ANALYSIS OF STRUCTURE, CONDUCT AND PERFORMANCE OF SMALL RUMINANT STOCK MARKET PARTICIPANTS OF ISIOLO –NAIROBI TRADING MARKET, KENYA

CHARLES OOKO ONYANGO

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DECLARATION AND APPROVAL

DECLARATION

This Thesis is my original work and has not been presented for award of any degree or diploma in any other University.

Charles Ooko Onyango

Department of Agricultural Economics and Agribusiness Management, Egerton University

Sign--   Date--

APPROVAL

This Thesis has been submitted to the graduate school for examination with our approval as University supervisors.

George Owuor, PhD

Senior Lecturer, Department of Agricultural Economics and Agribusiness Management, Egerton University

Sign--   Date--

Esther Njuguna, PhD

Agricultural Economist, Kenya Agricultural Research Institute (KARI)

Sign--   Date--

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DEDICATION

I dedicate this work to the fond memories of my late Mum, Esther.

ACKNOWLEDGEMENT

ABSTRACT

The growing population in developing countries has necessitated a shift in preference for indigenous food. Small ruminant meat being one of the preferred indigenous products has registered huge increase in demand over the last few years. Therefore, demand for sheep and goat meat is predicted to rise predominantly in Arid and Semi- Arid Lands (ASAL), thereby creating new meat markets as well as expansion of the existing small ruminant value chain. Isiolo- Nairobi small ruminant value chain is characterized by heavy traffic of small ruminant livestock destined for Nairobi meat markets and its environs. It is therefore expected that, this high volume of livestock trade would empower the livestock keepers and ultimately improve their livelihoods. However, in spite of this economic potential, the livestock keepers still live as low income earners thereby leading to prevalent poverty conditions. In this regard therefore, the study singled out to characterize Small ruminant stock market participants along the Isiolo- Nairobi value chain and examine the nature of the market structure exhibited in the Small ruminant stock trade. Sample size of 210 consisted of Nairobi traders, brokers, butchers and keepers from Isiolo were interviewed. The analytical approach used in the analysis was combined Lerner index and Gini-coefficient model. Results show that 68% of the market participants along the value chain are mainly the brokers with marketing participants highly varied. Lerner index indicated that the 64% of the market gain lies in the hands of the traders along the chain rather than to the farmers. Only 36% gain along the chain go to pastoralists. Among other initiatives that seek to empower livestock keepers by providing adequate support on market infrastructure, the study recommends that livestock keepers (pastoralists) should be facilitated to form vibrant groups (farmer groups) in ASALs to strengthen their participation in the Livestock market. This is because, strong and vibrant farmers' organizations can provide opportunities to farmers to effectively play a role in the livestock market economy and largely benefit from it by improving household income.

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ABBREVIATIONS

APEC	-	Asian-Pacific Economic Cooperation
ASAL	-	Arid and Semi-Arid Land
ASDP	-	Agricultural Sector Development Strategy Plan
AU-IBAR	-	African Union- Inter Africa Bureau of animal Resources
CB –LEWS	-	Community Based Livestock Early Warning System
DLPO	-	District Livestock Production Office
DNAP	-	Draft National ASAL Policy
ECOSOC	-	United Nations Economic and Social Council
EPZ	-	Export Processing Zone of Kenya.
FEWS NET	-	Famine Early Warning Systems Network
IAASTD		International Assessment of Agricultural Knowledge, Science and Technology for Development
KASAL	-	Kenya Arid and Semi- Arid Lands Project
MC	-	Marginal Cost
MDG	-	Millennium Development Goals
MF	-	Mark up Factor.
NEPDP	-	North Eastern Province Development Programme
S-C-P	-	Structure Conduct and Performance paradigm
TC	-	Total Costs
WB	-	World Bank

