Mekelle University
The School of Graduate Studies

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Performance Efficiency Analysis of Livestock Marketing in Afar region, Ethiopia

By

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A Thesis Submitted in Partial Fulfillment of the Requirements for the Master of Science Degree in Cooperative Marketing

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Jun, 2008
Mekelle

ACKNOWLEDGEMENT

My special and sincere gratitude goes to my Advisor Dr. Veerakumaran G. for his earnest and constructive comments throughout the analysis and preparation of the manuscript. I would also like to acknowledge Prof. G.B. Pillai (PhD.) for his encouraging and helpful comments and suggestions. Moreover, I would like to acknowledge my teachers Dr Kefelgn, Dr. R. Dayanandhan, Dr. Ajay, Prof. S. Nakkiran (PhD.) Dr. S. Karanakaran, Dr. Kelemework for their enthusiastic support and course delivery.

I would like to thank my employer, Afar Pastoral and Rural Development Bureau, in general, and Afar Cooperative Development and Promotion Office, in particular for approving and sponsorship of my in-country scholarship in the M.Sc. study and thesis preparation. I would like to acknowledge FARM Africa – Ethiopian Pastoral Program (EPP) for the budget support during my survey. I would like to acknowledge also ACDI/VOCA and GL-CRSP Afar Program Component in providing me the necessary market information and data.

My special thanks also go to my friend Ekram Kebir for her support and encouragement. Finally, I want to express my deep gratitude to my beloved family for their wholehearted motivation and support throughout the study period.

DECLARATION

This is to certify that this thesis entitled "Performance Efficiency Analysis of Livestock Marketing in Afar Region" submitted in partial fulfillment of the requirements for the award of the degree of M.Sc., Cooperative Marketing to the School of Graduate Studies, Mekelle Univer sity, through the department of Cooperatives, done by Mr. Tesfaye Berihun, Id. No. --------is an authentic work carried out by him under my guidance. The mater embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Name of the student: _____ Signature & date _____

Name of the supervisor: _____ Signature& date _____

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ACRONYMS

ACDI/VOCA	Formerly Agricultural Cooperative Development International and Volunteers in Overseas Cooperative Assistance
CSA	Central Statistics Authority
GDP	Gross Domestic Product
FAO	Food and Agricultural Organization
GL-CRSP	Global Livestock Collaborative Research Support Program
GOE	Government of Ethiopia
LINKS	Livestock Information Network System
MEDAC	Ministry of Economic Development and Cooperation
MOARD	Ministry of Agriculture and Rural Development
BOFED	Bureau of Finance and Economic Development/
PLI-LM	Pastoralist Livelihood Initiative - Livestock Marketing Project
USAID	United States Agency for International Development
USD	United States Dollar
VCA	Value Chain Analysis

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ABSTRACT

This research examines the performance of livestock marketing in Afar region. Afar region is the least developed region characterized by recurrent drought, inadequate basic livestock market infrastructure and accessibility. The pastoralists are not benefited from the large livestock population they hold. The research is indebted to evaluate the livestock marketing system in identifying and measuring the livestock market structure, conduct and performance efficiency in order to support the livestock development intervention and policy decision.

Primary and secondary data were used to the analysis. Data from primary source were collected by means of both traders' survey and market survey. Traders' survey was conducted in seven (Abaala, Ayssita, Chifra, Gewane, Sabure, Werer, and Yallo) markets of the region using structured interview schedule. The quantitative market data was also collected through intensive price monitoring at the four largest markets of the region (Ayssita, Chifra, Sabure, and Yallo) in the major trading days for two months. Market data collected by LINKS and ACDI/VOCA for the Year 2007 are the secondary sources. Sample markets were evaluated using market concentration ratio on the subject of the market structure; and the level of performance efficiency at all links of market chains are also analyzed with statistical analysis of multivariate correlation and marketing margin. Multiple regression technique was used in determining livestock price in relation to livestock breed, sex, age group, grade, number of buyers, number of sellers, number of intermediaries, and market places.

The study result shows that the majority of the markets in the region are primary markets except Ayssita, Chifra, and Yallo. Both primary and secondary markets of the region have market chains with the border markets of Djibouti and terminal markets of the neighboring regions. Marketing facilities in the region is very poor characterized by inadequate basic market infrastructures and information system. Lack of demand, price instability, lack of working capital, and drought are the main problems of livestock trading in the region. The sample markets have an oligopsony market structure with higher wholesale buyers' concentration; and they are also inefficient with higher marketing margins except Yallo market. Livestock price is significantly influenced by breeds, gender, age group, and grades of animals and the multivariate correlation result shows that markets are not integrated at all levels of livestock price movements.

Livestock development projects are indispensable to solve the main marketing problems. Improving basic marketing facilities would improve the marketing system; and expansion of large and medium scale livestock product processing units also would create more livestock demand for pastoralists. For the most part, pastoralists association in the form of livestock marketing cooperatives would improve the pastoralists bargaining power and market efficiency by large.

1 Introduction

1.1 Background

The livestock sector in Ethiopia contributes one third of the total agricultural Gross Domestic Product (GDP) and provides livelihood for 65% of the population (MEDAC 1998). But the peripheral areas of the pastoral regions' contribution are not proportional to the volume of livestock they have. CSA estimated in 2005 that farmers in Afar Region had a total of 327,370 cattle (representing 0.84% of Ethiopia's total cattle), 196,390 sheep (1.13%), 483,780 goats (3.73%), 200 mules (0.14%), 12,270 asses (0.49%), 99,830 camels (21.85%), 38,320 poultry of all species (0.12%), and 810 beehives (less than 0.1%). The CSA estimated on the basis of a survey performed in December 2003 that nomadic inhabitants had 1,990,850 cattle (an 83.8% share of those animals in the Region that year), 2,303,250 sheep (90.6%), 3,960,510 goats (90%), 759,750 camels (85.9%), 175,180 asses (92.5%), 2960 mules (88.6%), and 900 horses (100%).

Afar Region is one of the poorest and least developed Regions of Ethiopia, neglected by national development efforts. It is only in recent years that efforts have been undertaken to provide basic infrastructure such as road accessibility and administrative buildings as well as education and basic health services for each of the woredas (Guinand, 2000). Beside the livestock and other resources, Afar has significant geographical importance a location between the highlands and the

Red Sea. Therefore, of the regional economy of trade and finance are polarized by the transit road to Djibouti port. (Piguet, 2002)

Since the livelihood of the pastoralists is highly dependent on the livestock and the cash income from livestock, identifying all the potentials and constraints in the livestock marketing and its performance efficiency analysis help to provide them with alternative markets that reducing cost and increase the benefit they deserve.

Therefore, livestock marketing study and current information about the system can serve as a vehicle for improving the over all marketing conditions in the region and contributes more to agricultural and rural development effort.

1.2 Statement of the Problem

Preliminary studies in the region and other reviews related in the regions livestock market have perceived the structure and performance of live animal market to be poor in both export and domestic market. The prevailing factors which affects the overall Ethiopian livestock trade is found to be critical to support the regions' effort against the poor performance of the sector. The wide-ranging problems of Underdevelopment and lack of market-oriented production, lack of adequate information on livestock resources, inadequate permanent animal route and other facilities like water and holding grounds, lack or non-provision of transport, ineffective and inadequate infrastructural and institutional set-ups, prevalence of diseases, illegal trade and inadequate market information (internal and external) are some of the reasons mentioned to this poor performance (Belachew and Jemberu 2002; Yacob 2002).

However, those factors generally affecting the marketing system should be evaluated and measured in order to identify and prioritize the intervention area in supporting the livestock marketing system. The market behavior, linkages between channels and traders, structure and performance efficiency in progress in Afar region is inadequate for designing policies and institutions. And current knowledge on marketing function and market information is not yet organized and interpreted at some points in any of market integration. Sample traders survey and price monitoring at the basic market channels give a fresh look to the gap and examine whether livestock marketing is meeting the requirements of both sellers and buyers at the optimal level; and marketing and distribution service are provided at low cost.

1.3 Purpose of the study

Ethiopia, especially peripheral areas of the country have an absurd gap in livestock market information (FAO, 1999). Afar region in the widest sense have suffered lack of market information and support on access and market infrastructure (Piguet, 2002). As the researcher's knowledge concerned, there is no detail and wide ranging marketing system evaluation and performance analysis having market data on price, market throughput and physical and facilitating function.

In absence of data on the magnitude and seasonality of supply and prices analysis; and without market evaluation (whether the system is functioning efficiently), livestock market development projects and institutional supports will not grant the desired success (World Bank, 1987)

However the potential to livestock development in the region is very wide, detailed stratification of livestock development projects in to areas where they fit best and their market integration through alternative channels are the main components of livestock market development that is not yet critically evaluated and analyzed.

So the study will give a tip to the comparative advantage of such a proposal and strategic development options in assessing and determining the degree of market efficiency in terms of marketing margins and spatial price correlation of markets.

In broad-spectrum, this study on the above issue will also help policy makers to policy decision and supportive intervention of livestock marketing in the region.

1.4 Hypothesis

The entire hypothesis set below represents the null hypothesis that will be tested statistically.

There is no significant price correlation between animals of each grade at all market.

There is no significant relation between livestock price and livestock breed, sex, age, seasons of the year, market place, volume of supply, sales volume, number of buyers and sellers in the market, number of intermediaries in the market.

There is no large marketing margin difference at all links of marketing channels

1.5 Objectives

The general objective of the study is to evaluate and analyze the structure and performance efficiency of existing livestock marketing system at various links of marketing chains in Afar region and to identify key constraints and potentials in the system.

Specific objectives:

To study the existing livestock market structure and conduct in the Afar region

To identify the determinants of effective livestock marketing and their influence on price

To evaluate the existing livestock marketing services in the region

To assess the degree of livestock marketing efficiency in the region

1.6 Scope of the study

This study focuses on marketing structure, conduct, and performances of live animals (only cattle, camel, sheep, and got marketing) and its efficiency at various links of marketing channels in Afar region. The study uses qualitative traders' survey at the main market locations of the region, quantitative survey or market data at four large redistributive markets of the region and secondary data collected by Livestock Information Net work Knowledge System (LINKS) of the year 2007.

1.7 Limitation of the study

The researcher has employed price monitors having experience on grading and weighting of live animals. But it has been difficult to explain all grades in absolute terms at all markets. Due to lack of strict standardization, most of traders and graders in the market are valuing and categorizing the animals in general forms based on their specious and sex. So grading live animals at different markets is subjective and this may results in difference in comparison.

Sometimes traders prefer to use informal outlets than formal market outlets. Obtain reliable information about price and volumes sold or exchanged informally has been difficult. So official price monitoring data collected at formal outlet may not represent specially the number of animals traded to the border market.

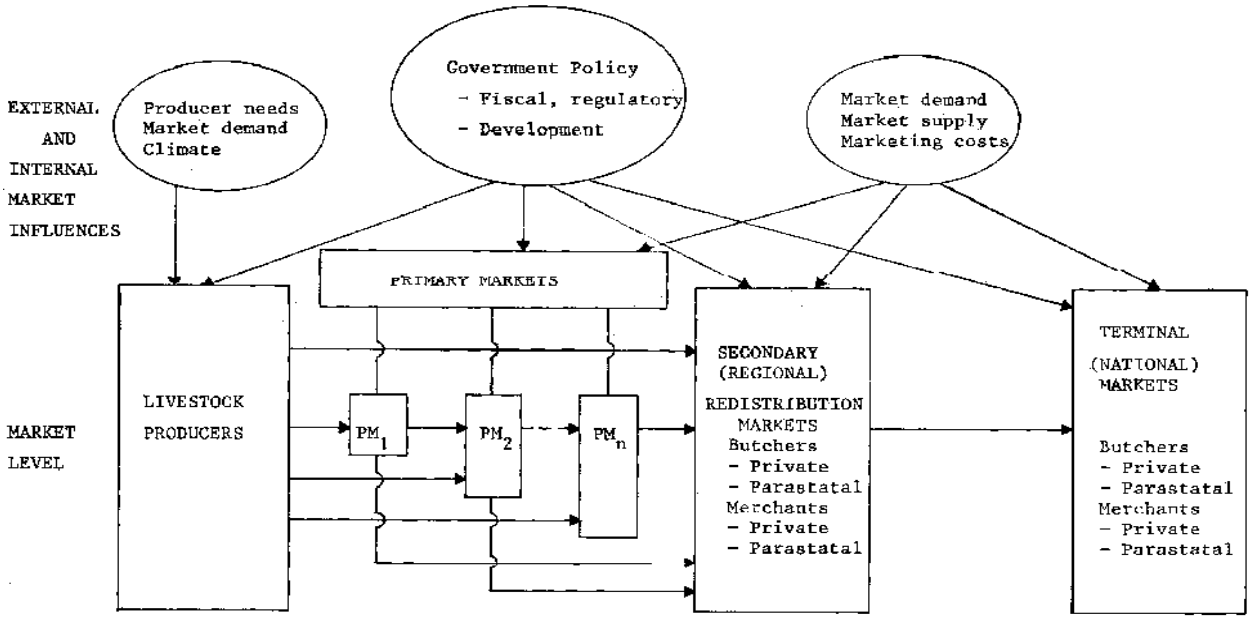
2 Literature Review

The main objective of this literature review is to specify the basic concepts and definitions related to the study and overview the empirical studies that give better understanding to identify gaps for further research. Books, magazines, research works and reports from the library and different World Wide Web have been used.

2.1 A livestock marketing system model

A schematic representation of a livestock marketing system is shown below. The bottom part shows the flow of livestock flows from producers to secondary (regional) and terminal (national) markets through one or more primary collection markets.

Figure 1: Livestock marketing system model (FAO, 1999)



Source: FAO, 1999

Livestock markets can easily be differentiated by the type of sellers and buyers operating in the market and the purpose for which livestock are purchased. Table 1 summarises these attributes for three types of livestock markets (Ariza Nino et al, 1980).

Table 1: Characteristics of livestock markets

Type of market	**Main sellers**	**Main buyers**	**Purpose of purchase**
1. Primary collection markets	Producers	Other producers	For stock replacement or fattening
		Local butchers	Slaughter
		Traders	Collection for resale in larger regional markets
2. Secondary distribution markets	Traders	Local butchers	Slaughter
		Traders	For resale in terminal markets
3. Terminal markets	Traders	Local slaughter houses	Slaughter
		Traders	Export

Source: Ariza Nino et al, 1980

The top of Fig. 1 shows the external and internal factors that influence the livestock marketing system. First on the supply side the cash needs of producers, the strength of demand for their livestock, and pastoralists' expectation of the nature and length of the dry and wet seasons influence the volume of the different species of livestock on offer at any time. The higher the cash needs of the pastoralists the greater the volume of livestock on offer. Their response to market demand has been a subject of controversy in the literature (FAO, 99; Jarvis, 1980).

(Ariza Nino et al, 1980) However, there is growing evidence that pastoralists in fact dispose of their marketable animals in a manner consistent with sound economic behavior. In other words the stronger the effective market demand as expressed by high prices, the greater the volume of livestock supplied. Finally, pastoralists' perception of the climate influences supply and hence the price of livestock. Anticipation and occurrence of prolonged dry seasons induce more sales. The poor condition of the animals plus the greater numbers supplied during such times depress livestock prices. On the other hand the anticipation and occurrence of good raids causes pastoralists to withhold animals from the market so that they can put more weight and fetch better prices later on.

Second, government policy through fiscal, regulatory and development intervention affects the volume, flow and prices of livestock in the marketing system. Favorable fiscal policies that encourage livestock production and reduce costs to producers increase the supply of livestock, e.g. subsidies, and price stabilization policies. On the other hand taxes and levies of all kinds tend to restrict the volume supplied. The control of epidemic diseases, the proper development of range areas and the development of trek routes and livestock market facilities tend to increase the volume supplied and reduce marketing costs. In general government monopolistic tendencies and the fixing of artificially low prices stifle market supply and demand. (FAO, 1999)

Finally, market demand as expressed by the volume and prices buyers are willing to pay for livestock influences the behavior of the markets at all links in the system. The efficiency of the market as reflected by the marketing costs of the system and to what extent price changes are transmitted through the marketing system strongly influences the operation of the markets. The

less efficient the market the less responsive will supply be to changes in market demand. (FAO, 1999)

2.2 Concept and definition

Below is a brief description of some of the terms and concepts used in the discussion which follows.

2.2.1 Exchange and price

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 (e.g. auction yards), or it may be agreed upon informally (e.g. between neighboring producers or between producers and rural butcheries). Informal marketing also occurs when livestock or livestock outputs are exchanged for goods in kind. (Kohls & Uhi, 1985)

2.2.2 Physical and facilitating functions

Marketing also involves the movement of goods from the point of exchange to their final destination. This movement involves such operations as transportation, storage and processing (physical functions), grading, the provision of finance, risk-bearing and the dissemination of market information (facilitating functions). (Kohls & Uhi, 1985)

Physical functions

The main physical functions of livestock marketing are transport, assembling and storage.(FAO, 1999)

Transport: The direct costs of trucking, trekking need to be estimated for each stage in the marketing process. It is relatively easy to calculate (or obtain information about) the costs of rail and road transport.

Trucking charges levied can often be obtained by cross-checking information given by the transport operators and producers or traders involved in the marketing process. This information should then be compared with calculated estimates of the cost per kilometer, taking into account fuel, repairs, maintenance, depreciation charges plus levies and taxes (e.g. road tax). (FAO, 1999)

Trekking costs will normally involve a fee paid to hired trekkers. If farmers or pastoralists trek their own cattle, the opportunity cost of the trekker's time should be used (if this can be estimated).

Hidden or indirect costs can be important in the estimation of transport costs. In particular, the following should be fully accounted for:

 Livestock deaths and forced sales which occur while animals are being transported (road and rail transport and trekking)

 Weight loss during transport resulting in reduced grade at the final destination (road and rail transport and trekking)

 Encroachment on cropping or grazing land resulting in conflict and the need for compensation (trekking)

 Bribes paid at transport check-points (road transport and trekking)

 Costs associated with government maintenance of roads and trek routes, water points and holding grounds, and

 Interest on capital tied up from the point of sale to final destination.

Assembling: Assembling in an African livestock marketing context is a physical as well as an exchange function. The assembling of livestock may occur at various stages during the marketing process where exchange takes place (e.g. at primary, secondary and terminal markets), but other physical services (e.g. holding stock before transfer) also occur. Thus, apart from data on buyers, sellers and throughput, data on any of the following costs may be needed:

Feeding - Animals held at transit points need to be fed and handled, and charges for these services will normally be levied. Grazing fees may be charged for the use of land at each assembly point. Alternatively, it may be necessary to impute a value for the land utilized (e.g. based on its opportunity cost).

Handling - Handling charges may include health care, watering as well as wage payments for those involved. The provision of holding yards at assembly points also a cost directly attributable to the marketing of livestock. Annual costs such as repairs, maintenance and depreciation should, therefore, be apportioned equally to the livestock passing through each assembly point.

Levies and taxes which are charged by local or government authorities for the use of land at each assembly point.

Hidden costs - Costs such as death and loss of weight and grade which may occur at assembly points should also be accounted for if these have not been previously considered in the estimation of transport costs (see note above).

Similarly, if animals are held at assembly points for prolonged periods, interest foregone on capital tied up during the waiting period should be included if this has not been accounted in previous estimates

Storage: The storage of slaughtered animals at abattoirs and butcheries involves direct costs such as wages and salaries, insurance, repairs, maintenance and depreciation on equipment (in refrigeration plants, for instance). Hidden costs such as the interest foregone on capital tied up in animals stored should also be included.

