39.9	48.0	39.4	38.0	28.8
Ranking (R1)	**3**	**6**	**1**	**4**	**2**	**5**	**7**	**8**	**3**	**6**	**1**	**4**	**2**	**5**	**7**	**8**
Marketing cost	105.3	128.7	89.4	113.2	101.3	126.5	116.9	142.0	127.4	148.1	103.2	123.0	108.6	131.9	134.0	157.2
Share of marketing cost	2.7	3.1	2.7	3.2	2.8	3.2	2.9	3.5	2.1	2.8	2.4	3.0	2.4	2.9	2.4	3.1
Ranking (R2)	**1**	**5**	**2**	**7**	**3**	**6**	**4**	**8**	**1**	**5**	**2**	**7**	**4**	**6**	**3**	**8**
Sum of price mark up	55.9	64.1	48.1	58.4	55.3	65.3	76.9	89.2	61.3	64.9	49.5	60.1	55.0	66.1	75.4	87.9
Ranking (R3)	**2**	**5**	**1**	**3**	**3**	**6**	**7**	**8**	**3**	**5**	**1**	**3**	**2**	**6**	**7**	**8**
Total score	6.0	16.0	4.0	14.0	8.0	17.0	18.0	24.0	7.0	16.0	4.0	14.0	8.0	17.0	17.0	24.0
Composite index(Ri/Ni)																
Efficient channel	**II**	**V**	**I**	**IV**	**III**	**VI**	**VII**	**VIII**	**II**	**V**	**I**	**IV**	**III**	**VI**	**VI**	**VII**

4.5. Price Analysis

4.5.1 - General results of the model

The OLS and heteroscedasticity adjusted (MacKinnon and White, 1985; and Davidson and MacKinnon, 1993) estimation results are presented in Table 16. The adjustments made on the standard errors following MacKinnon and White (1985) and Davidson and MacKinnon (1993) resulted in standard errors often greater than that of the OLS. As expected, the White standard errors were found to be very low. The statistical significance of the estimated parameters is uniform for the adjusted MacKinnon and White and Davidson and MacKinnon standard errors variables included in analysis and reference level are shown Table 15.

Based on the Akaike and Bayesian information criteria, the FGLS shows a significant improvement over the ordinary linear regressions (Table 17). The signs and magnitudes of the parameter estimates show a slight difference across the models.

Season dummies have virtually the same significance pattern in all the models. Market locations have similar signs and significance of coefficient estimates in all specifications except that Mollale market dummy is not statistically significant in all models. Among the sheep classes, ewe and ewe lamb show a similar pattern of significance across the models, ram and ram lamb sheep dummies are not significantly important in all estimations. Moreover, attributes of sheep reveal a similar pattern of significance across the different models.

Among buyers' purpose, primary level consumption (home consumption) is significant in OLS and HC_1 to HC_3 models at 5 percent level but the level of significance changed to 10 percent in FGLS estimation and reproduction purpose have shown similar signs and significance pattern in all specifications. Secondary level consumption and fattening purpose is not significant even at the 0.1 level of statistical error in all estimations. Among seller's purpose commercial purpose is significant at 1 % in OLS and HC_1 to HC_3 models; the level improved 5 % in FGLS estimation. Replacement purpose reveals similar signs and

significance in all estimations, where as consumption purpose is not significant in all estimation to.

Table 15. Variables included in analysis and reference level

Variables	Levels	Reference level
Sample markets	*Bash* market	*Mehal meda*
	Wejed market	
	Geyi market	
	Mollale market	
	Mehal meda	
Seasons	Normal season	Holiday
	Fasting season	
	Holiday	
Sheep Type	Ewe	
	Ram	
	Castrated	
	Ewe Lamb	
	Rum Lamb	
Coat color of sheep	White color	Mixed color
	Black color	
	Red color	
	Mixed color	
	White cream	
Body condition	Very fat	Very fat
	Fat	
	Moderate	
	Thin	
	Very thin	
Coat hair	Long coat hair	Small coat hair
	Medium coat hair	
	Small coat hair	

Age of Sheep	Number of teeth	
Age square	Number of teeth	
Buyers purpose	Resale	Resale
	Fattening purpose	
	Primary consumption	
	Secondary consumption	
	Reproduction	
Sellers Purpose	Urgent cash need	Urgent cash need
	Commercial Purpose	
	Consumption Purpose	
	Replacement	

4.5.2. Determinants of prices

The econometric estimations indicate that season, market location, class of sheep, body size, age and coat hair are the most important determinants of sheep prices in the rural markets of Menz district. Sheep prices during fasting and normal season are significantly lower than the reference season, which is a holiday season when the demand for sheep increases in terminal markets. This result is consistent with the works of Andargachew and Brokken (1993).

The coefficients of the market dummies are markedly different from zero, implying price differentials for sheep relative to *Mehal meda* , the base market. For instance using FGLS the price at Bash market is lower than *Mehal meda* market by 7% followed by *Geyi* then *Wejed* Markets. *Mollale* market is statistically insignificant with negative sign, the negative sign implies lower price in *Mollale* market as compared to *Mehal meda* but there is no a notable price difference between *Mollale* and *Mehal meda* markets since both markets are secondary markets.

Buyers' classification of sheep based on age and sex is important determinant of price. Based on the results of the FGLS, castrated sheep have a price premium of about 11% over ewe lamb, followed by ewe; ram lamb is insignificant with negative sign. The coefficient for ram

sheep is insignificant with positive sign, which means ram sheep received positive price premium than the castrated sheep class but the reverse can happen in many other circumstances. The most consistent variable in determining the price of sheep in these rural markets is age of the sheep. The results show a strong quadratic relationship between age and price of sheep that at younger ages an increase in age increases the price of the animal with the maximum effect occurring at 3 years (using FGLS results). At older ages, the prices decrease as age increases.