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background information

Sub-Saharan Africa emerges as one of the regions in the world with the fastest growing population, approximated at 800 million in the year 2007 (Collins, 2007) and growth rate estimated at 2.3 percent per annum. Despite the fact that the larger part of Sub Saharan Africa is Arid and Semi Arid Land (ASAL), rain-fed agriculture has always been the integral pillar of the economic activity in the region with production ranging from short term drought tolerant crop varieties to livestock production (World Bank, 2009). It is however noted that, livestock production especially sheep and goat forms the major economic activity in the east and central Sub Saharan Africa (SSA) region. As reported in the Agricultural Sector Development Strategy Plan 2010-2020, Kenya has its economy purely based on agricultural production which directly contributes 26% of the GDP annually and another 25% indirectly (GoK, 2008). The sector accounts for 65% of the Kenya's total exports and grant more than 70% of informal employment in the rural areas (Government of Kenya, 2010). Horticulture has recorded an outstanding export-driven expansion in the precedent 5 years and is currently the principal subsector, contributing 33% of the GDP and 38% of export earnings. According to Blackburn (2007), findings reveal that about 84% and 59% households in Ethiopia and Kenya are pastoralists, respectively. Of all these pastoralists, 73% of them keep goats.

On the other hand, Food crops contribute 32% of the GDP with only 0.5% per cent accounting for exports. The livestock subsector contributes 17% of the GDP and 7% of exports. The Agricultural Sector Development Strategy Plan 2010-2020 indicates that livestock and fisheries subsectors have huge potential for growth that has not been exploited and these statistics are just indicative measure of such a potential (Figure 1). The strength of agriculture sector performance has a positive correlation with the overall economy, signifying the outstanding contribution of this sector to the livelihoods of the rural population. As indicated in Figure (1), between 1980 and 1990 the sector recorded an average annual growth rate of 3.5 per cent that abridged to 1.3 per cent in the 1990s through 2005 before the economy boosted its performance in 2005. On this basis, agricultural sector is expected to remain on an upward trend with main focus shifting of sustainability
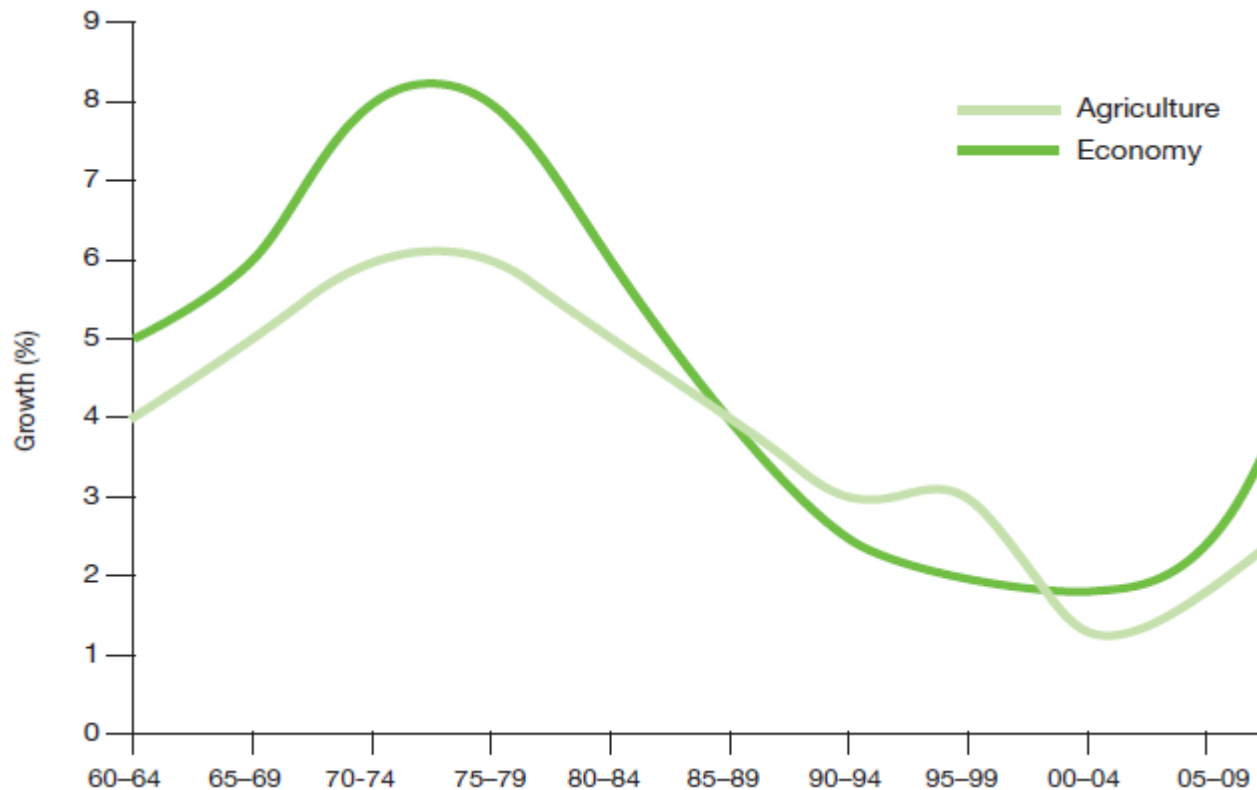
Figure 1: Trends in agricultural and economic growth (1960–2008)[1]