All other factors being constant, higher throughput levels reduce the unit per costs of storage. Low throughput levels and unpredictable supplies have been associated with high per unit storage and handling costs for many regional abattoirs in Africa (ILCA, 1989).

Facilitating functions

The main facilitating functions of livestock marketing are grading and standardization, finance, risk bearing and information.

Grading and standardization: These operations may take place at several points in the marketing process (e.g. at the primary level between buyers and producers, at slaughter before distribution to consumers). The salaries and wages of those involved are the main direct costs of formal grading operations (e.g. at recognized government sale yards). If grading is done informally, the opportunity cost of the grader's time is a hidden cost which should be estimated.

Finance, risk bearing and information: Each of these functions involves direct costs (e.g. interest on borrowed funds, commission charges for risk bearing and information supplied by intermediaries or traders involved in the marketing process).

Such costs are difficult to estimate when informal barter-type arrangements are made between producers and sellers or buyers and other intermediaries.

2.2.3 Degree of market efficiency in terms of marketing margin

Technical versus economic efficiency

The degree of efficiency is often the measure by which marketing systems are evaluated. However, a distinction exists between technical and economic efficiency. A new machine may allow for greater technical efficiency by using fewer inputs for the same level of output; it may not result in economic efficiency if the cost of the machine is not compensated by the savings in inputs. Economic efficiency is more desirable because it considers the value of resources, not just their quantity. Economic efficiency occurs in marketing when market operations are carried out at the least cost, subject to the techniques and knowledge available, provided that the good is supplied at a desired quality.

Economic efficiency is likely to occur in a competitive environment where traders are forced to provide good quality products and services at low prices, or be undercut by others more willing to do so. The obstacles to economic efficiency in marketing are lack of information, resistance of established institutions and monopoly or oligopoly power on the part of some market agents (Kohls & Uhi, 1985)

To evaluate markets on the basis of efficiency, the ingredients of an efficient market must be identified. Four of these are:

- Consumer demand is accurately and quickly relayed to the producer and the resulting information on producer supply is relayed back to the consumer.

- Marketing and distribution services are provided at the minimum cost per unit, compatible with the kinds and qualities of service required. Normally, the cost of marketing services will be reflected in the marketing margin.

- Innovation and flexibility exist so that market intermediaries are able to respond to new opportunities in terms of location or product quality.

- The national objectives of marketing are assisted.

2.2.4 Marketing margin, a measure of market efficiency

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.

A marketing margin is the difference between the primary and derived demand curves**.** Primary demand is based on consumer preferences and their response to retail prices. Derived demand is based on the relationship between price and quantity at the farm gate or intermediate points. Derived demand can thus be thought of as consumer demand as experienced by producers or other intermediaries. Primary and derived supply curves are analogous. The retail price is established where the primary demand curve and the derived supply curve intersect. The farm-gate price, on the other hand, occurs at the point where derived demand and primary supply curves intersect.

There are several types of marketing margins, based on the market level being considered.

- The wholesale margin is the difference between the price paid by the wholesale trader (or the processor) and the farm-gate or producer price.
- The retail margin is the difference between the price the retail trader pays and the retail price he charges to consumers.
- When the margin is expressed in monetary terms, it is called the price spread.
- When the margin is expressed as a percentage, it is known as the percentage margin.
- The mark-up is the price spread between two levels in the market divided by the selling price, expressed as a per cent.

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

2.2.5 Some approaches in estimating market margins

Three commonly used approaches to determine marketing margins are:

- Sample prices of uniform products at each market stage cross-sectionally at one point in time across a variety of market agents.

- Sample prices of uniform products at each market stage through time (time-series)**,** relying on data from a smaller number of sources.

- examine gross receipts and expenses of marketers at each stage, and divide by number of units traded.

The method selected may depend on the availability of reliable means of collecting data.

2.2.6 Reference values of marketing margins for evaluating market efficiency

FAO, (1999) Reference standards can be used to set up a point at or beyond which performance is judged to be "satisfactory" or "unsatisfactory". Market margins of more than 15%, for example, could be considered unacceptable. These are best used, however, as an indicator that more examination, using other measures of evaluation, is needed.

Because economic conditions generally, and marketing systems in particular, tend to change rapidly of their own accord even when governments do not deliberately intervene, infrequent one-time evaluations may be inadequate. Thus, permanent monitoring systems may be required. However, these can be expensive, and careful planning is required to ensure that a monitoring system will be viable over the longer term, with data not only being collected with satisfactory accuracy, but also analyzed and utilized. A permanent monitoring system needs to collect some data without reference to specific criteria for evaluation. Data of this kind include export and import flows, price trends and information on functions, flows, participants and stages.

Efficiency in performance of marketing functions is not in all cases equated with small marketing margins. Similarly, large margins are not necessarily a firm indication of inefficiency or excess profit by traders. Marketing margins and costs can only be meaningfully discussed in relation to the services and functions which are provided. We return to the question whether marketing services provided are "worth" the cost.

Widening margins over time may reflect an increased demand by consumers for additional services. In that case, consumers may begin to prefer more processing or better presentation or handling, increasing the value added and the margin between producer and consumer prices. Consumers may demand meat which is refrigerated and packaged, and be willing to pay for the additional value added because they perceive the worth of such product handling. This change in demand points toward one reason why it is difficult to measure market efficiency. Markets must encourage new production and consumption by introducing new products. Thus, equilibrium and stable margins may not always exist.

In developed country markets for beef, the proportion of retail price which goes to the producer is likely to be small, reflecting the large value added of handling and packaging. Such comparisons are really valid only when production systems, marketing systems and consumer preferences are similar. Thus comparisons between marketing channels within an economy can be useful. The existence of large differences in margins between marketing channels would justify further examination of services, costs and market conditions. Because there are no absolute indicators of efficiency, evaluation depends on comparisons between enterprises and between marketing sectors and channels within an economy.

2.2.7 Price analysis

Price analysis is a widely-used evaluation method which looks at the spatial correlation of markets through time. The assumption is that if market prices in different regions move together, then the overall market is operating effectively, in that supply is being distributed regionally in a way which meets local demand. It also assumes information and transport are operating effectively. However, there is some criticism of this method because markets with no strong trade links may show correlated price simply due to similar demand and supply conditions. Further, a monopoly firm could control prices in several regional markets. If price correlation occurs, other evidence needs to be used to discover how prices are being determined.

2.2.8 Services

Marketing services may be difficult to evaluate directly, although cost comparisons can provide some indication of availability. Evidence of excessive mortality and weight loss may indicate that feed, water points or other services during transport are lacking. The functioning of services can also be seen in the structure of the market. Large numbers of intermediaries in the market indicate a lack of capital and risk-avoidance services such as banking and insurance. Without capital, traders are forced to deal in small quantities at a time. This leads to a preponderance of small traders in the market. Lack of livestock insurance can have the same result. The presence of numerous traders can thus be seen as an effective adaptation of the market to a situation where services from external and public source are lacking.

2.2.9 Structure, conduct and performance analysis

FAO, (1999) a measure of market evaluation which can complement the market margin analysis is a classic approach called structure, conduct and performance analysis. The three elements of the analysis, as the name implies, are conduct, structure and performance

The approach, based on ideal competitive market conditions, holds that if the market is "structured" in a particular way, it will tend to make participants conduct their business in particular and rather predictable ways with, again, particular and partially predictable consequences for market performance. This approach focuses on the continuous monitoring of the market on structural issues, (which are easier/cheaper to monitor), leaving a full investigation

of performance (e.g. price-margin analysis) only to those cases where monitoring of structure suggests that some undesirable conduct and performance are likely to arise.

Structure 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. Entry, or the ease with which individuals can join and leave business, is important to a competitive environment and to market structure. 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. 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.

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 (subsidiaries).

These conditions can sometimes be seen in African markets where one ethnic group, often from another country, can dominate a particular market and, through cohesive behavior, affect market conditions. Thus, a point of examination might be the social composition and distinctiveness (e.g. in terms of ethnic group, income class, membership of associations) of one kind of market participant (e.g. traders) and the practical social opportunities that this gives to collude in operating against the interests of other market participants (e.g. farmers or consumers).

Performance is the focus of the margin analysis discussed above. It is exhibited by trends and stability of prices, margins and profits. A monitoring scheme which focuses on the relatively easy-to-monitor issues of structure will not itself provide the raw material needed to evaluate the efficiency of a marketing system. It may, however, provide information at relatively low costs on changes indicating the opportunity for monopolistic tendencies to prevail.

2.2.10 Market information and intelligence

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. Such information can be used by traders to shift to those goods with high consumer demand. An effective market information system reduces risks to traders, eventually reducing market margins. When reliable information is not available, traders increase their margins to protect themselves from risk (e.g. if information on distant cattle

markets is not reliable, traders face the risk of finding low prices at the end of a long trek) (Abbott J C and Makeham J P.1979). .

In most African livestock markets, evidence suggests that information flows relatively freely through traditional information systems, although this may not be the case for markets that are not trading regularly throughout the year. Even external consumer preferences are conveyed well, as evidenced by a quick shift in the suggested export patterns when international demand changes.

Researchers in West Africa found it easy to obtain price information for livestock transactions. Further, prices reported by buyers and sellers showed close correlation. Information about prices and market conditions is spread rapidly by returning merchants and word of mouth (the price of live cattle in Ouagadougou reaches Abidjan in about the time it takes trains to travel the distance).

An efficient market information system needs to address information flows in both directions between consumers and producers. Information should be evaluated in terms of its accuracy, how promptly it reaches those who need it and its degree of detail. These can be determined by comparing the results of surveys of traders and agents with known information about the market (Kohls R L and Uhl J W. 1985).

2.3 Empirical Studies

Piguet (2002) identified, livestock traders and middle men set the price, because of the communication gap between Afar pastoralists and, highland and urban traders,

Furthermore, in terms of marketing information, pastoralists are generally not aware of prices and marketing conditions elsewhere. Due to market segmentation and the shear total lack of market and trading information of the Afar pastoralists, highland traders and middlemen exploit them and hence, fully benefit from the Afar pastoralists' unawareness.

Aklilu (2002) explained that, the decision to sell animals by the primary producers in Ethiopia is usually based on urgent cash requirements. Producers come to the markets with no information beforehand on the going price of the day and farmers may take back their animal(s) if the price offered is too low to try their luck next time in the same or in another market nearby. Pastoralists take the same measure if the market happens to be close to where they graze their animals. But, if the market is of some considerable distance from where they reside then they will be persuaded to sell their animals, however low the price is on the day, as they can't afford to return empty handed without buying grain and other necessities for their families. Profit becomes a motive for sale only at farmer-trader level and above.

Christopher et al, (2004) from the hypothesis that causes limited marketed off take in Ethiopia and Kenya, lack of information, cash transaction costs to market participation and limited access to financial savings instruments do not appear to limit livestock marketing. The main constraint on livestock marketing appears to be the limited attractiveness of alternative, non-livestock investments in the study region. In summery, scant empirical support for many of the claims

commonly made in current discussions of how best to stimulate livestock marketing off take among pastoralist in this region. The best strategy appears to be generalized support for viable pastoralism.

Ariza-Nino et al, (1980) found that, throughout the 1970s the traditional marketing system for livestock and meat in West Africa demonstrated remarkable ability to adjust to changing conditions. It should continue to do so in the future. Given the shortcomings of the physical infrastructure, the system operates efficiently. Little evidence of monopoly power or collusion among traders and butchers has been found. High marketing costs and rates of return on capital in cattle trade reflect the high transport costs and taxes involved, and risks and uncertainties encountered. Calls for reorganization of the livestock and meat trade appear unnecessary.

(Bekure et al, 1982) conclude that, in the past governments in Africa have intervened in various ways in order to regulate and increase the efficiency of the marketing system. These interventions have ranged from the control of livestock and meat prices to the outright purchase and sale of animals and meat. Experience, however, shows that the scope for increasing efficiency lies neither in attempts to regulate and control the market participants, nor in efforts to control prices, nor in the creation of parastatals but rather in facilitating the operations of the market participants and instituting measures which reduce their costs.

Most of the studies found that the marketing system existing for the majority part of African countries does not provide sufficient services to stimulate livestock production and marketing. The inconsistency and divergence of problems are identified as the main constraint to improve livestock marketing among countries in sub-Saharan countries. This and its result; the comparative advantage they get from the market do not give an implication that can be used

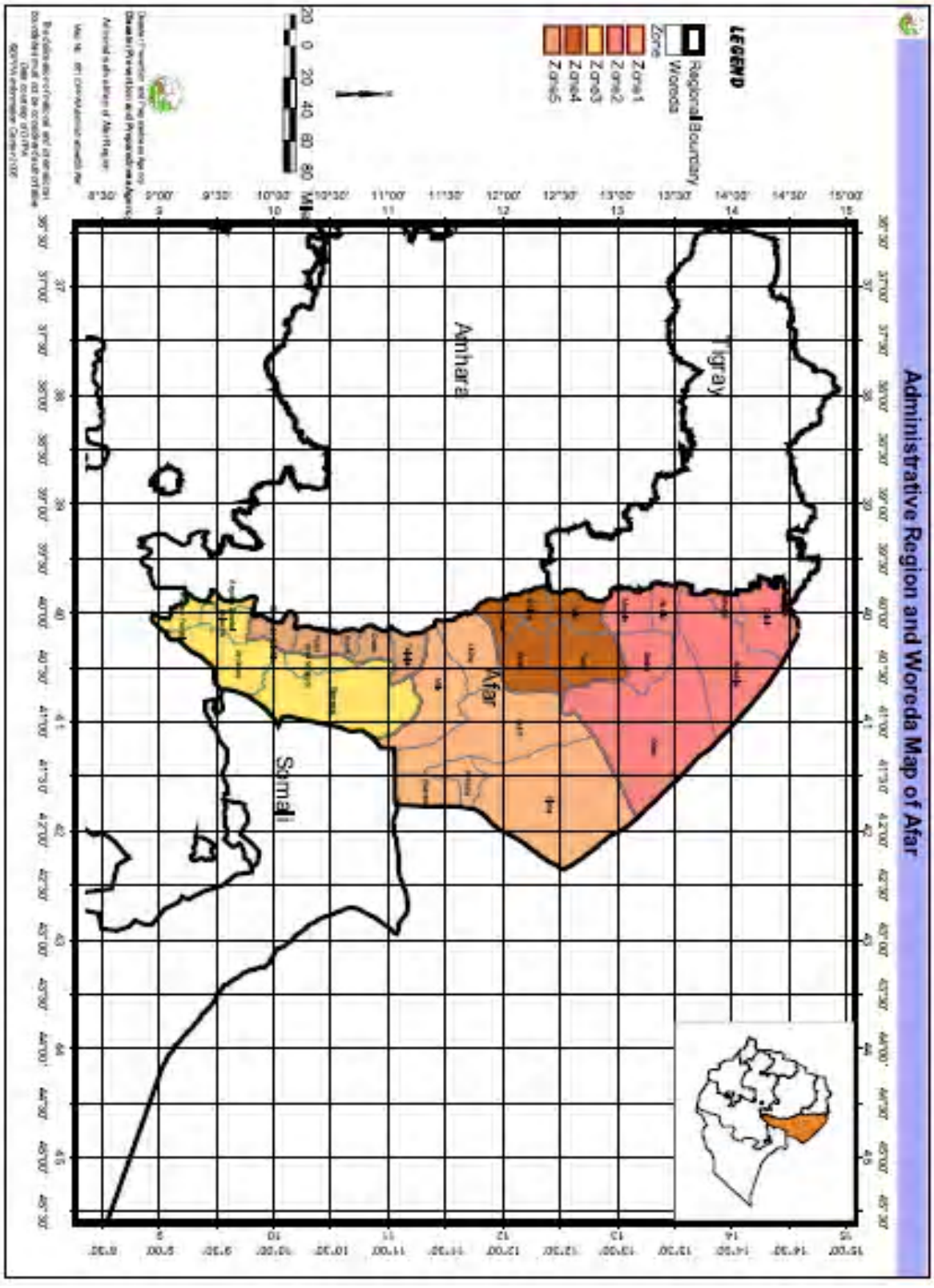
widely in all countries and regions in improving livestock marketing system. So to improve livestock marketing system in places having atypical conditions like Afar region in Ethiopia, research on marketing evaluation and performance analysis should be done.

3 Materials and methods

3.1 Description of the area

Afar is one of the nine ethnic divisions of Ethiopia, and contains the homeland of the Afar people located in north east Ethiopia stretched from the north Danakil depression to south lowland awash valley sharing international boundaries with Eritrea and Djibouti. The region land about 96,707 square kilometers is structured into five zones and 29 woredas (political administration divisions). Based on figures from the Central Statistical Agency of Ethiopia (CSA) published in 2005, Afar has an estimated total population of 1,389,004, consisting of 772,002 men and 617,002 women. 1,263,000 or 90.9% of the population are considered rural inhabitants, while 126,000 or 9.1% are urban.The Afar people originally belonged with Cushitic ethnic group like their Oromo and Somali neighbors, predominantly nomadic in origin and the majorities are still practicing “transhumant pastoralism” for subsistence (Guinand, 2000). This region has an estimated density of 14.36 people per square kilometer

The regions temperature is usually high and ranges from 12 ^{0}C to 48 ^{0}C , May, June and July being the hottest months, and January and February the coldest months.. (The Afar Depression, part of the East African Rift system, is the site of a triple junction where three tectonic plates of the earth's crust are moving away from each other, and is therefore the site of much past and present volcanic activity.)



Map 1: Administrative region and woreda map of Afar

The Afar Region has consistently turned up evidence of the earliest hominids, from the Lucy (3.4 million years old) dig in 1973 to the discoveries in the last decade of Arbi Pithecus Ramidus (4.4 million years old) and Arbi Pithecus Ramidus Kadaba (5.2-5.8 million years old).

To day the country as well as the region is in the way of free market. This market economy incites investment in the region. Based on the regional potential, most of the region investment is in agricultural sector, mainly in Cotton production and limited number in Broom Corn production.

According to Investment office data, the regional investment activity is concentrated in 6 wereda namely Amibara, Gewane, Assayita, Dubti, Mile and Awash. 58.10% of the regional agricultural investment is covered by a single wereda i.e. Amibara.

The existence of high temperature and low rainfall creates high evaporation in the region. This situation removes the limited water from the soil. In addition to this low soil fertility, rocky and sandy nature of the land, crop production and land covered by crop is very limited. As shown from the land use part only 3.20% of the land is used for cultivation /this percentage includes state farms/

According to the Central Statistics Authority (CSA) statistical Bulletin 351, in the region 13140 ha of land is used in 2003/2004 and the estimated production is 261341 quintals for private peasants' holdings (Central Agricultural Census Commission, 2001/02).

However greater effort is benign made by the regional government to enhance the level of education coverage in the region, it is still in lower level comparing to other regions.

According to data processing units of BOFED (Bureau of Finance and Economic Development), the total number of regular schools are 210, number of students are 44216 and number of teachers are 1385.

Road network, in the context of the region, is the basic socio economic infrastructure. It is the means to the country for international linkage, i.e. for import and export. In the region in addition to road network there is also a few km railway route to Deredawa.
In the region, in general, there are 3733.3 km road network. From these 684 km are Asphalt, 1415.81 km Main Gravel roads (RR50), 132.5 km rural roads (RR30), and 1501 km community roads (RR10) by 2005. The road density of the region is 39.19 /1000 sq km.