Body condition of sheep has a significant overall effect on sheep price among all sample markets. The price of sheep increases with the improved body condition. In all sample markets, higher prices were obtained for sheep in good body condition than the skinny ones. As evident from the results of the FGLS estimation, very fat sheep received higher price premium of 9% than very thin sheep. This result agrees with the hypothesis specified and confirms the findings of Andagrachew and Brokken (1993), Rodriguez *et al.,* (1995) and Beneberu, (2003).

The coefficients for the coat color attribute considered by buyers are statistically significant. The econometric estimations show that red, white and cream-white colors have positive price premium over mixed color. For instance using FGLS white-colored sheep have a price premium of 14% over mixed color. However black coat color exhibits the lowest value among the colors included in the model.

Coat hair of a sheep is also one of the attributes considered by buyers during purchasing. All estimations consistently reveal that those sheep with long coarse hair coat have lower price value compared with base variable short coat hair. The main reason is that buyers perceive the long coat hair will create difficulties when selecting sheep since the coat hair overvalue the weight and body condition of sheep.

Table 16. Regression result of OLS and heteroscedasticity consistent standard error estimation

Ln(price)	Coefficient	OLS SE	HC$_1$SE	HC$_2$SE	HC$_3$SE
Constant	4.6632	0.0501	0.0542	0.0547	0.0578
Bash market	-0.0692 ***	0.0209	0.0204	0.0205	0.0215
Wejed market	-0.0504*	0.0204	0.0199	0.02	0.021
Geyi market	-0.0468*	0.0203	0.0202	0.0204	0.0205
Mollale market	-0.028	0.0209	0.0207	0.0207	0.0217
Fasting season	-0.0851***	0.0154	0.0167	0.0167	0.0176
Normal season	-0.0694**	0.046	0.0466	0.0467	0.0476
Ewe	-0.0793*	0.0545	0.0575	0.0578	0.0594
Ram	0.0144	0.0279	0.0278	0.0279	0.0293
Ewe Lamb	-0.1148***	0.0445	0.0472	0.0477	0.0495
Ram Lamb	-0.0405	0.0283	0.0326	0.0329	0.0348
White color	0.1384***	0.0211	0.0215	0.0216	0.0227
Black color	-0.1950***	0.0271	0.0279	0.0281	0.0297
Red color	0.0623*	0.0408	0.0483	0.0483	0.0492
White cream	0.0433	0.0312	0.0389	0.0389	0.0399
Fat	-0.0468	0.0639	0.1102	0.1164	0.1289
Moderate	-0.0818	0.0617	0.1024	0.108	0.1195
Thin	-0.0777**	0.0235	0.0258	0.0261	0.0277
Very thin	-0.0971***	0.0215	0.024	0.0242	0.0255
Long coat hair	-0.0732**	0.0687	0.0623	0.0624	0.0637
Medium coat hair	-0.032	0.0176	0.0177	0.0178	0.0187
Age	0.2133***	0.0397	0.042	0.0425	0.045
Age square	-0.0315***	0.0062	0.0063	0.0064	0.0067
Fattening purpose	-0.0226	0.0289	0.0292	0.0295	0.0312
Primary consumption	0.0637**	0.047	0.0405	0.0408	0.0426
Secondary consumption	0.053	0.0471	0.0448	0.0448	0.0461
Reproduction	-0.1022**	0.0358	0.0363	0.0365	0.038
Commercial Purpose	0.0855*	0.0606	0.063	0.0631	0.0633
Consumption Purpose	0.041	0.0322	0.0369	0.037	0.0343
Replacement	-0.0773**	0.0433	0.0475	0.0477	0.0491
R^2	76.07				
Adjusted R^2	74.75				

Note: *** , ** and * significant at α=1 %, α= 5%, α= 10%, respectively, using HC$_3$ standard errors.

Table 17. Regression result of OLS and Feasible Generalized Least Square Estimation

Ln(price)	OLS		FGLS	
	Coefficient	**St.Err**	**Coefficient**	**St.Err**
Constant	4.6632	0.0501	4.7021	0.052
Bash market	-0.0692 ***	0.0209	-0.0738***	0.021
Wejed market	-0.0504*	0.0204	-0.0448*	0.0214
Geyi market	-0.0468*	0.0203	-0.0574**	0.0204
Mollale market	-0.028	0.0209	-0.0331	0.0214
Fasting season	-0.0851***	0.0154	-0.1000***	0.0161
Normal season	-0.0694**	0.046	-0.0659**	0.0461
Ewe	-0.0793*	0.0545	-0.0700*	0.055
Ram	0.0144	0.0279	0.0232	0.0278
Ewe Lamb	-0.1148***	0.0445	-0.1071***	0.0452
Ram Lamb	-0.0405	0.0283	-0.0668	0.0271
White color	0.1384***	0.0211	0.1439***	0.0235
Black color	-0.1950***	0.0271	-0.1878***	0.0244
Red color	0.0623*	0.0408	0.0647**	0.0431
White cream	0.0433	0.0312	0.0488*	0.0328
Fat	-0.0468	0.0639	-0.0272	0.0551
Moderate	-0.0818	0.0617	-0.0984	0.0516
Thin	-0.0777**	0.0235	-0.0534**	0.0218
Very thin	-0.0971***	0.0215	-0.1182***	0.0218
Long coat hair	-0.0732*	0.0687	-0.0834**	0.0685
Medium coat hair	-0.032	0.0176	-0.0264	0.0188
Age	0.2133***	0.0397	0.1767***	0.0404
Age square	-0.0315***	0.0062	-0.0257***	0.006
Fattening purpose	-0.0226	0.0289	-0.0315	0.0286
Primary consumption	0.0637*	0.047	0.0714**	0.0413
Secondary consumption	0.053	0.0471	0.0495	0.0333
Reproduction	-0.1022***	0.0358	-0.0977***	0.0345
Commercial Purpose	0.0855*	0.0606	0.0871**	0.0633
Consumption Purpose	0.04	0.0322	0.0485	0.0336
Replacement	-0.0773***	0.0433	-0.0811***	0.0413
R^2	75.16		76.07	
Adjusted R^2	73.78		74.75	