One of the major challenge that agricultural sector faces is the dependency on rain fed agriculture (ADSP, 2010). Worsened by the growing threat of climate change, Arid and Semi-Arid Land (ASAL) has enlarged to cover more than 84 per cent of the Kenyan land mass[2], given that ASAL is estimated to support over 30 percent of the human population and 60 percent of the total livestock population (Verbeek *et al.*, 2007). The livelihoods of the population in ASAL mainly depend on livestock production; specifically, sheep and goat which form part of the small ruminant livestock in Kenya (Kosgey *et al.,* 2006). The small ruminants (Sheep and Goat) are adapted to cope with harsh climatic conditions due to their ability to utilize a wide variety of food sources. For instance, Sheep can exploit a wide range of food sources such as cacti in the desert, tree leaves and fruit seeds. Perhaps the most extraordinary adaptation is that of feeding on dry thorny bushes. The ability to adapt to these harsh conditions explains why Sheep and goats

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[1] Agricultural Sector Development Strategy Plan 2010-2020

[2] Kenya Vision 2030

constitute 60% of livestock in these areas (Barrett *et al.*, 2006). This means that, ASAL economy is driven by the performance of the small ruminant livestock market.

The observed performance of the small ruminant livestock market over time indicates that in the future, there would be increased demand for livestock meat and its products. This is what Delgado (2001) connote as *"livestock revolution."* Based on this concept, it is envisaged that persistent change in meat demand within the global market is expected to increase. This increase over time implies that many rural households in SSA will benefit from increased demand for small ruminant products, hence a positive effect in household income. This concept further stipulated that from 1970s to mid of 1990s, the consumption of meat and milk in the developing countries has increased tremendously more than twice the rate of increase in developed economies. As observed within these years, there is a justification for this demand to remain on an upward trend. In summary, livestock revolution is anchored on the level of demand of livestock products such as meat, hide and skin among other products. However, based on marketing theory, the key assumption of this projection is purely based on the free forces of demand and supply (influenced by increase in population, increase in income levels for the consumers and suppliers, increase in urbanization rate) to create market opportunities for livestock keepers in ASAL (Bellemare *et al.*, 2004).

In order for the ASAL market to benefit from this market, there must be an efficient market and marketing system. Efficient functioning of the livestock and livestock product market is the only sole economic incentive to justify the livestock keepers' engagement in livestock trade. However, in the recent past, livestock keepers have experienced both market and climate related challenges. For example, a lot of livestock transactions are affected during the dry seasons since the livestock keepers are *"desperate"* to dispose their sheep and goats before succumbing to drought. Accumulative effect of this scenario has led to low prices of livestock and their products especially during the dry seasons (Barrett *et al.,* 2001). Since livestock keepers' measure wealth in terms of the number of livestock owned, the income generated from sale of small ruminant stock wields considerable impacts in livelihoods income. This is viewed in terms of how much they offload to the market, retain for consumption as well as cumulative effect of livestock income within the households.