The country coverage of modern telecommunication technology is fast and trying to access remote area. But the regional situation is not as fast as the technological development. At present, in the region, only 4 digital, 10 V_SAT and 16 Radio communications are available. 44.83% or 13 Werdas doesn't have means of communication. Comparing to zonal distribution, zone one has relatively good telecommunication coverage

3.1.1 Description of the woredas selected for traders survey.

Two kinds of survey are conducted. The first is price monitoring quantitative survey through direct observation and interaction with market participants at four markets weekly in market days (Asyita, Chifra, Yallo, and Sabure: all markets are named by the name of the woreda expect Sabure). And the second is qualitative survey of sample traders at seven woredas of trader's location/market place selected purposively. The following are the woredas' profile selected to qualitative traders' survey.

Asayita: Part of the Administrative Zone 1 which is bordered on the south by Afambo, on the west by Dubti, then on the north by the Awash River which separates it from Elidar, and on the east by Djibouti. This woreda has an estimated total population of 69,397, of whom 30,944 were males and 38,453 were females; 22,718 or 32.74% of its population are urban dwellers, which is greater than the Zone average of 14.9%. (CSA, 2005)

Yalo: Part of the Administrative Zone 4, which is located at the base of the eastern escarpment of the Ethiopian highlands, and bordered on the south by Gulina, on the west by the Amhara Region, on the north by the Administrative Zone 2, and on the east by Teru. This woreda has an estimated total population of 25,494, of whom 11,236 were males and 14,258 were females; 1,370 or 5.37% of its population are urban dwellers, which is greater than the Zone average of 1.6%.(CSA, 2005)

Chifra: Part of the Administrative Zone 1, which is located near the base of the eastern escarpment of the Ethiopian highlands and bordered on the south by Mille, on the west by the Oromia zone in Amhara Region, on the north by the Administrative Zone 4, and on the east by Dubti. this woreda has an estimated total population of 90,896, of whom 39,706 were males and 51,190 were females; 1,209 or 1.33% of its population are urban dwellers, which is less than the Zone average of 14.9%.(CSA, 2005)

Awash Fentale: Part of the Administrative Zone 3, which is bordered on the south by the Oromia Region, on the west by the Amhara Region, on the north by Dulecha, and on the east by Amibara. Towns and cities in Awash Fentale include Awash Sebat Kilo and **Sabure**. This woreda has an estimated total population of 24,970, of whom 11,909 were males and 13,061 were females;

12,684 or 50.80% of its population are urban dwellers, which is greater than the Zone average of 27.8%.(CSA, 2005)

Amibara: Part of the Administrative Zone 3, which is bordered on the south by Awash Fentale, on the west by the Awash River which separates it from Dulecha to the southwest then on the northwest by the Administrative Zone 5, on the north by Gewane, and on the east by the Oromia Region. Towns in Amibara include Awash Arba, Awash Sheleko, Melka Sedi and Melka Werer. This woreda has an estimated total population of 54,190, of whom 23,982 were males and 30,208 were females; 28,397 or 52.40% of its population are urban dwellers, which is greater than the Zone average of 27.8%.(CSA, 2005)

Gewane: Part of the Administrative Zone 3, which is bordered on the south by Amibara, on the west by Bure Mudaytu, on the northwest by Administrative Zone 5, on the north by the Administrative Zone 1, on the east by the Somali Region, and on the southeast by the Oromia Region; the Awash River defines parts of the boundary with Administrative Zones 3 and 5. Towns in Gewane include Meteka and Gewane. This woreda has an estimated total population of 36,813, of whom 15,959 were males and 20,854 were females; 12,611 or 34.26% of its population are urban dwellers (CSA, 2005)

Abala: Part of the Administrative Zone 2, which is located at the base of the eastern escarpment of the Ethiopian highlands, and bordered on the south by Megale, on the west by the Tigray Region, on the north by Berahle, on the northeast by Afdera, and on the east by Erebti. The major town in Abala is Abala. This woreda has an estimated total population of 34,514, of whom 16,181 were males and 18,333 were females; 4,820 or 13.97% of its population are urban dwellers. (CSA, 2005)

3.2 Sample selection procedure

The Afar people widely inhabit dry, harsh environment where the temperature some times rises to 48 ^{0}c in the hottest months. The northern part of the region is the driest and hottest part of the region including Dalol depression, one of the lowest and hottest places on earth 116 m below sea level. They rely on livestock for survival, moving from one area to another depending on the availability of seasonal water and grazing land. They suffer the recurrent drought enormously challenging their survival.

Sometimes in different parts of the region conflict forces pastoralists to change their usual migration patterns and most importantly were denied access to either traditional water points and wells or grazing areas or both together. On top of this rather complex and confuse conflict situation, drought due to lack of rain in the region will force the pastoralists to migrate in neighboring regions. So at this great challenge, obtaining list of livestock owners and interviewing them based on random sampling technique is very difficult and neither the producers' opinion nor the satisfaction they get from livestock trading are tested statistically. But to gather information concerning livestock marketing service informal group discussion among the pastoral livestock producer-traders' are conducted at the main livestock trading centers in the region. And the result along with other related information is presented in descriptive form.

To conduct the qualitative survey regarding market performance and efficiency list of traders who are employing themselves in livestock trading (both producer traders and middle men) and working frequently in the local market is used as bench mark to the sample frame.

There are 29 woredas in Afar region. Only seven woredas in the region have cattle and shot markets. So, to complete the qualitative survey, livestock traders working in the seven market location of each woreda are selected.

The researcher has made a pilot study with a team of the regional pastoral agriculture and rural development bureau since 28 Aug. to 24 Sept.2007 in the seven markets/traders location of the region (Asayita, Chifra, Yallo, Sabure, Abala, Gewane, and Amibera) with the program supported by USAID Pastoral Livelihood Initiative (PLI). During this survey the researcher with the assistance of woreda administrators, clan leaders, woreda pastoral offices development agents, cooperative marketing experts and key informants has generated list of livestock traders operating in the above seven market/traders location. From the list of livestock traders 35 percent trader respondents are selected at random based on probability proportion to size (PPS). The total sample size is 120.

Table 2: Number of traders and sample size by market towns in the region

No.	Traders location	No. of traders	No. of sample traders (35%)	
1	Abala	49	17.15	= 17
2	Amibera/Werer	60	14	= 14
3	Asayita	65	22.75	= 23
4	Chifra	50	21	= 21
5	Gewane	49	17.15	= 17
6	Sabure	30	10.5	= 11
7	Yallo	40	17	= 17
	Total	343	120.05	= 120

Out of the seven markets four markets are selected for quantitative survey. These markets are the largest markets that, most of the regions primary markets and producers are feeding from all directions. And these markets are identified to be regional secondary or redistributive markets based on agreed criteria (ACDI/VOCA, 2006).

So, in order to conduct quantitative survey through price monitoring system, data were collected from these markets (Asayita, Chifra, Yallo, and Sabure) by direct observation and discussion with key communicators at a time in two months on the bases of market days (short term intensive weakly price monitoring). Other market data from secondary sources (Collected by Livestock Information Net work Knowledge System – LINKS, in the year 2007) are also made in to use.

3.3 Survey methodology

Both qualitative and quantitative data including exchange data on sales, purchases, prices, buyers, sellers and market throughput and physical and facilitating functions data were collected by sample traders survey and cross-sectional survey of market price monitoring. To capture seasonal variation and changes due to religious festivals, time-serious data were used from secondary sources.

Price monitoring were conducted to determine whether prices paid at one point in time differ between different markets with respect to total daily sales and purchases by livestock species, number of sellers, active buyers and intermediaries (cross-sectional studies). To complement and check information obtained during traders surveys interview with same traders was carried at the market focusing on to prices received by grade and class of stock, numbers sold, commissions and levies charged (e.g. trader commissions), reasons for sale, other outlets used, frequency of sale, distances traveled to market and intermediaries involved

To analyze margins of livestock marketing (prices paid and received at the different outlets), the main physical functions of livestock marketing such as transport, assembling (feeding, handling, levis and tax, and hidden costs) storage and the facilitating functions of livestock marketing like grading, standardization, finance, risk bearing and information data were gathered through sample traders surveys and secondary data source.

During sample traders survey, interview schedule has been designed to obtain additional information on factors involved in the determination of price, proposed destinations for purchased livestock, modes of transport used, sources of finance and facilities available.

In quantitative survey at the market, two price monitors of each market who were trained and assisted by the researcher tallied the numbers of different grades of livestock offered for sale. All markets have full time security staff to prevent purchased animals that are going to be taken away by the new owner without payment of the appropriate fees. So the price monitors have recorded the numbers of animals sold with the assistance of market's revenue collector. Price monitors in association with brokers have also recorded the numbers of traders (sellers and buyers), and intermediaries available in the market and the price of all kind of animals by grade throughout the day.

Data enumerators for both qualitative and quantitative surveys were selected from high-school graduates having experience of interviewing with pastoralists and fluency in Afargna (the regions language). And the researcher closely assisted them.

Interview schedule were designed in English and translated to Afargna (the regions language). And it was pre-tasted in similar areas to make further modification if needed.

3.4 Data Analysis

3.4.1 Variables

Dependent variable

The most important single parameter in collecting time series data on livestock marketing is livestock price. For a given market and a given period (week, month, year) mean livestock prices per head and live-weight can be analyzed by breed, sex and age. (Bekure et al, 1982)

Price as a main continuous dependent variable were regressed with discrete and continuous variables that are assumed to be factors for livestock price variation such as livestock breed, sex, age, condition, seasons of the year, market place, number of traders and intermediaries in the market, and number of livestock offered and sold in the market.

Independent variables

Qualitative (Discrete) variables: These data assumed to be determinants of price were obtained by interviewing the traders and by direct measurement. For the direct measurement, a sample of animals were selected on each market day by systematic sampling of pen lots and records of specific features of animals by breed, age, sex, condition were made (Chabari et al, 1987).

Age of animals: It is used as a discrete dummy variable having three classes of age groups such as immature, young, and matured classes.

Sex of animals: Discrete dummy variables represented in the model by 1 and 0 for sexes male and female.

Grades of animals: There are four grades of animals that represents; grade1 represents large mature animals for export quality. Grade 2 represents medium size export quality. Grade 3 represents young animals having good body condition used by export abattoirs. Grade 4 represents, animals grater than immature and having average body condition mainly used for local consumption.

Seasons of the year: To capture seasonal variation in livestock price, all four seasons of the year including religious festivals will be taken as a discrete dummy variable.

Market places: all four market places selected to intensive price monitoring (Asyita, Chifra, Yallo, and Sabura) and other two markets, Abaala and Werer were also being taken as a discrete dummy variable.

Quantitative (Continuous) variables: These data were collected by enumerators stationed at market points by complete enumeration without much difficulty (Solomon Bekure and Negussie Tilahun, 1983).

Number of animals on offered and sold: by making actual counts of individual animal lots; number of animals offered and sold by breed, age, sex, and condition were obtained. Animals 'on offer' from those actually sold also were distinguished.

Number of sellers, number of buyers and intermediaries: In most situations, it is fairly easy to identify sellers even when animals are grouped into large lots. But it is not always easy to identify the active buyers or intermediaries present. They may be other farmers or pastoralists, regular or itinerant traders, butchers or government agents.

However, regular attendance at a given market outlet by enumerators were improved the identification of these groups of people involved in livestock marketing. Interviewing those sellers or buyers who are well known will also help to identify active buyers and intermediaries.

3.4.2 Analysis

The Analysis of this research is broadly organized by two major components of livestock price movement and market performance and efficiency.

Livestock price analysis: Based on the short term price monitoring data collected in selected market and the secondary data serious collected by LINKS and ACDI/VOCA, a spatial price correlation between animals and grads in same market and market integration between same grades of animals in different markets are analyzed using multivariate correlation coefficient analysis.

$$P_{it} = \beta_0 + \beta_1 P_{jt} + e_t$$

Where P_i and P_j are prices series of a specific animals in different markets i and j; t is time for the specific study and e_t is the residual error term assumed to be distributed identically and independently. The parameter β_0 represents other costs.

The Correlations Multivariate option gives the Correlations table, which is a matrix of correlation coefficients that summarizes the strength of the linear relationships between each pair of response

(*Y*) variables. This correlation matrix only uses the observations that have non-missing values for all variables in the analysis.

The Pearson product-moment correlation coefficient measures the strength of the linear relationship between two variables. For response variables *X* and *Y*, it is denoted as *r* and computed as

$$r = \frac{\sum (x-\bar{x})(y-\bar{y})}{\sqrt{\sum (x-\bar{x})^2}\sqrt{\sum (y-\bar{y})^2}}.$$

.If there is an exact linear relationship between two variables, the correlation is 1 or –1, depending on whether the variables are positively or negatively related. If there is no linear relationship, the correlation tends toward zero.

A stepwise multiple regression analysis and analysis of covariance (ANCOVA) were used to fit a demand model for a given market relating price to livestock breed, sex, age, season, volume of supply, numbers of animals sold, number of buyers, and number of intermediaries in the market.

A statistical model, describing relationships between a response variable Y and an explanatory variable x, for groups indexed by a dummy variable z, is:

$$Y_i = \beta_0 + \beta_1 x_i + \beta_2 z_i + \beta_3 x_i * z_i + e_i$$

Market performance and efficiency: Studies of market performance and efficiency include two major aspects of the livestock marketing system. The first is an assessment of the degree of buyer concentration in the markets selected for time series data collection and how livestock prices are arrived at and purchasing is financed.

The second study involves establishing the cost of livestock marketing as animals change from the hands of producer to final consumer. Marketing costs information established by interviewing livestock traders and spot checking; the information by actual observation on their operations are analyzed in terms of marketing margins. And marketing margins are also calculated for different levels of the market, that:

Marketing margin = $P_1 - P_2$

Where

P_1 = the price at one level or stage in the market

P_2 = the price at another level

In measuring the marketing margin cross-sectional margin analysis method were used in a stepwise analysis through:-

 indicating the market structure and linkages

 making out the main physical and facilitating operations performed between the different outlets specified

 estimating the cost of operations including hidden costs performed within each outlet

To represent statistical data in the analysis; histogram, cumulative frequency curve, Lorenz curve, bar chart, and two-dimensional graph or scatter plot are employed.

4 Results and Discussion

4.1 Structure of livestock marketing system

Livestock marketing in afar region has diversified in a widest range from local consumption to live animal export to Djibouti, Sudan and the Gulf. In this respect, the markets in the region have followed the four tires system having various market actors, volumes of animals traded, market days they operate, and different purposes and types of functions. The first tire is the bush or farm level markets that are widely spread in the entire pastoral areas, having a characteristic of trading one or to animals by pastorals and local traders. The second tire is the primary or local market. This market, according to the Ethiopian livestock market structure, has characterized by the volumes of animals less than 500 mainly dominated by livestock producers as main sellers; and traders, local butchers, and other producers as main buyers. In this market, animals are also transacted for stock replacement or fattening, slaughter, and for resale in other large redistributive or secondary markets.

The survey result shows that, however the volumes of animals offered for sale varies significantly in different conditions (internal and external market influences) and the majority of the markets including the sample traders locations are primary markets. Seventy five percent of the traders have bought animals direct from the pastorals in their purchase market including their assembling location. The rest 25% of the traders bought animals from commercial pastorals, assembler

traders, and cooperatives. This sort of market concentration and other results of the number of animals transacted, and purpose of buying in most of the traders purchase market indicates the structure of marketing system in the region.

Table 3: Sample livestock traders' response by their sources of purchase at their main trading location (2007)

Sources in the market	**Freq. of respondents**	**Percentage**	**Cumulative %**
Producer/pastoral	116	97%	97%
Local trader	71	59%	156%
Assembler trader	32	27%	183%
Cooperatives	4	3%	186%

Source: Survey result

Note: Sum of the frequencies and percentages in the table is grater than the total number of sample trader respondents since they react with more than one from the options.

Here, unlike the theoretical aspect that presumes each market actors have their own specialization at each level of markets; all consumers, institutional buyers, assembler traders, and large enterprises can be found in all primary, secondary, and terminal markets at different concentration rate. So, sample traders located in Asayta, Chifra, and Yallo have bought animals from local traders and they end up their transaction at other terminal markets for the purpose of slaughter and export. The survey result also shows that more than 600 animals are offered in each market days at Asayta, Chifra, and Yallo. So, these and historical background of the markets being a place of livestock traders junction to the region shows that, the three markets are secondary or redistributive markets

4.2 Market chains and destination of livestock

Trading livestock in Afar region is the main activity that supports the entire livelihood of pastoral communities. However, the pastoralists' livestock off-take is very low mostly driven by their immediate cash need; it is the ever source of revenue to the pastorals in purchase of other commodities other than livestock. So, livestock in the region always traded in fulfilling all the desires of market participants through an integrated and diversified ways from pastoral traders to final consumers. Livestock trading route in the region is categorized in four main channels based on their destination and purpose of sales in formal and informal trading practice. The first is live animal exported to Djibouti mainly to the Gulf. In this channel official trade routes and unofficial trade routes are substantially used in the same way as the main livestock trading route of live animals export. Animals are used to be assembled from local and redistributive markets from the region by small and medium scale traders and transported to Nazret and Methara market to live export. This is one way of the first channel; the other ruts to this channel are totally unofficial. Animals as previous are assembled from north east and central parts of the region through Yallo and Chifra markets and channeled to Assayita market and crossed the border through Dekeli in to Djibouti and the Gulf. Animals exported to Sudan are assembled mainly from the same markets of Chifra, Assayita and from northern part of the region and transported through Mekelle market and Humera. The volume of animals traded to this rout is less than the previous one characterized by a specialized experience of camel trading. The second channel is meat export through export abattoirs and processors. Mostly, animals from southern part of the region into Sabure, Awash fentale and Worer markets are frequently assembled by local traders from the surrounding local and bush markets and transported to Modjo and Debrezeyt export abattoirs directly by their

buying agent or other assembler traders. Elfora is another potential buyer of this channel operating direct from the local markets of the region. There are also flows of animals from central and western part of the region to these export abattoirs through Chifra and Yallo markets and to Elfora by assembler traders all the way through Bati and Combolcha markets. The third channel is live animal trades to neighboring regions for consumption, reproduction and butchery. Methera and Nazret in the south Bati in the west and Mekele in the north are the largest among the markets to this channel. The last channel is local consumption in to the region mainly distributed by pastoralists and local traders.

Table 4: Sample livestock traders' response by their sales market (2007)

The traders end market	**Freq. of traders responses**	**Percentage**	**Cumulative %**
Consumers and institutional buyers (hotels, butchers, educational institutions…)	94	78%	78%
Assembler traders	110	92%	170%
Commercial fattening units	34	28%	198%
Meat processors (factories and abattoirs) through Agents	55	46%	244%

Source: survey result

4.3 Marketing facilities

Livestock marketing systems differ from agricultural marketing systems in terms of product procurement, processing, grading and transportation. Markets for livestock products are less organized than crop markets.

Most of the livestock marketing facilities are constructed under livestock development program launched by government or non-government programs. This as the main component of development program; provides operationally sustainable facilities in boosting the livestock marketing activities by conducting optimal livestock transaction.

All livestock markets in the region were not provided with any of the livestock facilities, except that of the traditional markets of Yallo and Chifra merely fenced without compartment. That was actually made-up to collect tax. The livestock marketing component of Pastoral Livelihood Initiative (PLI), implemented by ACDI/VOCA (2007), has tried for strengthening the Ethiopia's livestock marketing system by increasing sales to high value domestic and export markets. At this respect the program component of Afar region has selected five important livestock markets at the beginning and adds three more later to construct key livestock market facilities as essential activities to reduce costs and improve pastoralists' access to markets.