Note: ***, ** and * significant at α=1 %, α= 5%, α= 10%, respectively

The purposes for which sheep were purchased are taken as proxy variable for buyers bargaining power. Primary level consumption (home consumers) and reproduction purpose are statistically significant. The results show that consumers paid higher price up to 7% (using FGLS result) over those who bought for resale purpose, while farmers purchased for reproduction purpose have relatively strong bargaining power with downward price premium of about 9% as compared to those who bought for resale purpose.

The coefficient of seller's purpose is also an important variable to sellers' bargaining power. Among the sheep sellers those who sold their animals for replacement purpose received lower price as compared to those who sold for urgent cash need. Whereas farmers, who sold sheep for commercial purpose, have the advantage of higher price premium over urgent cash need. The result of FGLS depicts producers receive higher price up to 8% when they sell their animal for commercial purpose , where as producers have lower price premium of 7% when they sell for reproduction purpose compared to urgent cash need.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

The specific objectives of the study have been to assess the marketing efficiency of indigenous sheep marketing and to identify factors that determine the price of indigenous sheep. To achieve these objectives, primary and secondary data were collected. Data from primary sources were collected through market and traders' surveys. For market survey, five markets (*Mollale, Mehalmeda, Bash, Geyi* and *Wejed*) were selected and covered as well as one terminal market from Addis Ababa (*Sholla* market).

Market survey was conducted in three seasons (Holiday, normal and fasting) and 338 samples of transactions level data were collected from the sample markets. Traders' survey was carried out during two different periods one during high transaction (festival period) and another during normal period. All traders in the market were included in the survey and sample of 186 traders were surveyed.

The sheep marketing system was evaluated using structure, conduct and performance approach. Concentration ratio was computed to assess the concentration of the market. In addition, binary logit model was used to identify market barriers. Marketing costs and gross margin were computed to access the marketing efficiency; and multiple-linear regression model was fitted to identify factors that determine gross margin. Moreover composite index was used to judge efficiency of different sheep marketing channels.

To examine the determinants of sheep prices the study employed a hedonic model. Heteroscedasticity consistent error regression model and feasible generalized least squares were employed to account for Heteroscedasticity errors. Based on Akaike, Bayesian and log-likelihood criteria of model selection, the feasible generalized least square is best suited in examining price functions in such sample markets.

Survey result shows that there is lack of marketing facilities and services, except secondary markets are fenced for the purpose of tax and fee collection by the respective administration

of the area. The value of concentration ratio indicated that traders operate in an inefficient market, controlled by some full time and secondary producer traders in the secondary markets. Working capital, access to information, education and experience in trading business are found to be significant explanatory variables, which have effect on the existence of market barriers. Transport, for animals, shortage of working capital, risk associated with theft and loss of sheep weight loss before reselling and unstable demand were perceived by traders as major problems of marketing.

The result of gross margin showed that full time traders and secondary farmer traders get high gross marketing margin, the higher gross margin indicates inefficiency in the marketing system. In addition, the result of multiple regression showed that variable cost, experience of traders, increased period between purchase and sale transactions and loss of sheep increased unit gross margin and sheep traders who had additional occupations earned and use brokers to sale animals significantly larger gross margin per sheep than those who had livestock trade as the only occupation and did not use brokers. On the other hand, unit gross margin significantly decreased as size of working capital increased besides trader who have access to price information and sale their animal to regular customer earned significantly lower margin than those who did not.

The empirical estimations of hedonic price model consistently showed that market place, seasonal differences and animal characteristics that include sex based classification of sheep, body size, coat hair, coat color and age were very important factors influencing the market prices sheep sellers receive. Proxy variables for buyers and sellers bargaining power - buyers' purpose, and sellers' purpose - were found to be important variables in determining price. The significance of the attributes of animals in influencing prices reveals the importance of the preferences for traits in the decision-making process related to buying and selling of sheep.

5.2. Recommendations

This study is part of a larger study that aims to improve the livelihoods of poor livestock keepers who depend highly on indigenous small stocks. The proposed improvement is achieved through a community-based management of indigenous breeds. Based on the findings of this study, the following policy measures are recommended.

The findings of hedonic price analysis suggested that sheep breeding strategies and activities should duly consider the preferences expressed through the prices paid for animals, these could enhance the efficiency of sheep pricing system and consequently improve the livelihoods of sheep keepers and handlers. It is vital to train producers on the importance of market oriented (commercial) livestock production system.

Besides, to create ways for competitive conditions in the local markets, producers should be organized into cooperatives with all round support to strengthen their bargaining power. Considering the potential of sheep resource in the study area, it is suggested that the government can organize youth in sheep trading business in the form of small-scale industry.

The result of the study revealed that market information system seems to be one of the crucial problems, it is essential for the efficient functioning of the marketing system to provide comprehensive, accurate and timely information to market participants. The current livestock market price information system, which has been developed by Livestock Marketing Authority, is a good beginning in improving livestock marketing information system in the country. However, the activity is restricted to specific marketplaces; the service should be extended to benefit all concerned parties through appropriate mechanisms.