The first five markets of Asita, Chifra, Yallo, Andido, and Sabura are selected as market sites to be constructed based on agreed criteria and through consultations with pastoralists, livestock traders, government officials and NGOs, as well as on the recommendations from a value chain analysis conducted by ACDI/VOCA and other PLI partners. The main factors used as the selection criteria are:

- Weekly volume of animals supplied to market,
- Availability of water and feed resources in a given locality,
- Alignment with the Ethiopian Livestock Development Master Plan and,
- Most importantly, their linkage to export markets.

This selection criterion has abandoned the already established markets of Werer that is far-off from the newly established markets of Andido by 15 km. But this newly established market does not replace Worer market. It is a new one in a series of market sites to be constructed and the market will be operating in different day.

The newly-constructed Markets have facilities like loading ramps, holding areas, veterinary inspection posts, feed and water troughs. This integrated facility will commonly improve marketing transactions and help to maintain the condition of the animals until they reach the other secondary or terminal markets.

Figure 2: The new Chifra market under construction by ACDI/VOCA

Source: Own picture during the survey

Additional three markets are to be constructed by the program due to the reason that they have merits. Gewane has been a large market, accommodating all cattle, camel and shoats. But recently its function is limited to shoat market dominantly influenced by the near-by villages

market of Meteka and Debel. Now the growing desire of the people and the areas' prospective potential has made the market on the increasing proposition to expand it through livestock marketing facilities. The other two markets conceived to be constructed with livestock market facilities by the program are Aliwha and Logia having a potential of shoat market and an attribute being a center of regional town Semera-Logia respectively.

The other woreds having a livestock population of more than 400 animals per sq/km are Abala and Dalifige and having their own markets. However, these markets have provided large volume of livestock to the nearby towns of Mekele and Bati respectively. Abaala and Dilifige were not evaluated with the said criteria to have livestock marketing facilities of their own. But the Regional Agriculture Pastoral and Rural Development Bureau has tried to reach the market sites with market infrastructure such as livestock holding stations, watering access and other livestock market facilities.

4.4 Transportation systems

In Ethiopia the livestock transportation is limited to trucking and trekking. Many studies have examined the advantages and disadvantages of both trucking and trekking system in the view of costs and their impact on livestock trading system. Most of the comparison has been made on the basses of the direct and indirect costs of the transportation system. The direct cost is obviously known, the comparison or the opportunity cost that needs to be examined critically lays on the indirect costs. Indirect costs include weight loss or death in transit that could results in early sale on the way, forced sale or loss of grade at sale, crop damage or pasture use during transit that

causing conflict or the need for cash compensation and the costs of government services to avoid these tribulations. Trucking has higher direct costs of fuel, depreciation, capital. Consequently, the indirect costs of trekking i.e. weight loss of animals due to inadequate feed could be compatible and affordable when compared the direct cost of trucking.

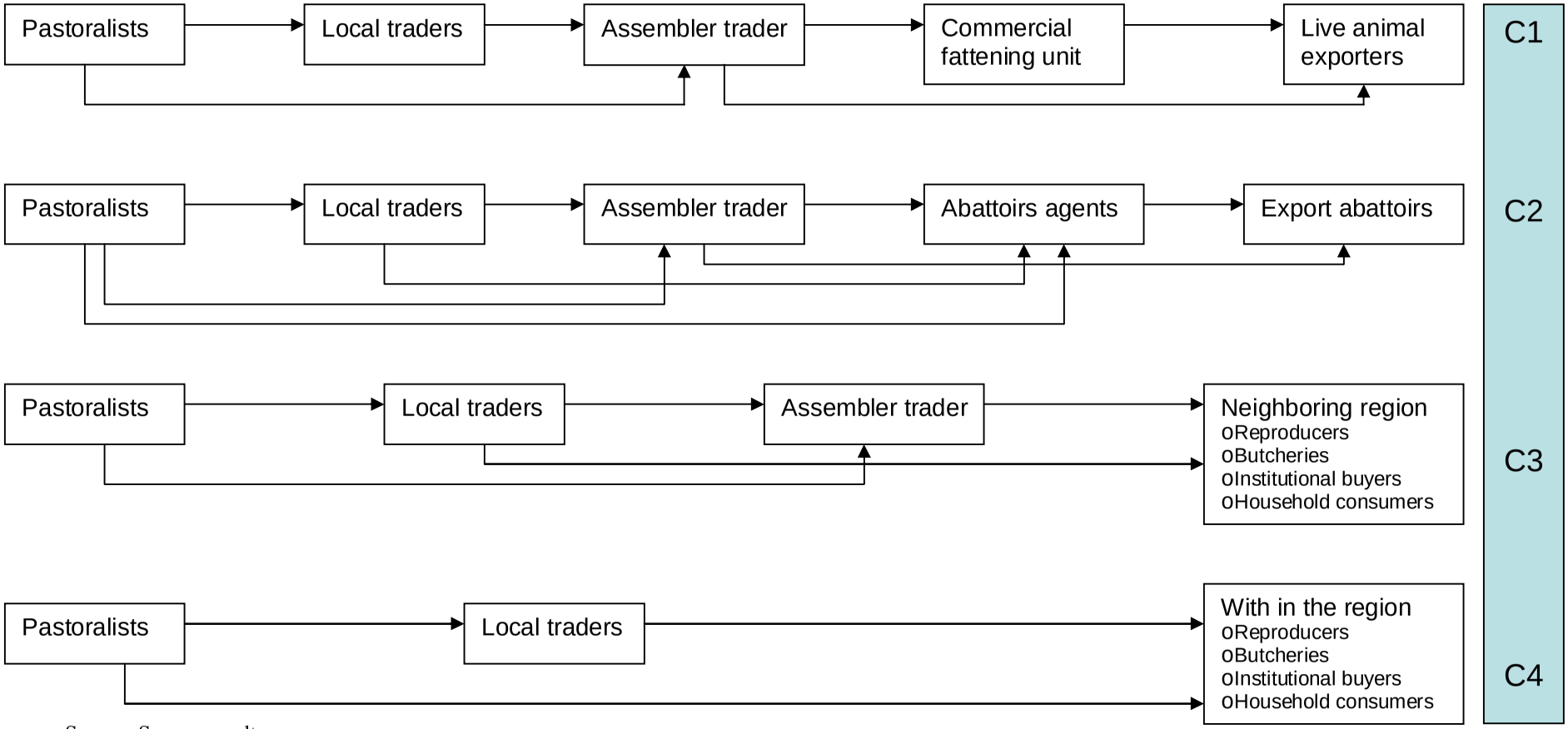
Animals are transported to the regional markets from all directions of the region whether they are large stock or small stock. But at the regional market large traders used trucks to transport small stocks to terminal markets. But still cattle and camels are trekked to terminals. So trekking uses as a means to move livestock to the primary, secondary and terminal markets in the region. This would be more advantageous had the pasture and water remains available all the year round along the routes. In the wet season animals will get more weight during trekking unlike the cost of trucking. Unfortunately the recurrent drought lefts the trek routes without pasture and feed more than half a year. Without facilities for food and water, weight losses can be expected to range from 8-13%. These could be reduced to about 5% by providing both adequate water points along the trek routes (Ansell 1971). During bad years, losses from trekking can be expected to be much higher but not necessarily higher than when other modes of transportation are used. Trucking possibly will be valuable if used in large scale frequently in order to make use of economies of scale.

4.5 Actors in the livestock market yards

In any of the marketing system, all the market participants have their own role in determining the marketing behavior of the specific market yards. More over marketing provides economic benefits to the entire local livelihood in creating alternative economic opportunities. Every

livestock marketing actors has their own role and exists similarly in each market over the region. The large numbers of market participants in all livestock market yards of the region are livestock sellers and buyers. These sellers and buyers are also divided according to their scale and purpose of operation. There are different groups of sellers and buyers who are linked at all levels of market chains. The first groups are pastoralists who come to sale their animal instigated by immediate cash need, the rise in demand or the drought condition. The second groups are local traders. These traders are mainly used to collect animals from pastoralists at farm gate and sale to other assembler traders by adding their own margin at their main trading location and some times they trek animals to other regional markets when they take for granted higher demand. The third groups are wholesale traders who are small in numbers at all markets compared to the first and second groups. These traders are operating at large scale at all levels of market yards in the region. In using the economics of scale especially at transportation cost, they take the largest market share of animals supplied and highest share from retail price at the expense of pastoralists. Mainly they collect animals from regional markets and sell at terminal markets in other regions. But some times they assemble animals from local markets when the demand is high at terminals by considering the marginal costs they add and the price they expect at terminal markets. The fourth groups are buying agents of live animal exporters and export abattoirs. ELFORA is the largest from this commercial fattening units and processors. Even though, the organizations have received animals from assembler traders, they used to collect animals at selected markets (e.g. Werer, Gewane, Eliwha, Chifra, etc.) of the region directly through their buying agents. The other market participants are market intermediaries that consist of brokers, sales agents and commission agents. Their number and rate of participation varies irregularly in all markets.

Figure 3: Livestock Market Channels in Afar Region



Source: Survey result

4.6 Traders' profile

There are all types of traders in all markets including the bush (farm gate) markets. It is in fact compulsory since money serves as medium of exchange and the fact that those who produce some specific commodity need to exchange to satisfy their desire. This is the most imperative reason of pastorals to get involved in livestock trading among other factors. However, in any case for the immediate cash need of pastorals or the growing market demand, it is usual to see first hand sellers in primary and secondary markets. The traders' survey focuses on those traders who are frequently operating in all markets rationally established at woredas of the region having high livestock density and animal trade-off. The survey categorized the traders in to small scale traders, medium scale traders, and large scale traders in respect to the amount of working capital used for each type of animals and their trading practice. And the result shows, 65% among the total 120 respondents were operating at their market with a minimum working capital of 500 - 1000 USD in assembling animals to resale in another market and hording sometimes until they get better price. The remaining 34% was small scale traders having working capital less than 500 USD. They used to sell animals from their market to another markets and some times they collect animals from pastorals at farm gate and sold at their markets to assembler traders and buying agents. In assessing the nature of their trading business, 85% of the respondents run their trading business as sole ownership and the remaining 15% traders are partnership. Ages of the traders, only for this study, are divided in to three groups. The first group is Young whose age is less than 25 and it covers 35% of the sample traders. The others are Middle-aged who are between 26 and 45years old and, Elders grater than 45 years old and they each represent the remaining 55% and 10% of the respondent traders respectively. Female in the pastoral areas involves in livestock

trading specially in shoat trading at irregular intervals to meet their immediate cash need. Here, all the sample trader respondents are male being a profit maker on livestock trading business.

Figure 4: Female pastoralist in shoat trading

Table 5: Sample livestock traders by age group (2007)

Age group	Abaala	Ayssita	Chifra	Gewane	Werer	Sabure	Yallo	Total	%
Young	4	8	8	5	6	6	5	42	35
Middle-age	12	12	11	10	7	3	11	66	55
Elder	1	3	2	2	1	2	1	12	10
Total	17	23	21	17	14	11	17	120	100

Source: Survey result

Trading livestock is weighted if it is predisposed by education or not. And the survey result shows that only 12% of trader respondents have attended regular school above grade six. Eighty percent are attending formal education up to grade six and the remaining 8 % doesn't take any formal education but they can read and write Amharic. At this point, the result doesn't specify whether education level is a necessary condition or not in livestock trading. But basic primary

education, being a sufficient or a means to perform livestock trading represents the majority of livestock traders in the region.

Table 6: sample livestock traders by level of education (2007)

Level of education	Abaala	Ayssita	Chifra	Gewane	Werer	Sabure	Yallo	Total	%
Illiterate	1	2	2	1	1	-	3	10	8
1 – 6 grade	13	20	15	15	10	10	12	95	80
7 -10 grade	2	1	3	-	2	1	2	11	9
11 -12 grade	1	-	1	1	1	-	-	4	3
Total	17	23	21	17	14	11	17	120	100

Source: Survey result

4.7 Trading activities

As it has been said above, livestock trading activities have different characteristics in different levels of market channels depending on the purpose of buying/selling and buyers/sellers concentration. Most of the time pastoralists come to sale animals without any information only necessitated by immediate cash requirement. But in the secondary markets there are many market participants having different purposes that influence the trading practices. However the markets or individual firms pricing system and the over all behavior of the market remains as a subject to the general market structure; the traders' practice and trade-off behavior, regardless of the markets' level of efficiency, gives a fresh look that how trading activity looks in the region.

4.7.1 Price determination

The traders' price decision at their purchase market and sales market can be influenced by the demand condition of each market used for purchase and sale. The majority of sample traders interviewed are found to be medium scale traders operating in all primary, secondary, and terminal markets. And those small and medium scale traders use both primary and secondary markets as sources of purchase market and secondary markets as sales market as well. So their response concerning their trading activities doesn't make any distinction among markets at different levels rather it indicates their implicit purchase and sales market at all levels.

Table 7: Traders price determination at purchase market and sales market.(2007)

Price determination	**At purchase market**	**At sales market**
Follow prevailing market price	38 (32%)	65 (54%)
Own determination based on the quality of the products	14 (11.5%)	13 (11%)
Jointly decided with other traders through discussion	14 (11.5%)	8 (7%)
Own determination based on cost and profit	54 (45%)	34 (28%)
Total	120(100%)	120(100%)

Source: Survey result

As indicated above in the table, the traders' price determination at their purchase market and sales market are mainly influenced by the prevailing market price and the traders own determination based on the expected prices and costs of animals. At the traders purchase market, the traders own determination and joint decision is higher than their sales market. However, the majority of the traders have influenced the market price by their side at their purchase market but at their sales market mostly price tends to be decided by the market as the levels increased from

primary to terminal markets. Here, the markets behavior of all levels that the sample traders are operating is not only a subject to their response. The markets behavior is influenced by different market actors and their interaction.

4.7.2 Use of intermediaries

Intermediaries in this study represent the market participants who facilitate the trading business other than traders themselves.

The pastoralist livestock production system is not market oriented and their marketed off-take rate is normally low. Hence, commercial livestock production and producer traders motivated by profit is almost nil in the pastoral areas of the region.

The survey result indicates that the majority of the traders use none of the intermediaries both in the purchase and sales market except large stock traders who used to trek them to the border. Large scale commercial fattening units, factories and abattoirs like ELFORA commonly use buying agents.

Table 8: Traders use of intermediaries at their purchase and sale market (2007)

Intermediaries	**Purchase market**	**Sales market**
Broker	16 (13%)	23 (19%)
Buying/selling agent	7 (6%)	9 (7.5%)
Commission agent	19 (16%)	13 (11%)
None	78 (65%)	75 (62.5%)
Total	120(100%)	120(100)

Source: survey result

The majority of the traders interviewed in this study purchase animals more often from the markets where they belong to than other market locations. And using intermediaries are not trustworthy and cost effective particularly when they trade in other market.

4.7.3 Trading business relation

Traders are interviewed if they have a regular market chain while they buy and sale animals; and the result indicates that the majority, 85% and 66% of the respondents, have no regular suppliers and customers respectively.

Table 9: Traders by their trading business relations (2007)

Responses	Regular suppliers	Regular customers
Have	18 (15%)	41 (34%)
Don't have	102 (85)	79 (66%)
Total	120(100%)	120(100%)

Source: Survey result

But as indicated in the table traders having regular customers are relatively more than those traders having regular suppliers. Among traders who have regular customers 69% of them do not let their customers buy on credit. And 83 % of traders having regular suppliers also do not have a trading practice at a credit base with any of their suppliers. But the remaining 31 % and 17 % of the respondents have a trade relation with their customers and suppliers at credit respectively. Traders haven't paid or received a different price while they are getting exchange at credit and none of the traders have made advance payment to future delivery.

Only some traders do take orders personally without meeting their customers by any means of communication i.e. telephone, radio message, mail, fax, telex and etc. All sample traders are

asked if they experienced a kind of problem with any of their customers whether they are regular or not. Some traders have experienced one of the problem listed and others experienced two and above and the others have not experienced neither of the problems. The survey results are depicted below.

Table 10: Traders' problem with customers (2007)

Problems with customers	**Frequency**	**Percentage**	**Cumulative %**
Payment after the agreed date	54	45%	45%
Partial payment	46	38%	83%
No payment	27	23%	106%
Attempt to renegotiate upon agreed price	32	27%	133%
Bad quality of purchased product	19	16%	149%
Disagreement over measuring system	58	48%	197%
No problems	63	53%	250%

Source: Survey result

More than half of the sample traders interviewed have not experienced any problems with customers. As indicated in the table above, disagreement over measuring system and delays of payment are more frequently experienced by traders than other problems. When conflict arises due to some of the problems specified above with suppliers or customers, the majority of the traders try to resolve their problems primarily through community mediation (Shimagle) and then they let the case pass to the kebele, woreda and above courts if it gets worst.

4.8 Marketing problems

The livestock sector in Ethiopia has entirely suffered poor livestock production and marketing extension service. Lack of market-oriented production system, and inadequate infrastructural and institutional set-ups are the major reasons that causes to the low performance of the overall marketing system in the country. However, problems are wide and susceptible to other conditions in Afar region as indicated in the literature, the existing livestock marketing system has also constrained by different problems. The fact that limits pastoralists' marketed livestock off-take rate remains as a subject to house hold survey though it is practically related with the marketing problems very much. However this research failed to obtain information on the constraints of pastoralists in livestock trading properly. To fill this gap, informal group discussion has been made at all sample markets and it gives a tip that lack of accessible market places, market facilities like feeding and watering points along the market places and low price are some of the reasons for limited off-take rate. The sample traders' survey result indicates that drought, price instability and lack of working capital (limited access to credit) are the first three problems having frequency percentage of 91%, 89%, and 87% respectively. The more prices are volatile, the market won't be predictable and traders will lose more. Lack of demand, inadequate infrastructure, price fixing by certain group, and loses of animals in disease, are also found to be the major marketing problems having a frequency percentage more than 70%. The percentage clarifies that a large number of sample traders have more than two or three marketing problems which considerably affect their trading business.

Table 11: Livestock marketing problems of sample traders (2007)

Problems	Freq. of responses	Percentage	Cumulative %
Price instability	107	89%	89%
Price fixing by certain groups	91	76%	165%
Barriers to trading on ethnic basis	4	3%	168%
Unfair or inappropriate taxation	7	6%	174%
Limited access to credit (lack of working capital)	104	87%	261%
Weak legal system in contract enforcement	38	32%	293%
Inadequate infrastructure	95	79%	372%
Lack of demand	100	83%	455%
Disease	89	74%	529%
Drought	109	91%	620%

Source: Survey result

4.9 Market structure

Market structure refers to the characteristic of market participants which technically influences the market behavior in determining competition and pricing system. The basic indicators of a particular market structure are the number of participants and their size distribution in the market that entail the degree of market concentration.

4.9.1 Market concentration

As specified above, concentration ratio refers the total numbers of buyers/sellers and their size distribution to have a share in a market. The survey result indicates livestock marketing in the

region like many others agricultural marketing, lacks specialization in transacting the product from producers to consumers. At any markets taken to intensive qualitative survey, all pastoralists, local traders, medium and large scale assembler traders, buying agents and consumers participate in the transaction process. At this junction, animals are channeled from producer to consumers and to other assembler traders. Unlike the logical or theoretical point of price competition and cost of transaction, animals are channeled from local traders to other assembler traders and consumers in the same market. In fact pricing system against cost of transaction and competition will be a subject to the prevailing market structure as a condition to market efficiency. If there is a high market concentration there is no market efficiency and the inverse is true that the lower concentration results in market efficiency assuming that competition will clean-up any of unnecessary margins at a condition in competitive market. (Purely competitive market is characterized by large number of buyers and sellers that a single buyer or seller cannot influence price, easy market entry and exit, determination of price through market forces and product homogeneity)

The market concentration ratio of the four selected market (Assayta, Chifra, Yallo and Sabure) is computed using the most commonly measuring system known as market concentration index of a four-firm concentration ratio [1](CR4). This ratio implies that the market share of the largest four firms; which is less than or equal to 33% generally indicates a competitive market structure, while a concentration ratio which is 33% to 50% implies weak oligopsonist market and the market share of the largest four firms above 50% indicate strong oligopsonist market structures Kohls and Uhl (1985).