The availability of market information would help producers, consumers and traders to plan production operations and make marketing decisions. Provision of information to sheep keepers help them make appropriate decisions as to when and where to sell their animals would also be an advantage for them in realizing higher prices for their animals. Traders' awareness about market demand for quality of product and related price will increase their

ability to transmit information to producers to improve production, both in terms of quantity and quality, thereby benefiting consumers. These shows that the need for government investment in market information.

One of the most physical drawbacks for sheep marketing system in the areas is related to transportation. Road infrastructure in the study areas is generally in a poor condition. Poor transport and communication systems, especially in rural areas, mean that it takes a long time to get animals to markets, and their quality suffers in the process. Thus, insuring security and upgrading marketing infrastructures will reduce the loss of sheep (in the form of theft and death during transportation) and enhance the marketability of sheep traded in the markets. This will potentially increase the welfare of smallholder producers and urban consumers. At the same time, it will improve traders' income and will allow them to offer better prices to producers as well as consumers.

As a rule, a trader who has no license is not allowed to undertake any business, like any other business, sheep trading needs trade license, and traders involved in this business need to be licensed. In practice, however, this is not the case for sheep trading business in the study area, which indicates weak legal system in sheep trading business. Hence, it is suggested that the respective body of the government needs to work along the enforcement of the law.

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7. APPENDIX

Appendix Table 1. Total number of sheep offered and sold at *Mehal meda* market

Type of sheep	Sheep offered				Sheep sold			
	Total	Mean	S.D	%	Total	Mean	S.D	%
Ewe	652	326	149.91	23.45	623	311.5	161.93	23.80
Rum	535	267.5	98.29	19.24	503	251.5	98.29	19.22
Castrated	635	317.5	184.55	22.84	599	299.5	188.8	22.89
Ewe lamb	493	246.5	70.00	17.73	461	230.5	81.32	17.61
Rum lamb	465	232.5	113.84	16.73	431	215.5	103.94	16.47
Total	2780	1390	616.60	100.00	2617	1308.5	634.27	100
Average	981.6	490.8	123.32		922.2	461.1	126.86	

Appendix Table 2. Total number of sheep offered and sold at *Mollale* market

Type of sheep	Sheep offered				Sheep sold			
	Total	Mean	S.D	%	Total	Mean	S.D	%
Ewe	539	269.5	86.97	24.09	524	262	125.86	25.80
Rum	442	221	166.88	19.76	429	214.5	180.31	21.12
Castrated	597	298.5	123.74	26.69	545	272.5	133.64	26.83
Ewe lamb	343	171.5	31.82	15.33	285	142.5	20.51	14.03
Rum lamb	316	158	86.27	14.13	248	124	91.92	12.21
Total	2237	1118.5	495.68	100.00	2031	1015.5	552.25	100
Average	787	393.5	99.14		707.6	353.8	110.45	

Appendix Table 3. Traders market share by average number of sheep purchased on sample marketing days

Firms	Mehal meda market			Mollale market		
	Average purchased	Market share	% share	Average purchased	Market share	% share
1	243	0.09	9.29	183	0.09	9.01
2	227	0.09	8.67	175	0.09	8.62
3	221	0.08	8.44	168	0.08	8.27
4	200	0.08	7.64	145	0.07	7.14
Sum	891			671		
Four largest share			34.05	Four largest share		33.04

Appendix Table 4. Price Spread in marketing channels of sheep from *Mehal meda* market

No	Producers and traders level	Marketing Channels of Sheep					
		I	II	III	IV	V	VI
I	Producers level						
1	Producers price at *Mehal meda*						
1.1	Sales price	261.50	261.50			261.50	261.50
	Geyi- Mehal meda						
II	Primary farmer trader						
1	Purchase price			217.75	217.75		
2	Cost incurred						
2.1	Transportation cost/trekking			1.21	1.21		
2.2	Feeding and watering			0.53	0.53		
2.3	Labor cost			0.79	0.79		
2.4	Market fee			0.50	0.50		
2.5	Personal expenses			1.32	1.32		
2.5.1	Transport cost			1.47	1.47		
2.5.2	Miscellaneous /traders personal expenditure			1.16	1.16		
2.6	Opportunity cost						
2.6.1	Own/families labor cost			3.16	3.16		
2.6.2	Loss of sheep			2.50	2.50		
2.6.3	Interest on capital			2.88	2.88		
	total cost			233.26	233.26		
3	Sales price			264.75	264.75		
4	Primary farmer traders profit			31.49	31.49		
	Wejed - Mehal meda						
II	Primary farmer trader						
1	Purchase price			197.75	197.75		
2	Cost incurred						
2.1	Transportation cost/trekking			1.50	1.50		
2.2	Feeding and watering			0.75	0.75		
2.3	Labor cost			0.94	0.94		
2.4	Market fee			0.50	0.50		
2.5	Personal expenses			2.06	2.06		
2.5.1	Transport cost			2.75	2.75		

No.	Item			
2.5.2	Miscellaneous /traders personal expenditure		1.75	1.75
2.6	Opportunity cost			
2.6.1	Own/families labor cost		5.63	5.63
2.6.2	Loss of sheep		4.15	3.56
2.6.3	Interest on capital		9.80	9.77
	Total cost		227.58	226.96
3	Sales price		273.75	273.75
4	Primary farmer traders profit		46.17	46.79
	Mehal meda to Addis Ababa(*Sholla*)			
III	Secondary farmer trader			
1	Purchase price	261.50	264.75	288.65
2	Cost incurred			
2.1	Transportation cost			
2.1.1	Trekking	5.74	5.74	5.74
2.1.2	Trucking			
2.2	Feeding and watering	6.49	6.49	6.49
2.3	Labor cost	1.23	1.23	1.23
2.4	Market service charge and fees			
2.4.1	Tax in the form of fee	0.50	0.50	0.50
2.4.2	Transit fee	0.85	0.85	0.85
2.4.3	Market service charge	2.66	2.66	2.66
2.5	Shed rent			
2.5.1	Shed rent in secondary market	0.53	0.53	0.53
2.5.2	Shed rent before terminal market	1.11	1.11	1.11
2.5.3	Shed rent in Addis Ababa	2.66	2.66	2.66
2.6	Payment for brokers	10.00	10.00	10.00
2.7	Personal expenditure			
2.7.1	Transport cost	2.30	2.30	2.30
2.7.2	Personal expenses	5.19	5.19	5.19
2.7.3	Miscellaneous expenditure	1.91	1.91	1.91
2.8	Opportunity cost			
2.8.2	Own/families labor cost	8.04	8.04	8.04
2.8.3	Loss of sheep	25.03	25.29	27.22
2.8.1	Interest on capital	15.11	15.27	16.43

No.	Item				
	Total cost	350.86	354.53	381.52	
3	Sales price	535.00	535.00	535.00	
4	Secondary farmer traders profit	184.14	180.47	153.48	
III	Collectors at secondary market				
1	Purchase price			261.50	261.50
2	Cost incurred				
2.1	Labor cost			1.15	1.15
2.2	Barn rent			1.15	1.15
2.3	Opportunity cost				
2.3.2	Own/families labor cost			1.38	1.38
2.3.3	Loss of sheep			1.47	1.47
2.3.1	Interest on capital			3.32	3.32
	Total cost			269.98	269.98
3	Sales price			288.65	288.65
4	Collectors profit			18.67	18.67
IV	Itinerant Traders				
1	Purchase price	261.50	264.75		288.65
2	Cost incurred				
2.1	Transportation cost				
2.1.1	Trekking	4.29	4.29		4.29
2.1.2	Trucking	7.45	7.45		7.45
2.2	Feeding and watering	6.38	6.38		6.38
2.3	Labor cost	0.81	0.81		0.81
2.4	Market service charge and fees				
2.4.1	Tax in the form of fee	0.50	0.50		0.50
2.4.2	Transit fee	0.95	0.95		0.95
2.4.3	Market service charge	1.33	1.33		1.33
2.5	Shed rent				
2.5.1	Shed rent in secondary market	0.37	0.37		0.37
2.5.2	Shed rent before terminal market	1.11	1.11		1.11
2.5.3	Shed rent in Addis Ababa	3.50	3.00		3.00
2.6	Payment for brokers	15.00	15.00		15.00
2.7	Personal expenditure				
2.7.1	Transport cost	1.15	1.15		1.15
2.7.2	Personal expenses	2.60	2.60		2.60

2.7.3	Miscellaneous expenditure	1.60	1.60	1.60
2.8	Opportunity cost			
2.8.2	Own/families labor cost	4.02	4.02	4.02
2.8.3	Loss of sheep	46.01	46.42	49.94
2.8.1	Interest on capital	16.14	16.28	17.51
3	Total cost	374.70	377.99	406.65
4	Sales price	707.50	707.50	707.50
	Itinerant traders profit	332.80	329.51	300.85

Appendix Table 5. Price Spread in marketing channels of sheep from *Mollale* market

No	Producers and traders level	Marketing Channels of Sheep					
		I	II	III	IV	V	VI
I	Producers level						
1	Producers price at *Mehal meda*						
1.1	Sales price	248.75	248.75			248.75	248.75
	Bash - Mollale						
II	Primary farmer trader						
1	Purchase price			197.75	197.75		
2	Cost incurred						
2.1	Transportation cost/trekking			1.04	1.04		
2.2	Feeding and watering			1.09	1.09		
2.3	Labor cost			0.65	0.65		
2.4	Market fee			0.50	0.50		
2.5	Personal expenses			1.74	1.74		
2.5.1	Transport cost			1.30	1.30		
2.5.2	Miscellaneous /traders personal expenditure			0.65	0.43		
2.6	Opportunity cost						
2.6.1	Own/families labor cost			7.04	4.70		
2.6.2	Loss of sheep			1.76	1.74		
2.6.1	Interest on capital			9.61	9.49		
	Total cost			223.15	220.44		
3	Sales price			257.75	257.75		
4	Primary farmer traders profit			34.60	37.31		
	Mollale to Addis						

	Ababa(*Sholla*)				
III	Secondary farmer trader				
1	Purchase price	248.75	257.75	266.50	
2	Cost incurred				
2.1	Transportation cost				
2.1.1	Trekking	6.71	6.71	6.71	
2.1.2	Trucking				
2.2	Feeding and watering	8.02	8.02	8.02	
2.3	Labor cost	1.32	1.32	1.32	
2.4	Market service charge and fees				
2.4.1	Tax in the form of fee	0.50	0.50	0.50	
2.4.2	Transit fee	1.58	1.58	1.58	
2.4.3	Market service charge	3.95	3.95	3.95	
2.5	Shed rent				
2.5.1	Shed rent in secondary market	0.66	0.66	0.66	
2.5.2	Shed rent before terminal market	1.58	1.58	1.58	
2.5.3	Shed rent in Addis Ababa	2.68	2.68	2.68	
2.6	Payment for brokers	10.00	10.00	10.00	
2.7	Personal expenditure				
2.7.1	Transport cost	3.05	3.05	2.84	
2.7.2	Personal expenses	5.21	5.21	5.21	
2.7.3	Miscellaneous expenditure	3.63	3.63	2.37	
2.8	Opportunity cost				
2.8.2	Own/families labor cost	11.37	11.37	9.95	
2.8.3	Loss of sheep	26.61	27.38	27.89	
2.8.1	Interest on capital	15.10	15.54	15.83	
	total cost	350.72	360.93	367.58	
3	Sales price	535.00	535.00	535.00	
4	Secondary farmer traders profit	184.28	174.07	167.42	
III	Collectors at secondary market				
1	Purchase price			248.75	248.75
2	Cost incurred				
2.1	Labor cost			1.15	1.15
2.2	Barn rent			1.15	1.15
2.3	Opportunity cost				