[1]CR4 were obtained as (four * total purchase of the largest trader in the sample) / (total purchases by all traders surveyed in the market * total number of traders operating in the market/ number of surveyed traders).

Table 12: Four firms market concentration ratio at selected markets (2007)

Markets	Animals	CR4 (%)
Assayta	Cattle	52
	Shoat	75
	Camel	44
Chifra	Cattle	38
	Shoat	30
	Camel	41
Yallo	Cattle	19
	Shoat	12
	Camel	26
Sabure	Cattle	36
	Shoat	47
	Camel	38

Source: Survey result

As indicated from the survey result, the numbers of traders who are assembling animals from each market vary time to time according to drought conditions. However, there are a number of traders who are used to collect animals from each market regularly. The concentration ratio result implies the existence of strong oligopsonic market structure in Ayssita market especially in shoat and cattle marketing having a CR4 75% and 52% respectively. Weak oligopsonic market structure is found to be a common feature of Chifra and Sabure markets having CR4 between 33% and 50% except that of shoat markets in Chifra CR4 30%. Yallo market is the only competitive market having a lower four firm's concentration in all Shoat, Cattle and Camel markets. This market is mainly influenced by large traders from Tigray region. Relatively large volumes of camel are traded from this market that is going to be exported to Sudan through Humera.

4.9.2 Market entry

Entry to the market can be influenced by external factors like government policies and support potential. The case prevailing in the country and the region as well is positive and promotes to improve the livestock trading. The survey result at this juncture necessitates other facts that hinder entry to trading livestock. This entry barrier may be caused by the costs of transportation or lack of timely information. Lack of organized market information affects the livestock traders' transaction costs adversely. The majority of the traders in the survey have no timely information to make appropriate buying, assembling and selling decision.

High transaction costs of livestock traders especially transportation cost to small traders is the major reasons that limits participation. So this condition results in the existing market concentration limited to small number of firms. If the potential marketed volumes from pastorals in a particular area are very small, unit costs may rise as the number of traders increase. This would tend to limit the number of traders operating in isolated areas with low trade volumes. However, these considerations do not rule out problems of market conduct and/or serious barriers to entry influencing market performance (Dessalgn et al 98).

4.10 Market conduct

Market conduct refers to market behavior that the market participants adopting in pricing, buying and selling of products in the market. Structure of the market that; whether the number of

participants and their power concentration in the market determine market conduct. As indicated in the market concentration ratio, almost there is an oligopsonist structure in all markets and products except Yallo market. These large firms who jointly posses the largest share of the market have an influence to distort the market price through joint ownership (subsidiary). The qualitative traders' survey indicates that none of them determines price in collusion at their market. But, both traders survey and quantitative survey results conducted in the sample markets indicates that buyers have all the powers either to make market control or lead to special arbitrage. Livestock sales markets in the region are dominated largely by pastoral/producer sellers and some local assembler traders having small stock (sheep and got) in order to meet their cash needs for the purchase of food, for covering wedding expenses, and for repaying loans and taxes. Because of their large number compared to the buyers; pastoralists bargaining power is generally weak. And they suffer lack of direct access to other markets or alternative channels due to the absence of market extension services. As observed from the market concentration ratio that is characterized by oligopsonic market structure, price is mainly determined by some groups of buyers.

The survey result indicates that 40% of trader respondents' price at which they buy animal at the local markets is set up by deducting miscellaneous costs and a net profit margin from the prevailing price in terminal markets. This indicates that the local market prices are largely determined in relation to terminal markets prices. It has been explained by traders that prices in terminal markets change quickly between the time they find out prices in terminal markets and the time they transport and sell their animal in the terminal markets. Price fluctuation in the terminal market is not transmitted to local and regional markets rapidly. So to avoid the risks of this high price volatility traders used to add a premium at their marketing margins.

4.11 Market performance

Market performance refers the result of the ultimate relation of market structure and conduct. The competition condition and pricing are the components of market structure and conduct that considerably affects market performance conditioned with the overall marketing environment including policy setting and economic conditions. Market performance in this study is examined using marketing margins at different levels of market chains and market integration in terms of price co-movement.

4.11.1 Marketing margin

Sample prices of uniform products at each market stage cross-sectionally at one point in time across a variety of market agents is used to determine livestock marketing margins. In computing the marketing margin at selected level of marketing channels both direct and indirect cost estimation of physical and facilitating function of marketing is made in to use. For this study markets linkages are disaggregated among the main channels of market chains in the region. Theses markets are Ayssita, Yallo, and Sabure vertically linked with [2]terminal markets of Djibouti, Mekelle, and Nazret respectively. Other markets have direct relation in feeding the selected markets towards the targeted market chains. With in this chain there are also three kinds of market channel that traders are used to follow in transacting animals.

C1 = Producer trader ----------Terminal Markets

C2 = Producer trader ---------- Local trader ----------Terminal Markets

C3 = Producer trader ------ Local trader -------Large scale trader -------- Terminal markets

In every stages of the marketing chains the direct cost of transportation and assembling are used with no complexity. While the indirect cost of transportation like death and loss of weight are calculated in adding up the weighted average loss on the remaining traded animals. Due to the traditional marketing system at each market yards in the region, none of the costs of [3]facilitating functions; finance, risk bearing, and information are came out as direct costs and as a result these are not included in the cost estimation directly.

Figure 5: Informal group discussion and information exchange with local traders and pastoralists at market (Dagu System)

Source: Own picture during the survey

[2]For simplicity, these terminal markets are considered to be the end market of live animals in computing the marketing margin

[3]Facilitating function of finance, risk bearing, and information are interest on borrowed funds, commission charges for risk bearing, and information supplied by intermediaries or traders respectively

Table 13: Cattle marketing costs and margins at regional and terminal markets (2007)

	Cost, Price and Margins (USD. per head)					
	Cattle	Shoat	Cattle	Shoat	Cattle	Shoat
Description						
Mean purchase price from producers	119.8	16.5	120.7	17.4	103.0	15.5
Market costs up to regional markets	Assayta		Yallo		Sabure	
- trekking	0.9	0.1	0.8	0.2	0.7	0.1
- watering fee	0.3	0.1	0.2	0.1	0.1	0.1
- food and lodging	0.4	0.2	0.3	0.3	0.2	0.2
- loss - trading	0.2	-	-	0.1	0.2	0.1
- others	0.2	-	0.2	-	-	-
Total	2.0	0.4	1.5	0.7	1.2	0.5
Mean sales price at regional markets	130.9	19.9	130.0	21.6	114.1	18.7
Trader's mean gross margin at regional market	8.5	3.0	7.8	3.5	9.9	2.7
Mean purchase price at regional markets	130.9	19.9	130.0	21.6	114.1	18.7
Marketing costs up to terminal markets	Djibouti		Mekelle		Nazret	
- County Council fees	0.3	0.2	0.3	0.2	0.3	0.2
- trekking fee	3.3	-	1.5	-	0.5	-
- watering fee	0.4	0.2	0.2	0.3	0.2	0.1
- food & lodging	0.6	0.3	0.2	0.4	0.4	0.2
- transport	7.0	0.8	6.5	1.0	4.0	0.6
- miscellaneous costs	0.2	0.2	0.2	0.2	0.1	0.2
- loss - trading	0.2	-	0.1	-	-	-
Total	12.0	1.7	9.0	2.1	5.5	1.3
Mean sales price at terminal markets	153.3	26.3	148.2	27.2	129.8	23.8
Trader's mean gross margin at terminal markets	11.0	4.3	9.2	3.5	10.2	3.8
Total Gross Marketing Margin (TGMM)	21.85%	37.26%	18.56%	36%	20.64%	34.8

Source: Survey result

Generally, the lower the marketing margin the more markets tend to be efficient. But to determine the overall market efficiency, operational and price efficiency should be examined from the producers and consumers point of view. Compatible cost increases with the demands of consumers as a result of improved service may cause higher marketing margin, but this doesn't imply the market is inefficient. The market will remain inefficient only when the cost becomes

higher without additional service or value. In this respect the retail price change at all links of the selected market channels in the region is associated with traders margin and transportation cost. These costs in fact have no more value addition other than the place value. So, as far as no extra service or value addition is the cause for the change in retail price, the marketing margin can show efficiency of markets that consist of the same context regarding policy setting and economic environment. As a result, the marketing margin analysis indicated in table 11 implies there is no significant marketing margin difference among all market chains having higher marketing margins above 30% in cattle marketing. Yallo market is more efficient than other markets in Shoat trading with a significantly lower margin 18%.

4.12 Livestock Price

Price as distinct variable has been analyzed by taking in to consideration livestock breed, age group, gender, market places, seasons of the year, number of market participants (buyers, sellers, and intermediaries). The whole regression model shows that significant price relation is found between price and other independent variables except that of number of market participants. A separate test has been made among all factors which are found to be significant in determining each animals prices using one way analysis of variance with in each group of the factors.

4.12.1 One-Way Analysis of Variance and *t*-Test: results and discussion

A one-way analysis of variance is the attribution and test that part of the total variability in a response is due to the difference in mean responses among the factor groups. The analysis of variance technique computes the mean within each group and the sum of squared distances from each point to the group mean.

Goat price

One way analysis of price shows that there is a significant mean price variation in all the factors assumed to be the goat price variation. The hypothesis set before holds that there is at lest one mean price variation with in the factors. So the result indicates there is mean price variation at ninety five percent confidence interval that p=0.001 is less than alpha= 0.05. Among the market places Abaala market has significantly different mean price from other markets. But the rest of four markets mean goat price is not considerably different. One-way analysis of goat price by age group shows that there is significant mean price difference among all age groups of mature, immature, and young goats at alpha=0.05. The same is true for all gender and grades of goats that there is significant mean price variation with in each group of goats' prices.

Table 14: Means of goat price for One-way ANOVA (2007)

Market	Number	Mean	Std Error	Lower 95%	Upper 95%
Abaala	355	23.2732	0.43948	22.411	24.135
Ayssaita	386	18.1218	0.42146	17.295	18.949
Chifra	240	18.2667	0.53450	17.218	19.315
Werer	237	17.7384	0.53787	16.683	18.794
Yallo	178	19.2416	0.62064	18.024	20.459
Age group					
Immature	332	11.8584	0.39336	11.087	12.630
Mature	596	23.8591	0.29359	23.283	24.435
Young	468	19.4722	0.33131	18.822	20.122
Gender					
Female	582	18.3883	0.35276	17.696	19.080
Male	814	20.3538	0.29829	19.769	20.939
Grade					
Grade 1	8	48.1250	2.7388	42.752	53.498
Grade 2	547	22.6197	0.3312	21.970	23.269
Grade 3	637	18.2559	0.3069	17.654	18.858
Grade 4	204	14.1324	0.5424	13.068	15.196

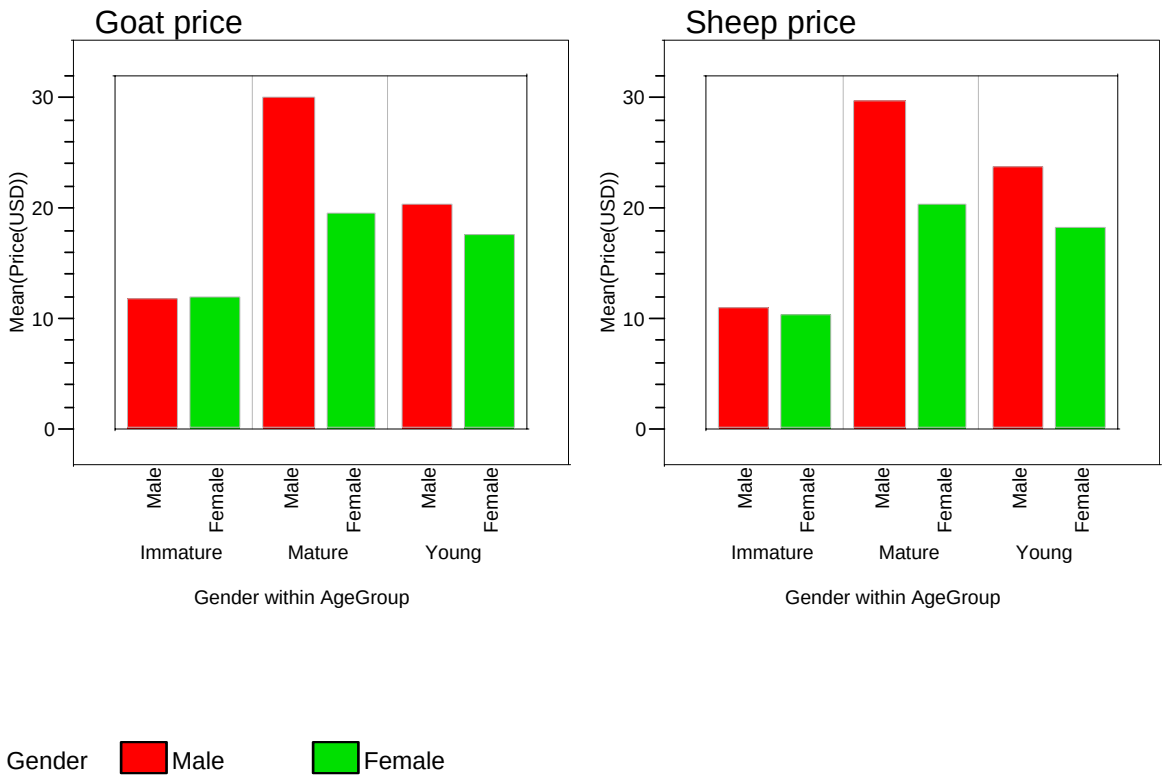
Source: Data collected by LINKS

Note: The Std. Error shown in the table of means for one-way ANOVA lists the estimates of the standard deviations for the group means. This standard error is estimated assuming that the variance of the

response is the same in each level. It is the root mean square error found in the Summary of Fit table divided by the square root of the number of values used to compute the group mean.

The summery statistics for mean price values of Gender with in Age Group indicated at the following chart implies different sheep and goat prices has been observed between male and female animals with in mature and immature age groups.

Figure 6: Mean price of goat and sheep with gender and age group



Sheep price

The analysis of variance result of sheep price is the same as goat price result. Only Abaala market has significantly high mean price variation from the other four markets. There is no significant mean price variation among the rest four markets. But other factors built-in the animals nature

like age, gender, and grade of animals have significantly different mean price variation among each group. Male sheep have higher price than female and the higher the age of sheep's (mature, immature, and young) and the superior the grades of animals the price will get higher and higher.

Table 15: Means of sheep price for One-way ANOVA (200)

Market	Number	Mean	Std Error	Lower 95%	Upper 95%
Abaala	309	30.4369	0.49930	29.457	31.416
Ayssaita	302	17.4636	0.50505	16.473	18.454
Chifra	218	18.7248	0.59444	17.559	19.891
Werer	210	16.4619	0.60566	15.274	17.650
Yallo	177	18.3051	0.65971	17.011	19.599
Age group					
Immature	248	11.0887	0.57665	9.957	12.220
Mature	548	24.3814	0.38792	23.620	25.142
Young	420	22.2548	0.44311	21.385	23.124
Gender					
Female	467	19.1906	0.47702	18.255	20.126
Male	749	22.0240	0.37666	21.285	22.763
Grade					
Grade 1	22	43.8182	2.0533	39.790	47.847
Grade 2	455	23.3670	0.4515	22.481	24.253
Grade 3	543	19.5175	0.4133	18.707	20.328
Grade 4	196	16.6531	0.6879	15.303	18.003

Source: Data collected by LINKS

Cattle price

The most traded cattle in the region are Danakil breed followed by Raya Azabo in all parts and northern parts of the region respectively. However, there are other breeds of cattle traded in the regions' market. The statistical analysis result indicates that price variation exists among markets which have similar cattle conditions. Abaala markets average cattle price is significantly different from other markets having higher mean price of 140.6USD and Werer market as well have a minimum mean price 89.7USD which is considerably different from other markets at 5% significant level. The rest markets of Chifra, Yallo, and Ayssita have no significant cattle price variation. Unlike other animals, different breeds of cattle are observed in livestock markets of the

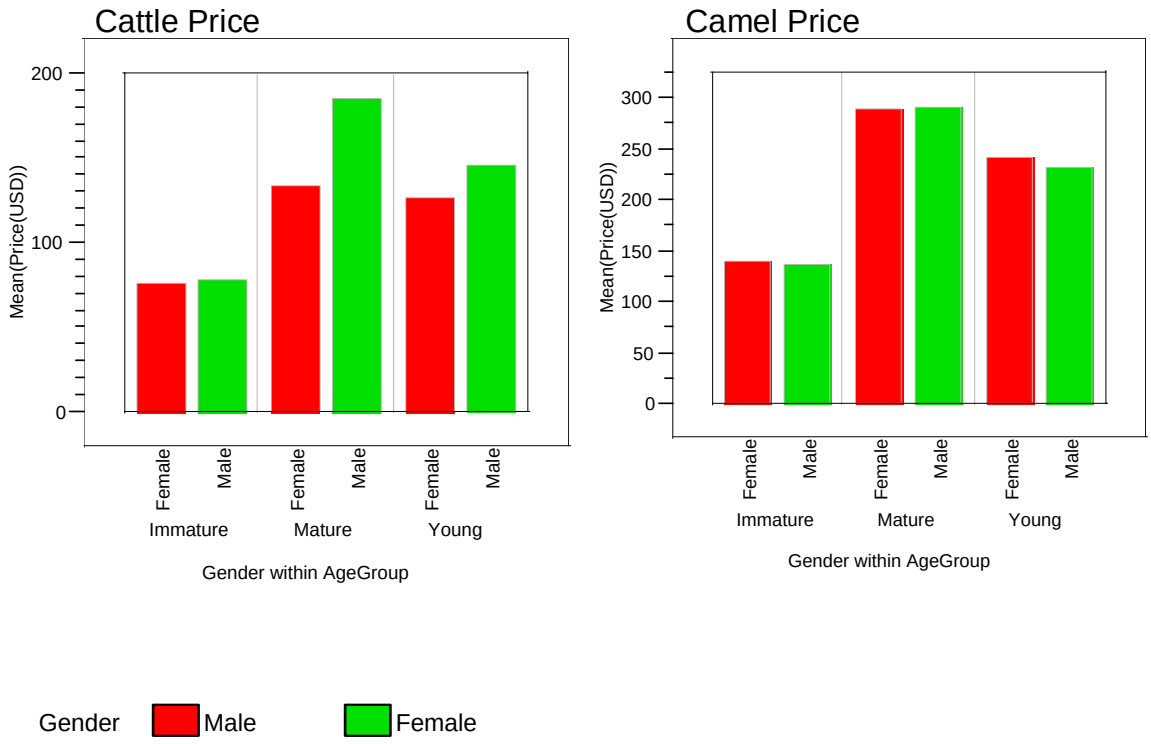
region. However the observation of Borena breed and Mixed breed of cattle is very small in the markets, a significant mean price variation among all breeds are pragmatic. Zebu breed has obtained a highest price having average price of 173.4USD mainly traded in Werer market. While Borena and Danakil breeds have lower mean price of 85.5 and 113 respectively that are significantly different from Zebu breed. The rest of the cattle breeds traded in the regions market; Mixed, Raya Azabo, Arsi, and Danakel have different mean price 156, 132.2, 126.4, 113 respectively that is not statistically different at 5% significant level. Another result, which is different to cattle, is the absence of significant mean price variation between male and female cattle. The commonly price difference that brings into being to all types of animal is tided with their age group and Grade. There is significant price divergence among all ages (mature, immature, and young) and grades (Grade 2, Grade 3, and Grade 4) of cattle. However gender and age group is found to be major factors to price variation, the male and female price with in immature age groups of cattle is not remarkable.