2.3.2	Own/families labor cost			1.38	1.38
2.3.3	Loss of sheep			0.70	0.70
2.3.1	Interest on capital			3.15	3.15
	Total cost			256.29	256.29
3	Sales price			264.50	264.50
4	Collectors profit			8.21	8.21
IV	Itinerant Traders				
1	Purchase price	248.75	257.75		264.50
2	Cost incurred				
2.1	Transportation cost				
2.1.1	Trekking	5.74	5.74		5.74
2.1.2	Trucking	10.81	10.81		10.81
2.2	Feeding and watering	8.11	8.11		8.11
2.3	Labor cost	1.03	1.03		1.03
2.4	Market service charge and fees				
2.4.1	Tax in the form of fee	0.50	0.50		0.50
2.4.2	Transit fee	1.21	1.21		1.21
2.4.3	Market service charge	1.69	1.69		1.69
2.5	Shed rent				
2.5.1	Shed rent in secondary market	0.47	0.47		0.47
2.5.2	Shed rent before terminal market	0.81	0.81		0.81
2.5.3	Shed rent in Addis Ababa	3.00	3.00		3.00
2.6	Payment for brokers	15.00	15.00		15.00
2.7	Personal expenditure				
2.7.1	Transport cost	1.62	1.62		1.62
2.7.2	Personal expenses	3.30	3.30		3.30
2.7.3	Miscellaneous expenditure	2.70	2.70		2.70
2.8	Opportunity cost				
2.8.2	Own/families labor cost	5.11	5.11		5.11
2.8.3	Loss of sheep	45.62	46.94		47.94
2.8.1	Interest on capital	16.00	16.46		16.81
3	Total cost	371.47	382.26		390.35
4	Sales price	707.50	707.50		707.50
	Itinerant traders profit	336.03	325.24		317.15

Appendix Table 6. Sheep trader's questionnaire

SECTION ONE

Area Information and type of the trader

		Name	Code
1	Name of Market		
1.1	Region		
1.2	Woreda		
1.3	Zone		
2	Type of trader		1=Wholesaler, 2=Retailer 3= Farmer trade 4=collector 5=Broker

Socio Demographics characteristics

			Code
1	Name of trader		
2	Age of trader		*Years
3	Sex of trader		1= Male, 2= Female
4	Religion		1= Orthodox, 2= Muslim , 3= Other, specify
5	Marital status		1= Single, 2= Married, 3= Divorced, 4=Widowed
6	Total family size		*Number of people
7	Education level		1= Illiterate, 2= Read and write, 3= Elementary 4= Secondary school, 5=above secondary
8	Residence of trader		
	Region		
	Woreda		
	Zone		

SECTION TWO

Characteristics of the business and financial capital

SN			Code
1	How do you undertake sheep trading?		1=Alone, 2=Partnership, 3=Family
1.2	If partners, number of partners		*Number of people
1.3	If family, number of family members involved		*Number of people
2	How long have you been in sheep trading?		*Number of years

3	Do you participate in sheep trading year round?		1= yes, 2= no
3.1	If no, at what period of the year do you participate?		1= holidays , 2= specify if other
3.3	Other than sheep trading do your have another occupation?		1= yes, 2= no
3.2	If yes, what is your occupation?		1=farming, 2= student, 3=daily laborer, 4=restaurant owner,5= butcher owner, 6= Others (specify)

4. Is there a minimum capital requirement to enter into sheep trading?
   1. Yes   2. No
5. If yes, what is the minimum capital requirement? _____Birr
6. What was the amount of initial working capital when you start this business?
7. What is the amount of your working capital now? _____Birr
8. What was the source of your working capital?
   1. Own saving   2. Loan   3. Gift   4. Share
   5. Other (specify)_____
9. If it was loan, from whom did you borrow it?
   1. Relative/ family   2. Other traders   3. Private money lenders
   4 micro finance institution   5. NGO   6. Bank
   7. Other, (specify) _____
10. How much was the rate of interest?
    For formal_____Birr
    For informal_____Birr
11. How was the repayment schedule?
    1. Monthly   2 .Quarterly   3. Semi- annually   4. Annually
    4. When you get money   5. Other (specify)……………
12. Is there change in accessing finance for sheep trade or any other purpose these days?
    1. Improved   2 deteriorated   3 no change

Buying and selling practices

1. What are you doing in this market today?
   1. Buying sheep   2. Selling sheep   3. Both
If answer to question 1 is 1 skip to question 7
2. If selling, where did you buy your merchandise?
   1. Farm gate [directly from the producer]   2. [Village]Bush market
   3. Primary market   4. Secondary market
   2.1. Name of the market_____
   2.2. Please specify your reason why you prefer the market_____
3. How many sheep did you sell today [until now] without fatten sheep? _____
4. What was your total stock? (Without fatten sheep)_____
5. Indicate the buying and selling price based on the type of sheep [a question to the seller]

Type of sheep	Buying price			Selling price		
	Min	Max	Average	Min	Max	Average
Ewe						
Rum						
Castrated rum						
Ewe Lamb						
Rum Lamb						