Table 16: Means of cattle price for One-way ANOVA (2007)

Market	Number	Mean	Std Error	Lower 95%	Upper 95%
Abaala	519	140.686	2.3956	135.99	145.39
Ayssaita	282	122.408	3.2500	116.03	128.78
Chifra	126	114.063	4.8621	104.52	123.60
Werer	151	89.728	4.4414	81.01	98.44
Yallo	148	123.385	4.4862	114.58	132.19
Breed					
Arsi	263	126.464	3.345	119.90	133.03
Boran	4	85.500	27.126	32.28	138.72
Danakil	601	113.000	2.213	108.66	117.34
Mixed	9	156.000	18.084	120.52	191.48
Raya Azebo	236	132.216	3.531	125.29	139.14
Zebu	113	173.407	5.104	163.39	183.42
Age group					
Immature	382	77.788	2.3885	73.10	82.47
Mature	496	153.206	2.0961	149.09	157.32
Young	348	137.966	2.5024	133.06	142.88
Gender					
Female	572	123.168	2.3796	118.50	127.84
Male	654	127.317	2.2254	122.95	131.68
Grade					
Grade 2	208	154.327	3.7727	146.93	161.73
Grade 3	661	128.051	2.1164	123.90	132.20
Grade 4	357	103.571	2.8797	97.92	109.22

Source: Data collected by LINKS

Figure 7: Mean price of cattle and sheep with age group and gender



Camel price

Considerable camel price difference is found between the markets. Abaala and Yallo have higher mean price of 254 and 223.9 respectively whereas in Ayssita and Chifra market, camel price variation is not significant having lower average price of 194.8, and 190.1 respectively. Regarding to other conditions believed to bring price variation, strange result has been found to Grade 3 and Grade 4 camels which have no significant price variation. However, Price difference between gender and age groups of camel is imperative and widespread in all markets; price difference between male and female camels with in each age group is not significant. This result shows that the price difference between genders of camel is a subject to other conditions like grades of camels, purpose of buying and their interactions.

Table 17: Means of camel price for One-way ANOVA (2007)

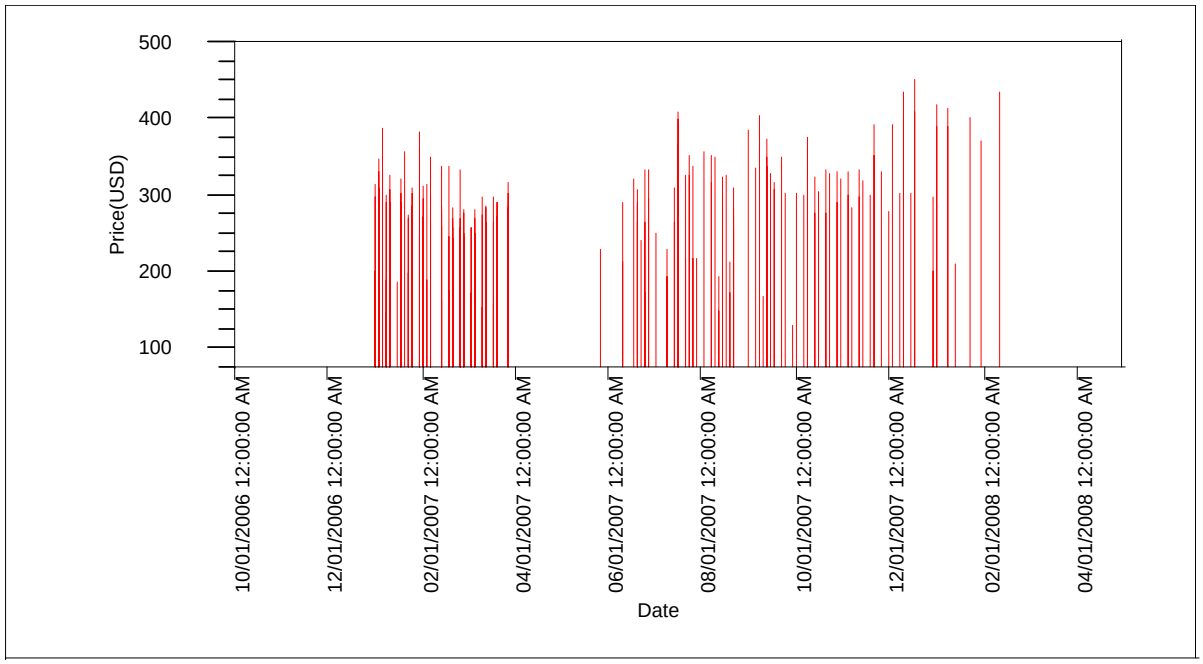
Market	Number	Mean	Std Error	Lower 95%	Upper 95%
Abaala	231	254.022	4.7897	244.61	263.43
Ayssaita	118	194.831	6.7015	181.67	207.99
Chifra	113	190.159	6.8482	176.71	203.61
Yallo	133	223.895	6.3123	211.50	236.29
Age group					
Immature	183	138.000	3.4698	131.19	144.81
Mature	197	291.244	3.3442	284.68	297.81
Young	215	233.981	3.2012	227.69	240.27
Gender					
Female	107	240.832	7.4590	226.18	255.48
Male	488	219.602	3.4927	212.74	226.46
Grade					
Grade 2	96	265.552	7.6688	250.49	280.61
Grade 3	374	219.342	3.8853	211.71	226.97
Grade 4	125	203.264	6.7206	190.06	216.46

Source: Data collected by LINKS

4.12.2 Impact of seasonality on livestock price

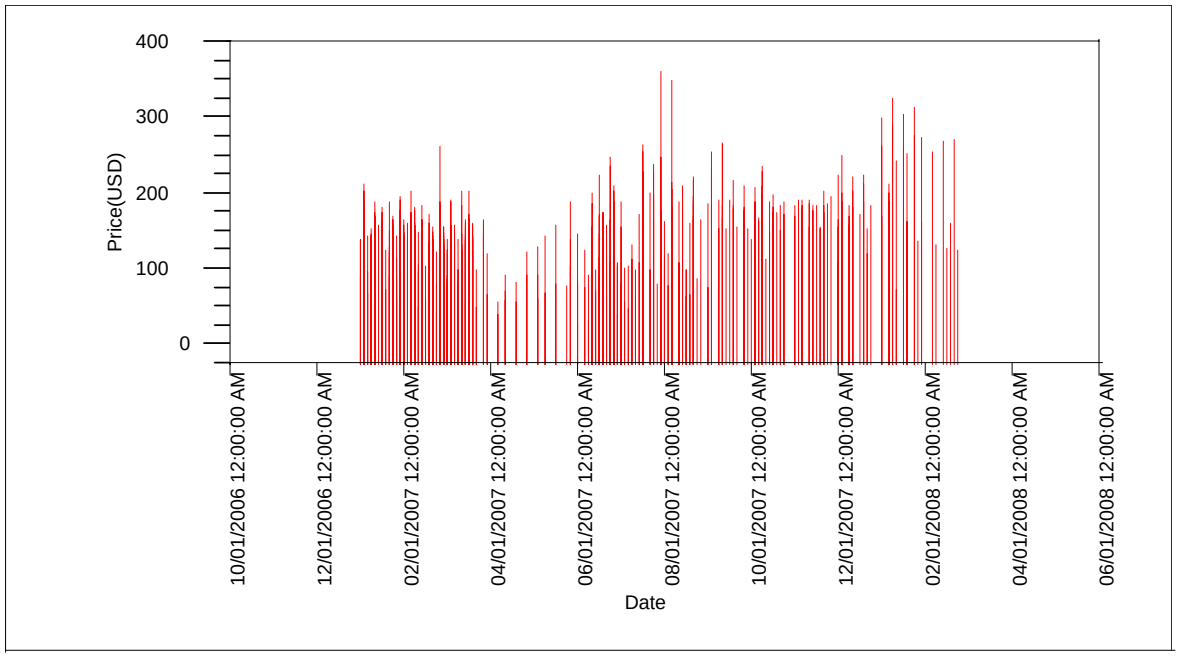
Seasonality in its general pattern has categorized in to different climatic conditions within a year. However the largest part of Afar region remains very hot all the year round, other parts which are adjacent to the highlands of the country have experienced the four seasons in the company of different climatic conditions. The general pattern of price depends on the availability of pasture and water over the year. During the dry season (mid-December to mid-march) livestock price tends to decline due to the drought that causes pastoralists to sale their animals. Depending on the rain condition, if it comes early, price of livestock will go up between mid-March to mid-June. This will happen to the seasons alone regardless of other conditions like festivals and demands in domestic and export markets. In the mid-June to mid-September and the mid-September to mid-December livestock price tends to go down and start to rise respectively depending on other conditions.

Figure 8: Price of camel over the year 2007



Livestock of Matured age group is selected to all these seasonality analysis. The rise and fall of price of animals in the year 2007 is indicated in the figures that Camel price is high in January and becomes low to June and starts to rise to August. And there is the same serge in price to September and remains slightly lower until December. Cattle price also starts to decline from March to June and rise the month onwards till it reaches to the peak in August. Then the price remains the same at average rate to December.

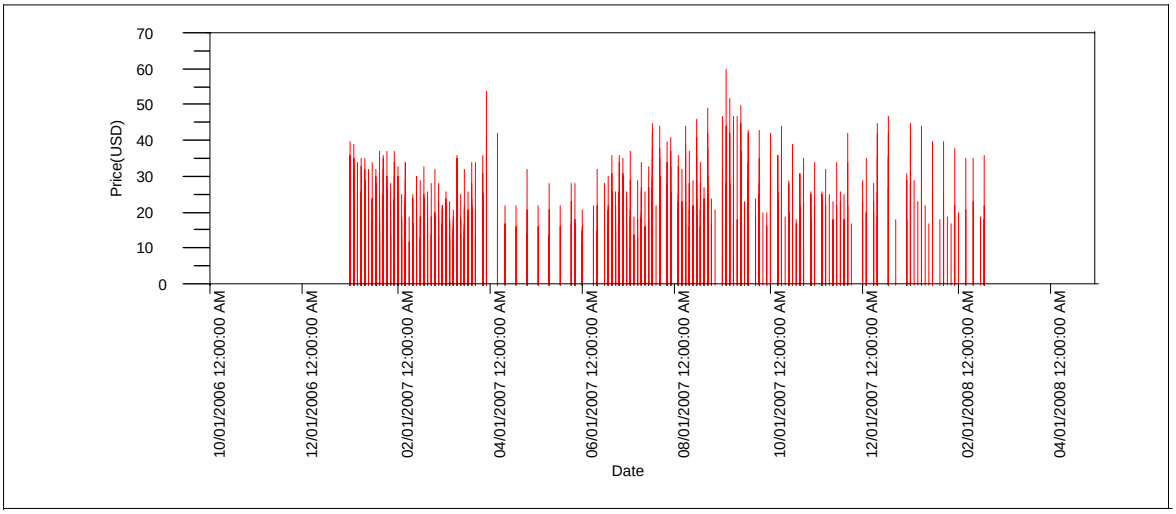
Figure 9: Price of cattle over the year 2007



Source: Data collected by LINKS

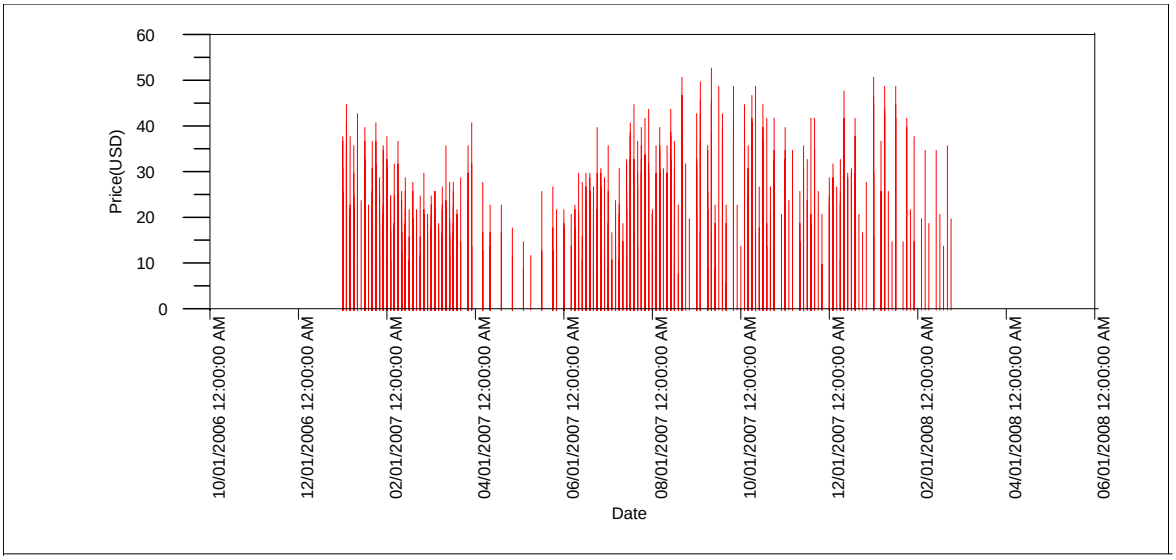
Goat and Sheep prices' trend observed over the Year 2007 is almost the same. As indicated in the figure, both Goat and Sheep price starts to turn down at declining rate from January to March and becomes high rapidly at April, then goes down to June and remains high again between August to October. And it begins to decline in December. This analysis lacks dependability to conclude the general trend of livestock price all over the years other than the year 2007.

Figure 10: Prices of goat over the year 2007



Source: Data collected by LINKS

Figure 11: Prices of sheep over the year 2007



Source: Data collected by LINKS

4.12.3 Price co-movement and market integration

Market performance can be analyzed using the indirect market efficiency measurement on the spatial price behavior that the system is to be efficient, characterized by high degree of price integration. Price change at a given market transmitted or co- move to other markets through arbitrage in a competitive and efficient transaction system. To analyze the linkage of markets across different routs including the transaction cost needs to be analyzed using advanced regression methods. Here the contemporaneous livestock price co-movement is analyzed using multivariate correlation coefficients of the same animals across different markets and different animals type in the same markets. Generally positive multivariate correlation coefficients of different species and types of animals indicate a market functioning in integration that one animal substitutes another. The same is true that a particular animal having a positive multivariate correlation coefficient across different markets can be anticipated operating well. .

Multivariate correlation analysis of the same types of animals in different markets

Before interpreting the correlation coefficient it is examined at 5% significant level, alpha = 0.05. If the significance probability value is less than $\alpha = 0.05$ the correlation coefficient is significant to determine whether the market is integrated or not. The market is said to be highly, modestly or moderately correlated according to the correlation coefficients. According to Blyn (1973) markets are integrated if the correlation coefficient is grater than positive 0.6.

Animals of matured age group at each species are used to the multivariate correlation coefficient analysis of the five markets (Abaala, Ayssita, Chifra, Werer, and Yallo). As shown at appendix---

Sheep

Sheep price correlation coefficient is significant to Ayssita and Chifra markets (prob. value. = 0.0008) and Abaala and Ayssita markets (prob. value = 0.006). the result indicates that almost no sheep price co-movement among the majority of markets except the moderate co-movement observed between Ayssita – Chifra markets and Abaala – Ayssita markets having correlation coefficient = 0.355 and 0.294 respectively. .

Goat

Improved price co-movement is observed in Goat marketing system. The pairwise correlation result indicates there are 56%, 32%, and 23% correlation between Ayssita – Aballa, Chifra – Abaala, and Chifra – Ayssita markets respectively. Surprisingly, a significant negative price correlation is observed between Werer and Abaala markets; may be the reason that can be speculated is that both markets are geographically located in a distant being sources of livestock supply to the border Djibouti and Nazret markets respectively. The high cost of exporters and abattoirs that collects Goat at Werer market may cut the price down there, and possibly the demand against the supply of Ethiopian exporters at border market can pick up the price at Ayssita market. This is in fact merely contemplated to the negative relation of Goat prices come about at the two markets only.

Cattle

Significant positive cattle price co-movement is observed between Chifra – Ayssita, Werer – Ayssita, and Werer – Chifra markets having correlation coefficients 0.595, 0.483, and 0.368

respectively. However price correlation is not strong, a better cattle price co-movement among the three markets enlighten them more with a comparative competence than other market places.

Camel

Significant positive Camel price correlation is found only between Ayssita and Abaala markets that comprise lower correlation coefficient 0.30. Generally the degrees of price co-movement between markets are low. In large numbers of market pairs the animals' price correlation coefficient is close to zero. That implies no correlation and co-integration is found at all between markets. As observed from the pairwise correlation of animals in each market pairs, Ayssita market is better correlated with some other markets followed by Chifra.

Inadequate marketing services such as lack of timely market information and inadequate market infrastructures that bring about lagged response of price to the demand can be the main reasons to lack of price co-movement.

Multivariate Correlation analysis of different types of animals at a market

The pairwise correlation analysis of different types of animals in Ayssita market indicates that significant price correlations are found between some degrees of animals' type. Strong price co-movement is observed between different grades of same animals. All types of cattle's Pair, Heifer – Fattened ox, Steer – Fattened ox, and Steer – Heifer have significant correlation coefficients of 0.833, 0.854, and 0.665 respectively except that of Bull price. And a strong price co-movement is observed between Goat (buck) and Ram (sheep) with in Ayssita market. No price co-movement is observed between large stocks and small stocks that may be resulted from lack of substitution

between them given that this kind of price co-movement is highly dependable on the degree of substitutability between animals.

4.12.4 Livestock supply and price

Theoretically, supply of livestock is a subject of price implying that supply will increase as price increases assuming that other things remains constant. The over all livestock price computed with the regression function is found to be significant in determining livestock supply. But the correlation coefficient result shows the relation between price of livestock and number of animals offered is weak.

The relation between numbers of animals offered, soled and average price of different types of animals is represented in overlay plot at the figures below. The number of data used to this analysis is so small to conclude. But it gives a tip how price and number of animals have been moving in the year 2007 at sample markets of Ayssita and Chifra.