6. What do you do if you cannot sell all the sheep you brought to the market?
   1. Take them back home to try another week   3. Sell them at lower prices
   2. Take them to other market(s) another time   4. If other means indicate

If answer to question 1 is 2 skip to question 16

7. How many sheep do you buy today?_____

8. Other than this, how many sheep do you have? (total stock without fatten sheep) _____

9. Why do not you buy more than this?
   1. Financial constraint   2. Could not handle more than this   3. High price
   4. Insufficient supply   5. Lack of market (demand)   6. I have bought enough

10. Did you buy your merchandise in bulk or on piece by piece basis?
    1. Separately   2. In bulk   3.Both

11. Who sets the price?
    1. The seller   2.Yourself   3.On agreement   4. Brokers

12. Indicate the buying and anticipated selling price based on the type of sheep [a question to the buyer trader]

Type of sheep	Buying price			Anticipated selling price		
	Min	Max	Average	Min	Max	Average
Ewe						
Rum						
Castrated rum						
Ewe Lamb						
Rum Lamb						

13. Who buys sheep for you?
    1. Yourself   2. Brokers/commission agent   3. Relatives
    4. Family members   5. Others, please specify_____

14. If not yourself, how much do you pay for others per animal? _____

15. Where do you sell the sheep you bought today?

Region	
Zone	
Woreda	
Market	
Distance from market	

16. How long does it take to reach the resale market?
    1. 1-2 days   2. 3-4 days   3. 5-6 days   4 . >6 days

17. Who are your regular customers?
1. Other traders   2. Consumers   3. Restaurant   4. Butcher
5. All   6.Others (specify)_____

Marketing Services

1. Do you pay tax for the sheep you buy?   1. Yes   2. No
2. If yes, where? (Multiple answers possible)
1. At purchasing place   2. On the way to the market   3 . In all places
4. Others (specify) _____
3. Do you pay tax for the sheep you sell?   1. Yes   2. No
4. What is the basis of the tax?
1. Age   2. Sex   3. The same payment
5. What is your opinion regarding the tax paid in this market as compared to others?
1. High   2. Low   3. Average   4. Similar   5. I do not know
6. Do you need to have license to enter sheep market as trader?
1. Yes   2. No   3.Not mandatory
7. If yes, what is the requirement, if any, to get a license? Please specify.

_____

8. How do you describe the procedure to get the license?
1. Complicated   2. Easy

Information access

How did you get information on supply, demand & price of sheep in other markets?

	Use code(source)	Source of information
Supply		1. Sheep traders 2.Radio 3.Telephone
Demand		4.Cooperatives 5.personal observation
Price		6. Broker 7.News paper 8.TV 9.other farmers 10. others____

How do you qualify your source of information?

	Reliability 1.reliable 2.unreliable	Adequacy 1.adequate 2.inadequate	Timeliness 1.ontime 2.delayed
Supply			
Demand			
Price			

In general, is the price of sheep decreased or increased for the last four years?
1. Increased   2.decreased   3.No change

If increased, what are the reasons? /put in order of importance/(0=*not important 1= important,*)

Reasons for increment	Order of importance(use the above code)
Due to low competition at the local market	
Due to shortage of production at local market	
Access to timely & accurate market information	
Due to better sheep production	
Due increase consumption of sheep meet in urban areas	
Due to increase the number of hotels and restaurants	
Due to increase price of goat, chicken and cattle	
Other reasons (specify) _____	

If your answer question no. 3 is decreased, what are the reasons? /put in order of importance//
(0= not important 1= important)

Reasons for decrement	Order of importance(use the above code)
Due to oversupply of sheep to the local market	
Due to high competition at the local market	
Due to poor quality of sheep	
Due to lack of timely and accurate market information on market price of butter	
Other reasons (specify)	

Are you willing to pay for market information for the future?   1. Yes   2.No

Transportation means and facilities

			Code
1	Mode of transportation you use		1= Trekking , 2= Trucking, 3=both
1.1	If trekking, why do you prefer trekking		1= financial constraint , 2= short travel distance, 3= I don't pay for trekking , 4=specify if other reason
2	Distance you use trekking to reach resale market		In Kms
3	Distance you use trucking to reach resale market		In Kms
4	Do you pay for trekking?		1= yes, 2= no
4.1	If not, indicate why you don't need to pay		1= use family labor , 2= use own labor , 3=specify if other reason
4.2	Base of payment for trekking		1= group, 2= individual
5	Do you pay for trucking?		1= yes, 2= no

5.1	If no, why you don't pay?		1= use own truck , 2= use families truck , 3=specify if other reason
5.2	Base of payment for trucking		1= group, 2= individual
6	How many sheep (on average) do you trek on a marketing day?		In numbers
7	How many sheep (on average) do you truck on a marketing day?		In numbers

List the problems in using trekking. (*if there are problems)

List the problems in using trucking. (*if there are problems)

Costs and related expenses

1. Do you feed the sheep you buy before resale?   1. Yes   2. No

2. Indicate the immediate costs incurred before resale. (Does not include fattening cost)

SN	Type of costs	Cost (Average)	* If the cost can not be stated use the following accordingly NA= Not Applicable, O = No Cost, MV= Missing value
1	Feed cost		
2	Supplement cost		
3	Watering		
4	Vaccination		
5	Barn or shed (rent)		
6	Herder (labor cost)		
7	Transport cost (for sheep)		
7.1	For trucking		
7.2	For trekking		
8	Transport cost (for trader)		
9	Personal expense		
10	Tax		
11	Fees for Brokers/commission agent (if they buy the sheep)		
12	Trade license fee (if any)		
13	License renewal fee (if any)		
14	Specify, if others		

3. Do you fatten sheep before selling?   1. Yes   2. No

If answer to question 3 is 2 skip to question 6

4. If yes, for how long?

    1. Three months   2. Six months.   3. One Year   4. 1-2 years

    5. >2 years   6. Others (specify)_____

5. How many sheep do you fatten annually?_____

6. Please indicate the costs (monthly average cost) *only for fattening

SN	Type of costs	Monthly Cost (Average)	* If the cost cannot be stated use the following accordingly NA= Not Applicable, O= No Cost, MV= Missing value
1	Feed cost		
2	Supplement		
3	Watering		
4	Vaccination		
5	Barn or shed (rent)		
6	Herder (labor cost)		
7	Specify, if others		

8. Did you sell fatten sheep today?   1. Yes   2. No

9. How many fatten sheep did you sell today?_____

10. Indicate the buying and selling price of fatten sheep (buying price is if the sheep for fattening was bought).

SN	Type of sheep	Buying price for fattening			Selling Price of fatten sheep		
	Fatten sheep	Min	Max	Ave	Min	Max	Ave

11. Did you lose any sheep last year?

   1. Yes   2. No

If answer to question 6 is 2 skip to question 1 in section VI

12. If yes, mention the cause of the loss.

		Number
1	Theft	
2	Disease	
3	During transporting	
4	Specify if others	

Opportunities, constraints and solutions

1. What are the opportunities in participating in sheep trading? (if any).

_____

2. What are the problems and risks related to sheep trading?

_____

3. What do you think about the solutions of each problem?

_____

Appendix Table 7. Market survey questionnaire

Area Information

SN		Name	Code
1	Name of Market		1.Mehal Meda 2.Mollale 3.Bash 4.wejed 5. Geyi
2	Region		
3	Woreda		
4	Zone		

☞ *Note for interviewer*

✍ *Politely introduce yourself and explain the objective of the survey before starting interviewing. The   respondent should be thanked for his/her time and given the appropriate customary departure.*

✍ *Please circle one of the choices the respondent selected and write his/her opinion where appropriate.*

PART ONE

SHEEP SELLERS QUESTIONNAIRE

SN			Code
1	Age		*Years
2	Sex		1= male, 2= Female
3	Education level		1= illiterate, 2= read and write, 3= elementary 4= secondary school, 5=above secondary
4	Type of seller		1=Farmer 2=Farmer trader 3= Collector 4=part time trader 5=specify if other

5. Distance to this market from home _____ hrs (Km).
   1. One hrs   2. Two hrs   3. Three hrs   4. >Three hrs

6. Means of transport to market:
   1. On foot   2. By horse/ mule   3. By car

7. Do you have access for vehicle transportation?
   1.Yes   2. No

8. If No what are the problem?
   1. No road and vehicle.   2. No vehicle but road.   3. No money
   5. close to home   5. Other (specify)_____

9. How frequent you visit this market?
   1. Weekly   2. In two weeks   3. In three weeks
   4. Once in a month.   5. Not constantly

PART TWO

CHARACTERISTICS OF SHEEP

No	Type of sheep				Breed		Origin of the sheep		Characteristics of sheep										
									Coat color					Coat color pattern			Coat hair type		
	1	2	3	4	I	C	Menz	Other(specify)	W	B	R	G	Other	P	Pa	S	Ss	Lc	Sc
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

NOTE

Type of Sheep	Breed	Coat Color	Coat color pattern	Coat hair type
1. Ewe(Mother)	I - Indigenous	W-White	P- Plain	Ss- Short and smooth
2. Rum	C- Cross breeds	B-Black	Pa- Patchy	Lc- Long and coarse
3. Castrated Rum		R-Red	S- Spotty	Sc- Short and coarse
4. Ewe lamb		G-Gray(jibema)		
5. Rum lamb		Other(specify)		

No	Characteristics of sheep																	Age (scientific)	Age (predicted)	Weight	Price
	Head profile			Horn		Horn shape		Body condition(scientific)					Body condition(predicted)								
	S	Co	Cv	A	P	R	S	Vf	F	M	T	Vt	Vf	F	M	T	Vt				
1																					
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

NOTE; Head profile   Horn   Horn shape   Body condition

S-   Straight   A- Absent   R-Rudimentary   Vf- Very fat
Co- Concave   P- Present   S- Spiral   F- Fat
Cv- Convex   M- Moderate
                           T- Thin
                           Vt- Thin

PART THREE

SHEEP BUYERS QUESTIONNAIRE

SN			Code
1	Age		*Years
2	Sex		1= male, 2= Female
3	Education level		1= illiterate, 2= read and write, 3= elementary 4= secondary school, 5=above secondary
4	Type of buyer		1=Farmer 2=Trader 3=Farmer trader 4=Collector 5=Home consumer 6=Butcher owner 7. Restaurant owner 8= specify if other

5. Distance to this market from home _____ hrs (Km).
    1. One hrs   2. Two-three hrs   3. Four-five hrs   4. >six hrs
6. Means of transport to market:
    1. On foot   2. By horse/ mule   3. By car
7. Do you have access for vehicle transportation?
    1.Yes   2. No
8. If No what are the problem?
    1. No road and vehicle.   2. No vehicle but road.   3. Shortage of money
    5. close to home   5. Other (specify)_____
9. How frequent you visit this market?
    1. Weekly   2. In two or three weeks   3. Once in a month
    4. During holiday   5. Not constantly
10. How do you establish the price of the sheep in the market?
    1. Based on the previous market day price   2. Negotiation
    3. Collecting information by seeing around on the same market day
    4. If other means (specify) _____