Figure 12: The relation among number of Bulls (4 and above years old) supplied, soled and average price (2007)

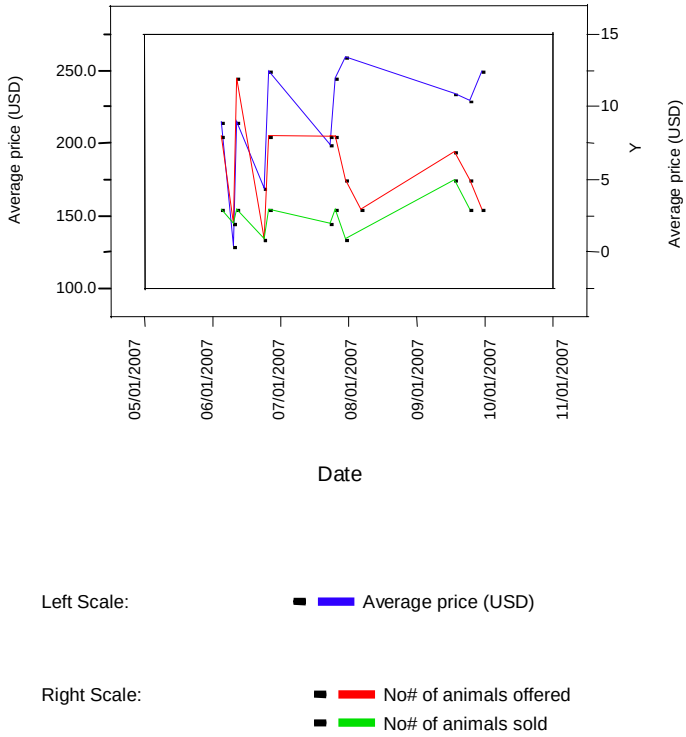
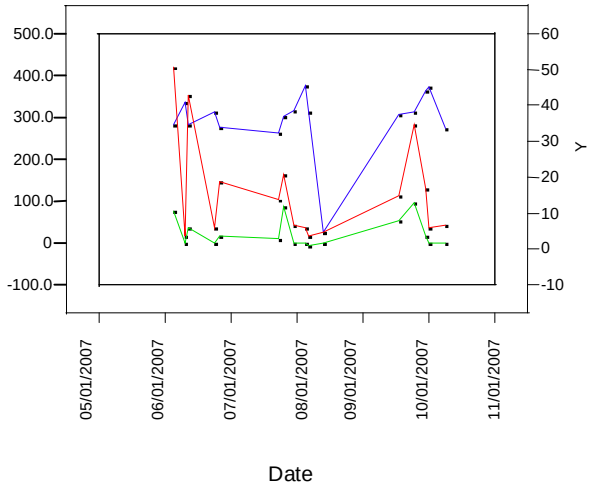


Figure 13: The relation among number of camel (big male) supplied, soled and average price (2007)



Source: Data collected by ACDI/VOCA

However the relation is too weak to develop the supply schedule, number of animals offered increase as price increases. This is logically accepted that supply is dependent on price in a condition other things are constant. But strong positive relation is found between number of animals sold and supplied. The positive relation of all price and animals supplied and sold is unlikely to depict the normal relation that has to be occurred in a usual condition. So it gives a fresh look to examine other factors that has pinched this abnormality and; the rise of demand at all levels of markets can increase the equilibrium price though price and supply of livestock moves together in the same way.

Figure 14: The relation among number of goat (buck) supplied, soled and average price (2007)

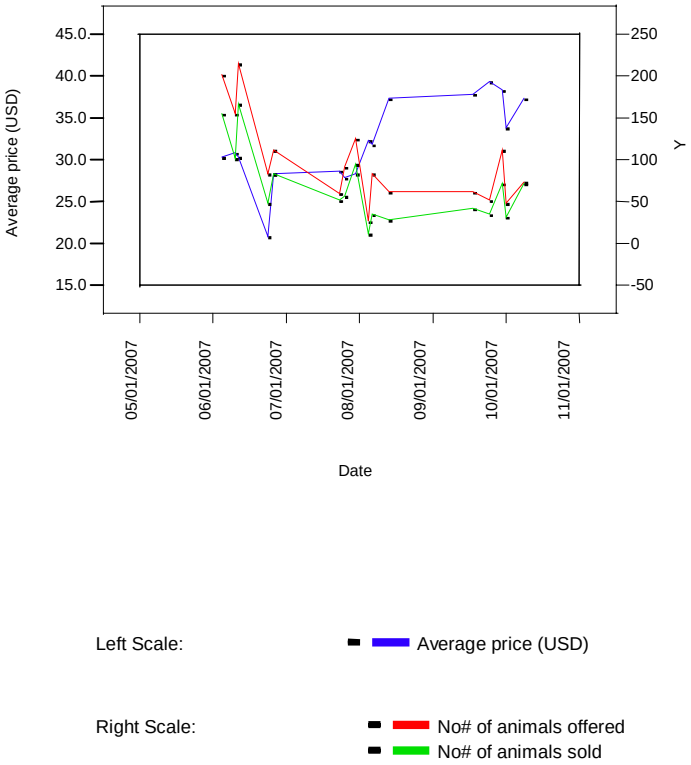
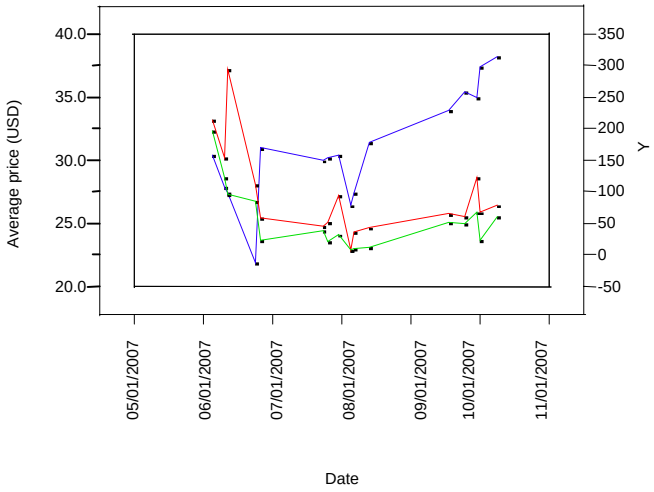


Figure 15: The relation among number of sheep (ram) supplied, soled and average price (2007)



Source: Data collected by ACDI/VOCA

The number of animals sold increase as the number of animals offered rises. But it doesn't imply any cause and effect relation with out the effect of demand and price. The cause what is happening in the relation depicted in the graph may feel right the rise of demand aligned with the price increase.

5 Conclusion and Recommendation

5.1 Conclusion

The livestock marketing system in the region has followed both formal and informal (contraband) trade routes. From these informal trade routes, camel trading from Yallo market through Humera to Sudan and cattle trading to Djibouti from Ayssita and Chifra markets are the largest. But most of the regions sheep and goat are traded in formal ways to neighboring regions for the purpose of slaughter by export abattoirs, butchers, hotels and direct users. Cattle and camels are also traded through these formal trading routs for live export via commercial fattening units and exporters.

The structure of livestock marketing system is assessed based on the agreed criteria of number of livestock offered, types of market participants, and purpose of buying/selling and; only three markets (Ayssita, Chifra, and Yallo) are found to be secondary or redistributive. These markets are largely dominated by pastoralists and local assembler traders as sellers and small numbers of wholesale traders as buyers. Most of the markets in the region are having oligopsonic market structure with a higher market concentration ratio of wholesale traders; as a result the largest market share go away with these groups plus they also have the power to influence price at the same time.

Trekking livestock is the main means of transportation in the region. Indirect costs of trekking, weight loss or death in transit will be high in drought seasons compared to the direct costs of trucking. But in wet season trekking will be more advantageous being provided with pasture and water alongside the trek routes especially for whom trekking aside the north-west and southern escarpments of the region.

Normally, livestock marketing system is too poor to meet both the pastoral livestock producers and the local traders' desire on the subject of the resources they have. There are some traders who have earned higher profit at the expense of the poor pastoralists; but the over all system is inefficient characterized by inadequate livestock marketing services and market infrastructure and as a result pastoralists and small-scale locale traders are remained with little return from the retail price of their livestock soled at terminal markets. Moreover, most of the local traders operating in the primary and secondary markets are suffered with the marketing problems of lack of market demand, price instability, lack of financial services; and the recurrent drought followed by livestock disease makes the assembling and holding situations worth even to preserve the original costs of animals.

Livestock price is dependent with market places, breeds, gender, age groups, and grades of animals having significant average price variations within each group. But the prices are not correlated each other in each markets that demonstrates the poor performance of markets in responding the demand promptly.

5.2 Recommendation

Livestock marketing is the main economic activity in the region that supports the livelihood of pastoralists by means of the cash income derived from the exchange of livestock. But the vicious circle geared with challenging marketing system has left the pastoralists with low income and this low income also constrained them in adopting market oriented system of production and wider linkage of market chain. So to break this round; external body other than the market actors, has to move the first wheel to make the marketing system more advanced and efficient. Marketing information system and extension service that focuses to increase the livestock sales volume with a better bargaining power will increase the pastoralists' income from the resources at hand. Then the income again will drive them to follow the fastest growing global marketing system which is mandatory to compete with others against the growing and changing tests and preference of customers.

In fact, efforts are made by NGOs and Governments in the area of physical market construction accommodated with other facilities in selected market locations. Beside this development of livestock market infrastructures such as holding stations, pasture and water points along with the trek routs will maintain the conditions and volumes of livestock traded better in the drought seasons.

The study result shows the existence of higher market concentration in the regional markets by large wholesale buyers is the main reason that results in low performance of marketing. Therefore

the physical infrastructure alone doesn't increase the pastoralists bargaining power unless they use economies of scale at every steeps of transaction being provided with reliable and organized marketing information. In this juncture, institutional set-ups, such as association of pastoralists in the form of livestock marketing cooperatives, will be more use full in avoiding the higher marketing margins caused by fragmented costs and premiums. Moreover, cooperatives for pastoralists can create new markets vertically and improve the trade volume and relation with all customers and livestock exporters concurrently through market integration and fair arbitrage. So to create effective and efficient marketing system in fulfilling both the producers and consumers interest, livestock marketing cooperatives are the best of the essence.

In solving the problem of low market demand, development of institutions in favor of livestock fattening and product processing in the widest sense of the country will create extra demand to both pastoralists and livestock traders.

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Appendix

Appendix 1: Livestock traders survey interview schedule

A. CHARACTERISTICS OF THE TRADER (RESPONDENT)

1. NAME OF RESPONDENT	
2. GENDER OF RESPONDENT 1. Male 2. Female	
3.AGE OF RESPONDANT 1. Youth 2. Middle-aged 3. Elder	
4. WOREDA	
5. ZONE	
6. REGION	

Now we will ask you about you and your trading business.

1 What is the level of schooling you have completed?	
2 What was your primary Occupation before getting involved in animal trade? (occupation code)	

3 Are you a member of any trader's association below?

Associations	1. Yes 2. no
3.1. Chamber of Commerce	
3.2. Cooperatives	
3.3. Informal traders association (not registered)	
3.4. NGO-sponsored associations	
3.5. Govt. sponsored associations	
3.6. Other ----------	

7 Do you get any advantages from membership in these associations? 1. Yes 2. No 3. Don't know

B. DEFINING THE TRADING ENTERPRISE

1 Since the start of this year , which were the most important animals that you trade? (see animals code) 1. Cattle 3. Sheep 2. Goat 4. Camel ☐☐☐☐

2 Do you have another occupation other than trading livestock? 1. Yes 2. No

3 If yes, what is your occupation? ☐

Occupation codes:

1. Farming/fishing/livestock raising
2. Processing of agricultural products
3. Trade in other agric, products than grain or coffee
4. Trade in non-agricultural commodities
5. Transport (e.g. truck, taxi)
6. Crafts (tailor, wood work, brick)
7. Services (ex: blacksmith, mechanic, restaurant)
8. Wage worker/civil servant
9. Student
10. No work/house work
11. Soldier
12. Other ----------

4 What is the legal status of this trading business? ☐

1. Sole ownership
2. Subsidiary (or branch) of another enterprise
3. Partnership
4. Cooperative
5. Shareholding Company (action)
6. State-owned enterprise
7. Other ----------

5 When did this trading business start operating? EC ☐

6 Did the current owner(s), you, start this trading business? ☐

1. Yes 2. No 3. Don't know

7 Who has helped you financially to start this trading business? ☐

1. Owner(s) only
2. Family members
3. Non-family members residing locally
4. Non-family members residing elsewhere
5. Local company
6. Foreign company
7. Local bank
8. Alternative financial institution (e.g, NGO,MFI)
9. Other
10. Don't know

C. MARKETING CONCERNS

We would like to ask you about your opinions regarding the current market situation.

1 Do you think that the marketing system in our country needs to be improved? 1.Yes 2.No 3.Don't know ☐

2 In your opinion, what are the three most important problems facing your marketing system? ☐☐☐

1. Price instability
2. Price fixing by certain market
3. Barriers to trading on ethnic basis
4. Drought
5. Trading practice of cooperatives
6. Disease
7. Pressure by authorities
8. Unfair or inappropriate taxation
9. Difficulties in obtaining license
10. Lack of regulation of unlicensed traders
12. Limited access to credit
13. Weak legal system for contract enforcement actors
14. Inadequate infrastructure
15. Problems with demand or Supply situation
16. Others ----------

3 How do you determine at what price to buy products, in the majority of cases?

1. Follow prevailing market prices
2. I make my own determination on the basis of the quality and quantity of the product
3. I discuss with other buyers like me and we jointly agree on the market price
4. I fix my purchase price according to the sale price I think can get (FINAL PRICE-COSTS)
5. I fix my purchase price according to the other large buyers in the markets
6. Other ----------

4 How do you determine at what price you will sell your products, in the majority of cases?

1. I follow prevailing market prices
2. I negotiate with individual buyers
3. I discuss with other sellers me and we jointly agree on the market price
4. I fix my sale price according to my purchase price (PURCHASE PRICE+COSTS)
5. I fix my sale price according to the other large sellers in the market
6. Other ----------

5 Are there large commercial trading enterprises and processing enterprises (factories, abattoirs, etc) active in your market?

1. Yes, 2. No 3. Don't know

6 If yes, how many operate in your main market?

7. With all the different market participants, do you consider this market to be competitive, in that prices are determined through free market competition among market actors? 1. Yes 2. No 3. Don't know

D.TRADING ACTIVITIES

1 Trading and storage patterns over time by product

Describe your purchases and sales (on your account) and storage (including carryover) in your recent transaction carried out this month

Product code --------		**Product code --------**		**Product code --------**		**Product code --------**	
Quantity purchased		Quantity purchased		Quantity purchased		Quantity purchased	
Unit code		Unit code		Unit code		Unit code	
Average purchase price		Average purchase price		Average purchase price		Average purchase price	
Quantity sold		Quantity sold		Quantity sold		Quantity sold	
Unit code		Unit code		Unit code		Unit code	
Average sale price		Average sale price		Average sale price		Average sale price	
Quantity in storage* (at end of month)		Quantity in storage* (at end of month)		Quantity in storage* (at end of month)		Quantity in storage* (at end of month)	
Unit code		Unit code		Unit code		Unit code	

2 Types of suppliers and customers by product

What are your source of purchase and sale; please indicate suppliers and customers

Purchase	**Product** ----------	**Product** ----------	**Product** ----------	**Product** ----------	**Sale**	**Product** ----------	**Product--** ------	**Product--** -------	**Produ** ------
From small-scale farmers/pastorals?					To consumers				
From commercial farmers/pastorals?					To traders				
From assembler traders?					To processors (factories,)				
From Cooperative s?					To institutional buyers (hotels, schools, defense…)				
From other?									
					To other ----------				

3 Variable Marketing Costs of Most Recent Completed Transaction

3.1 Ask the trader when he completed his last transaction, that is he bought and sold a given quantity. Ask which product that was. Then, all remaining questions concern that product, and only that transaction. A completed purchase and sale transaction is when all activities between purchase and sale have been completed)

a. Product code	b.Purchase market	c. Sale market	d. Kms from purchase market to sale market	e. Number of days between purchase and sale	f. Total quantity purchased	g. Unit code of purchase	h. purchase price (Birr)	i. Total quantity sold
m. Quantity lost during storage	l. Number of people from whom you purchased	m. Number of people to whom you sold	n. Did you travel to purchase or sale market? 1. Yes 2. No	o. Intermediary used for purchase (Intermediary cod)	p. Intermediary used for sale (intermediary code)			

Intermediary codes: 0.Non 1. Buying agent/selling 2. Broker 3. Commission agent

3.2 What were your marketing costs from purchase to sale for this transaction?

Cost Category	**a. Mode of Transport code**	**a. Birr**	**b. Unit code**
3.2.1 Loading at purchase market			
3.2.2 Payment to intermediary agent at purchase			
3.2.3 Tips during purchase			
3.2.4 Market levies at purchase market			
3.2.5 Market levies at purchase market to either intermediary or final sale market			
3.2.6Transport costs from intermediary to final sale market			
3.2.7 Total Payments at road stops (kella) ----- number			
3.2.8Total Bribes at road stops (kella) ----- number			
3.2.9 payment to transport broker			
3.2.10 Off-loading at intermediate market (not final sale market)			
3.2.11 Loading at intermediate market (not final sale market)			
3.2.12 Off-Loading at final sale market			
3.2.13 Storage costs (if paid per bag)			
3.2.14 Telephone/radio message costs for this purchase or sale			
3.2.15 Payment to intermediary agent at sale			
3.2.16 Tips during sale (outside of agent fees)			
3.2.17 Personal travel costs			
3.2.18 Municipality market levels at sale market			
3.2.19 Other ----------			

(Not: indicate applicable costs in the unit that is preferred by the respondent and note the unit code. If not applicable, mark 0. Use the code 33 if costs are for the entire shipment. If own vehicle, ask the trader to estimate transport costs, including gas and other costs per shipment. Taxes include all taxes that are proportional to shipment or to weight/ volume. Fixed taxes (e.g, per market day, monthly and annual assessments) must be entered in the operations costs section)

Mode of transport codes

1. Trekking 2. Trucking

4 Change in trading volumes

4.1 Have trading volumes changed in your main purchase markets?

animals you trade (code)	1999 compared to 1998 (E.C)			1998 compared to 1997 (E.C)		
	Trading volume			Trading volume		
	Dray season	Wet season	Festival	Dray season	Wet season	Festival

Codes: 1. Increased 2. Decreased 3. Remained 4. Don't know

4.2 If yes, what explains changes in trading volume in the past 3 Years? (post code)

E. TRADING PRACTICES

1. Use of Intermediaries

1.1 Do you use intermediaries, such as agents or brokers, who either sell or buy on your behalf? ☐
1. Yes 2. No

2. Regular Suppliers and Customers (Dembegna)

2.1 Do you have regular suppliers from whom you purchase regularly? 1. yes 2.No ☐
2.2 Do you have regular customers to whom you sell regularly? 1.yes 2.No ☐

3. Types of Contracting Agreement
(**Credit from Suppliers e.g. pastorals, Traders, others)**

3.1 Do any of your suppliers let you buy on credit? ☐
1. None of your suppliers 2. Some of your suppliers 3. All your suppliers

3.2 Do you pay a different price when you buy on credit? 1. Yes 2. No ☐

3.3 Do you let any of customers buy on credit? 1. Never 2. Some customers 3. All customers ☐

3.4 Do you receive a different price when you sell on credit? 1. Yes 2. No ☐

4 Do you ever buy with advance payment (full amount) or deposit (partial payment) ☐
To traders 1. Never 2. Sometimes 3. Always

5 What are your main sources of market information? Rank. First ☐ Second ☐ Third ☐

Information

1. Personal observation (seeing, eavesdropping)
2. Speaking with regular customers
3. Speaking with regular suppliers
4. Speaking with intermediaries (buying agents, brokers, Selling agents)
5. Speaking with other traders like your self
6. News papers
7. Radio/Television
8. Intemet
9. Respondent sets his/her own price
10. Association or Chamber of Commerce
11. Concerned government officials (trade bureau)
12. Other -----
13. I don't get any information

6 When you sell products in markets outside of your market, if you don't find a buyer, what do you do?

1. You leave your products with a selling agent or broker
2. You return with the products on the following market days
3. You sell products at a reduced price or home
4. You sell on credit
5. You recondition the product to increase its value
6. You return with the product to your own market
7. You take the product to a different market.

7 Trading Disputes

7.1 Have you experienced any of the following problems with customers?

	a. 1 Yes 2. No
1 Payment after the agreed upon date	
2 Partial payment	
3 No Payment	
4 Attempt to renegotiate agreed upon price	
5 Bad quality of purchased product	
6 Disagreement over measuring system	

8 Dispute Resolution

8.1 How did you ultimately resolve your disputes, with either suppliers or customers? Rank.

a. Disputes with suppliers First ☐ Second ☐ Third ☐

b. Disputes with customers First ☐ Second ☐ Third ☐

Responses

1. Kebele courts
2. Woreda and above courts
3. Association arbitration
4. Community mediation (shimagile)
5. Informal mediation by friends and peers
6. Brokers
7. Religious father
8. Clan leaders
9. Personal resolution (without other intervention)
10. No resolution
11. Other ----------

F. Financial Assets and Access to Credit

1 What is your current working capital that you use for trading purposes? Birr ☐

2 Have you had access to any form of credit (including informal sources)? 1. yes 2. No ☐

3 If yes, please indicate the sources

Credit source	
1.Bank	
2.Micro finance institution	
3.Saving and credit associations	
4.NGO	
5.Other traders	
6.Moneylender	
7.Friends or relative	
8.Ekub	
9.Other sources	

Thank you very much.

Appendix 2: Livestock Market Survey Data Sheet

Name of enumerator ---------- Name of market ---------- Date ---------- Signature ----------

No.	Type of Animals												Sex		Grade			Offered	Sold	Price	Time of Sales			
	Cattle			Sheep			Goat			Camel														
	IM	Y	M	IM	Y	M	IM	Y	M	IM	Y	M	Me	Fe	G1	G2	G3				1	2	3	4
1																								
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								
11																								
12																								
13																								
14																								
15																								

Note:

Type of animals	Age Group	Sex	Grade	Time of sales
	IM = Immature	Me = Male	G1 = Grade 1	1 = 6AM - 8AM
	Y = Young	Fe = Female	G2 = Grade 2	2 = 8AM - 10AM
	M = Mature		G3 = Grade 3	3 = 10AM - 1PM
			G4 = Grade 4	4 = After 1PM

Total number of buyers---------- Total number of sellers ---------- Total number of intermediaries----------

Appendix 3: Analysis of variance for goat price

Oneway Analysis of goat Price(USD) By Market

Summary of Fit

Rsquare	0.06745
Adj Rsquare	0.064769
Root Mean Square Error	8.280363
Mean of Response	19.53438
Observations (or Sum Wgts)	1396

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Market	4	6898.25	1724.56	25.1524	<.0001
Error	1391	95373.10	68.56		
C. Total	1395	102271.35			

Oneway Analysis of goat Price(USD) By AgeGroup

Summary of Fit

Rsquare	0.300282
Adj Rsquare	0.299277
Root Mean Square Error	7.167424
Mean of Response	19.53438
Observations (or Sum Wgts)	1396

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
AgeGroup	2	30710.20	15355.1	298.9004	<.0001
Error	1393	71561.15	51.4		
C. Total	1395	102271.35			

Oneway Analysis of goat Price (USD) By Gender

Summary of Fit

Rsquare	0.012819
Adj Rsquare	0.012111
Root Mean Square Error	8.510283
Mean of Response	19.53438
Observations (or Sum Wgts)	1396

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Gender	1	1311.01	1311.01	18.1016	<.0001
Error	1394	100960.34	72.42		
C. Total	1395	102271.35			

Oneway Analysis of goat Price (USD) By Grade

Summary of Fit

Rsquare	0.183246
Adj Rsquare	0.181486
Root Mean Square Error	7.746454
Mean of Response	19.53438
Observations (or Sum Wgts)	1396

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Grade	3	18740.85	6246.95	104.1028	<.0001
Error	1392	83530.50	60.01		
C. Total	1395	102271.35			

Appendix 4: Analysis of variance for sheep price

Oneway Analysis of sheep Price (USD) By Market

Summary of Fit

Rsquare	0.289599
Adj Rsquare	0.287252
Root Mean Square Error	8.776815
Mean of Response	20.93586
Observations (or Sum Wgts)	1216

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Market	4	38028.67	9507.17	123.4177	<.0001
Error	1211	93286.33	77.03		
C. Total	1215	131315.00			

Oneway Analysis of sheep Price (USD) By Age Group

Summary of Fit

Rsquare	0.238236
Adj Rsquare	0.23698
Root Mean Square Error	9.081071
Mean of Response	20.93586
Observations (or Sum Wgts)	1216

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
AgeGroup	2	31283.92	15642.0	189.6780	<.0001
Error	1213	100031.08	82.5		
C. Total	1215	131315.00			

Oneway Analysis of sheep Price (USD) By Gender

Summary of Fit

Rsquare	0.017587
Adj Rsquare	0.016777
Root Mean Square Error	10.30849
Mean of Response	20.93586
Observations (or Sum Wgts)	1216

t Test

Assuming equal variances

	Difference	t Test	DF	Prob > |t|
Estimate	-2.8335	-4.662	1214	<.0001
Std Error	0.6078			
Lower 95%	-4.0259			
Upper 95%	-1.6410			

UnEqual Variances

	Difference	t Test	DF	Prob > |t|
Estimate	-2.8335	-5.005	1184.76	<.0001
Std Error	0.5661			
Lower 95%	-4.0259			
Upper 95%	-1.6410			

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Gender	1	2309.39	2309.39	21.7324	<.0001
Error	1214	129005.61	106.26		
C. Total	1215	131315.00			

Oneway Analysis of sheep Price (USD) By Grade

Summary of Fit

Rsquare	0.143898
Adj Rsquare	0.141779
Root Mean Square Error	9.630936
Mean of Response	20.93586
Observations (or Sum Wgts)	1216

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Grade	3	18896.03	6298.68	67.9066	<.0001
Error	1212	112418.97	92.75		
C. Total	1215	131315.00			

Appendix 5: Analysis of variance for cattle price

Oneway Analysis of cattle Price (USD) By Market

Summary of Fit

Rsquare	0.083819
Adj Rsquare	0.080818
Root Mean Square Error	54.57653
Mean of Response	125.3809
Observations (or Sum Wgts)	1226

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Market	4	332728.8	83182.2	27.9266	<.0001
Error	1221	3636868.3	2978.6		
C. Total	1225	3969597.1			

Oneway Analysis of cattle Price (USD) By Breed

Summary of Fit

Rsquare	0.095449
Adj Rsquare	0.091742
Root Mean Square Error	54.25125
Mean of Response	125.3809
Observations (or Sum Wgts)	1226

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Breed	5	378895.5	75779.1	25.7472	<.0001
Error	1220	3590701.7	2943.2		
C. Total	1225	3969597.1			

Oneway Analysis of cattle Price (USD) By AgeGroup

Summary of Fit

Rsquare	0.328595
Adj Rsquare	0.327497
Root Mean Square Error	46.68231
Mean of Response	125.3809
Observations (or Sum Wgts)	1226

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
AgeGroup	2	1304388.7	652194	299.2763	<.0001
Error	1223	2665208.4	2179		
C. Total	1225	3969597.1			

Oneway Analysis of cattle Price (USD) By Gender

Summary of Fit

Rsquare	0.001323
Adj Rsquare	0.000507
Root Mean Square Error	56.91084
Mean of Response	125.3809

Observations (or Sum Wgts)	1226

t Test

Assuming equal variances

	Difference	t Test	DF	Prob > |t|
Estimate	-4.1487	-1.273	1224	0.2031
Std Error	3.2580			
Lower 95%	-10.5406			
Upper 95%	2.2432			

UnEqual Variances

	Difference	t Test	DF	Prob > |t|
Estimate	-4.149	-1.272	1198.8	0.2035
Std Error	3.260			
Lower 95%	-10.541			
Upper 95%	2.243			

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Gender	1	5251.7	5251.74	1.6215	0.2031
Error	1224	3964345.4	3238.84		
C. Total	1225	3969597.1			

Oneway Analysis of cattle Price (USD) By Grade

Summary of Fit

Rsquare	0.087868
Adj Rsquare	0.086376
Root Mean Square Error	54.41127
Mean of Response	125.3809
Observations (or Sum Wgts)	1226

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Grade	2	348799.7	174400	58.9072	<.0001
Error	1223	3620797.4	2961		
C. Total	1225	3969597.1			

Appendix 6: Analysis of variance for camel price

Oneway Analysis of camel Price (USD) By Market

Summary of Fit

Rsquare	0.122644
Adj Rsquare	0.118191
Root Mean Square Error	72.79693
Mean of Response	223.4202
Observations (or Sum Wgts)	595

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Market	3	437809.8	145937	27.5384	<.0001
Error	591	3131941.2	5299		
C. Total	594	3569751.0			

Oneway Analysis of camel Price (USD) By Age Group

Summary of Fit

Rsquare	0.634628
Adj Rsquare	0.633394
Root Mean Square Error	46.93811
Mean of Response	223.4202
Observations (or Sum Wgts)	595

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
AgeGroup	2	2265464.7	1132732	514.1337	<.0001
Error	592	1304286.2	2203		
C. Total	594	3569751.0			

Oneway Analysis of camel Price(USD) By Gender

Summary of Fit

Rsquare	0.01108
Adj Rsquare	0.009412
Root Mean Square Error	77.15646
Mean of Response	223.4202
Observations (or Sum Wgts)	595

t Test

Assuming equal variances

	Difference	t Test	DF	Prob > |t|
Estimate	21.2293	2.578	593	0.0102
Std Error	8.2362			
Lower 95%	5.0536			
Upper 95%	37.4051			

UnEqual Variances

	Difference	t Test	DF	Prob > |t|
Estimate	21.2293	2.881	178.364	0.0045
Std Error	7.3699			
Lower 95%	4.9763			
Upper 95%	37.4823			

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Gender	1	39551.1	39551.1	6.6438	0.0102
Error	593	3530199.8	5953.1		
C. Total	594	3569751.0			

Oneway Analysis of camel Price (USD) By Grade

Summary of Fit

Rsquare	0.063705
Adj Rsquare	0.060542
Root Mean Square Error	75.13882
Mean of Response	223.4202
Observations (or Sum Wgts)	595

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Grade	2	227412.7	113706	20.1398	<.0001
Error	592	3342338.2	5646		
C. Total	594	3569751.0			

Appendix 7: Response Price (USD) of the regression analysis

Summary of Fit

RSquare	0.682029
RSquare Adj	0.679673
Root Mean Square Error	29.12831
Mean of Response	124.6849
Observations (or Sum Wgts)	1225

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	9	2211167.6	245685	289.5667
Error	1215	1030876.8	848	Prob > F
C. Total	1224	3242044.4		<.0001

Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	60	245729.5	4095.49	6.0247
Pure Error	1155	785147.3	679.78	Prob > F
Total Error	1215	1030876.8		<.0001
				Max RSq
				0.7578

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	102.11267	1.146302	89.08	0.0000
Market {Werer&Chifra&Ayssaita&Yallo-Abaala}	-22.36355	1.013449	-22.07	<.0001
Market {Werer-Chifra&Ayssaita&Yallo}	-12.00572	1.419422	-8.46	<.0001
Market {Chifra-Ayssaita&Yallo}	-4.9007	1.516507	-3.23	0.0013
Market {Ayssaita-Yallo}	12.693577	1.553342	8.17	<.0001
AgeGroup{Immature-Young&Mature}	-34.5519	0.943601	-36.62	<.0001
AgeGroup{Young-Mature}	-12.59797	1.06085	-11.88	<.0001
Gender[Female]	-10.23086	0.906006	-11.29	<.0001
Grade{Grade 4-Grade 3&Grade 2}	-26.07818	1.051406	-24.80	<.0001
Grade{Grade 3-Grade 2}	-17.94261	1.226076	-14.63	<.0001

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
Market {Werer&Chifra&Ayssaita&Yallo-Abaala}	1	1	413150.3	486.9424	<.0001
Market {Werer-Chifra&Ayssaita&Yallo}	1	1	60699.4	71.5408	<.0001
Market {Chifra-Ayssaita&Yallo}	1	1	8860.5	10.4431	0.0013
Market {Ayssaita-Yallo}	1	1	56658.4	66.7781	<.0001
AgeGroup{Immature-Young&Mature}	1	1	1137620.9	1340.81	<.0001
AgeGroup{Young-Mature}	1	1	119652.9	141.0239	<.0001
Gender	1	1	108191.5	127.5154	<.0001
Grade{Grade 4-Grade 3&Grade 2}	1	1	521968.6	615.1966	<.0001
Grade{Grade 3-Grade 2}	1	1	181704.9	214.1589	<.0001

Appendix 8: Multivariate correlation analysis of the same types of animals in different markets

Multivariate Correlations result of Sheep price

	Chifra	Ayssaita	Abaala	Werer	Yallo
Chifra	1.0000	0.3552	0.0362	-0.0524	0.0584
Ayssaita	0.3552	1.0000	0.2938	0.0797	0.0639
Abaala	0.0362	0.2938	1.0000	0.0218	-0.0818
Werer	-0.0524	0.0797	0.0218	1.0000	0.0920
Yallo	0.0584	0.0639	-0.0818	0.0920	1.0000

Pairwise Correlations

Variable	by Variable	Correlation	Count	Signif Prob	Plot Corr
Ayssaita	Chifra	0.3552	86	0.0008	
Abaala	Chifra	0.0362	86	0.7406	
Abaala	Ayssaita	0.2938	86	0.0060	
Werer	Chifra	-0.0524	86	0.6316	
Werer	Ayssaita	0.0797	86	0.4660	
Werer	Abaala	0.0218	86	0.8422	
Yallo	Chifra	0.0584	86	0.5930	
Yallo	Ayssaita	0.0639	86	0.5590	
Yallo	Abaala	-0.0818	86	0.4541	
Yallo	Werer	0.0920	86	0.3995	

Multivariate Correlations result of Goat price

	Abaala	Ayssita	Chifra	Werer	Yallo
Abaala	1.0000	0.5666	0.3191	-0.1749	0.0991
Ayssita	0.5666	1.0000	0.2398	-0.3614	0.1763
Chifra	0.3191	0.2398	1.0000	0.2089	0.1814
Werer	-0.1749	-0.3614	0.2089	1.0000	-0.1920
Yallo	0.0991	0.1763	0.1814	-0.1920	1.0000

Pairwise Correlations

Variable	by Variable	Correlation	Count	Signif Prob	Plot Corr
Ayssita	Abaala	0.5666	86	0.0000	
Chifra	Abaala	0.3191	86	0.0027	
Chifra	Ayssita	0.2398	86	0.0262	
Werer	Abaala	-0.1749	86	0.1072	
Werer	Ayssita	-0.3614	86	0.0006	
Werer	Chifra	0.2089	86	0.0535	
Yallo	Abaala	0.0991	86	0.3638	
Yallo	Ayssita	0.1763	86	0.1044	
Yallo	Chifra	0.1814	86	0.0945	
Yallo	Werer	-0.1920	86	0.0766	

Multivariate Correlations result of Cattle price

	Abaala	Ayssita	Chifra	Were	Yallo
Abaala	1.0000	0.0940	0.0638	0.0646	0.0010
Ayssita	0.0940	1.0000	0.5947	0.4832	0.1053
Chifra	0.0638	0.5947	1.0000	0.3684	0.2097
Were	0.0646	0.4832	0.3684	1.0000	-0.1147
Yallo	0.0010	0.1053	0.2097	-0.1147	1.0000

Pairwise Correlations

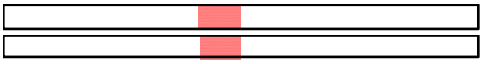
Variable	by Variable	Correlation	Count	Signif Prob	Plot Corr
Ayssita	Abaala	0.0940	61	0.4710	
Chifra	Abaala	0.0638	61	0.6251	
Chifra	Ayssita	0.5947	61	0.0000	

Variable	by Variable	Correlation	Count	Signif Prob	Plot Corr
Were	Abaala	0.0646	61	0.6211	
Were	Ayssita	0.4832	61	0.0001	
Were	Chifra	0.3684	61	0.0035	
Yallo	Abaala	0.0010	61	0.9941	
Yallo	Ayssita	0.1053	61	0.4193	
Yallo	Chifra	0.2097	61	0.1048	
Yallo	Were	-0.1147	61	0.3789	

Multivariate Correlations result of Camel price

	Abaala	Ayssita	Chifra	Yallo
Abaala	1.0000	0.3031	0.0436	-0.1617
Ayssita	0.3031	1.0000	-0.1738	-0.0508
Chifra	0.0436	-0.1738	1.0000	0.1519
Yallo	-0.1617	-0.0508	0.1519	1.0000

Pairwise Correlations

Variable	by Variable	Correlation	Count	Signif Prob	Plot Corr
Ayssita	Abaala	0.3031	54	0.0259	
Chifra	Abaala	0.0436	54	0.7545	
Chifra	Ayssita	-0.1738	54	0.2089	
Yallo	Abaala	-0.1617	54	0.2429	
Yallo	Ayssita	-0.0508	54	0.7151	
Yallo	Chifra	0.1519	54	0.2727	

Appendix 9: Multivariate Correlation analysis of different types of animals at a market

Multivariate Correlations

	Bull	Fattened ox	Heifer	Steer	Goat Buck	Sheep Ram	Camel Big
Bull	1.0000	0.6140	0.3624	0.4661	-0.4741	-0.2933	0.3572
Fattened ox	0.6140	1.0000	0.8358	0.8561	0.2258	0.3164	0.9467
Heifer	0.3624	0.8358	1.0000	0.7457	0.6395	0.7528	0.7708
Steer	0.4661	0.8561	0.7457	1.0000	0.2863	0.3287	0.8038
Goat Buck	-0.4741	0.2258	0.6395	0.2863	1.0000	0.9732	0.3473
Sheep Ram	-0.2933	0.3164	0.7528	0.3287	0.9732	1.0000	0.3714
Camel Big	0.3572	0.9467	0.7708	0.8038	0.3473	0.3714	1.0000

Pairwise Correlations

Variable	by Variable	Correlation	Count	Signif Prob	Plot Corr
Fattened ox	Bull	0.6140	5	0.2706	
Heifer	Bull	0.1548	8	0.7143	
Heifer	Fattened ox	0.8330	8	0.0102	
Steer	Bull	0.6133	8	0.1059	
Steer	Fattened ox	0.8542	8	0.0069	
Steer	Heifer	0.6650	12	0.0183	
Goat Buck	Bull	-0.0865	8	0.8386	
Goat Buck	Fattened ox	0.2865	8	0.4915	
Goat Buck	Heifer	0.5259	12	0.0790	
Goat Buck	Steer	0.5019	12	0.0964	
Sheep Ram	Bull	0.2203	8	0.6001	
Sheep Ram	Fattened ox	0.2921	8	0.4827	
Sheep Ram	Heifer	0.4245	12	0.1690	
Sheep Ram	Steer	0.4531	12	0.1391	
Sheep Ram	Goat Buck	0.6631	12	0.0188	
Camel Big	Bull	0.6728	8	0.0675	
Camel Big	Fattened ox	0.3986	8	0.3281	
Camel Big	Heifer	-0.1472	12	0.6479	
Camel Big	Steer	-0.0402	12	0.9014	
Camel Big	Goat Buck	-0.2449	12	0.4429	
Camel Big	Sheep Ram	0.1636	12	0.6114	