According to Barrett *et al.* (2001), livestock markets in ASALs are considerably locked up due to existing marketing inefficiencies: high transaction costs and poor market infrastructure, which further hinder market accessibility. Efficient market and marketing systems is therefore very key to the study since livestock industry has a towering degree of vertical relations with upstream and down-stream industries (ADSP, 2010). Marketing challenges experienced by the livestock keepers and traders in marketing the livestock and livestock products can be viewed to depict less attention on this sector; given its massive contribution in employing over 10 million people, contributing 7 per cent to the GDP and 17 per cent to the GDP and provides 50 per cent of the agricultural labor. Significantly, small ruminant livestock plays a big role in pastoral households' food security and incomes due to their short-generation intervals, high flexibility and all-around feeding habits. Kenya has an estimated 13 million goats and 10 million sheep with approximated Annual meat production 84,000 tonnes of mutton and chevon worth KES 14 billion (Government of Kenya, 2010). Figure (2) below is a comparative livestock prices 2002 to 2008 in the Isiolo region. Livestock prices have fairly remained within a narrow range of KE 2,000 to KE 2,500 despite the fact that this region experiences increased traffic of traders destined for various terminal markets. The dismal improvement in prices over the years (figure 2) raises a big question on the ASAL markets ability to respond to the changing economic environment (Njanja *et al.*, 2003). As expected, livestock keepers are suppose to benefit from increased demand over time. Conversely, this market may be seen to operate in "*vacuum*" that does not allow relay of information that reshapes market prices. The existence of information asymmetry could characterize the market behavior reflected in this case.
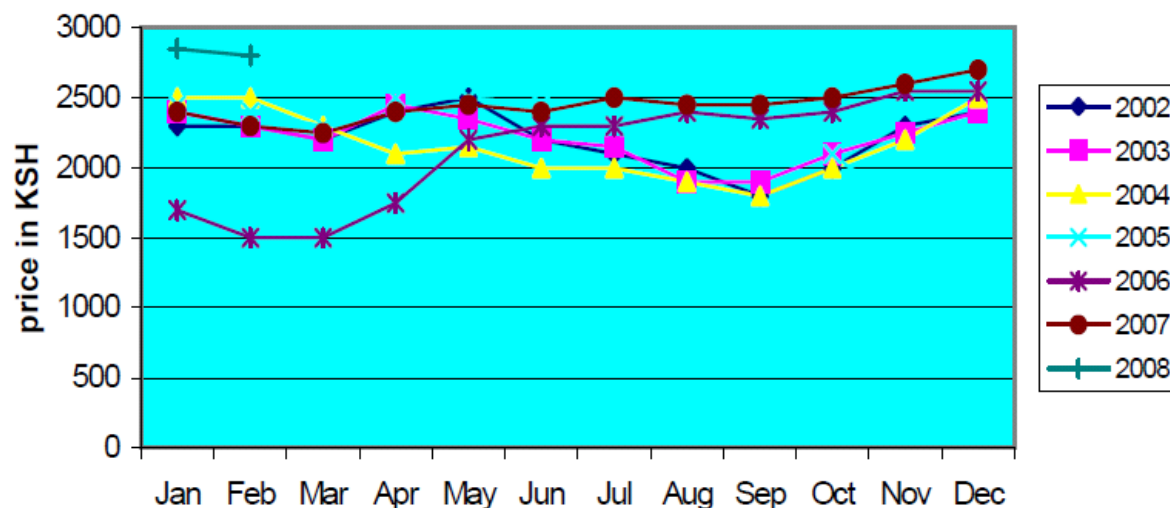
Figure 2: Comparative Livestock prices 2002 to 2008[3]

Despite the fact that livestock keepers have a free choice of when and where to sell their animals; this choice has considerably been constrained by recurrent problem of drought which forces them to resort to disposition. During drought, forage is very scarce leading to high livestock mortality which compels the livestock keepers to sell their animals before they succumb to drought (Barrett *et al.*, 2004). Long dry spell is the primary threat to livestock rearing in ASALs (Mendelssohn *et al.*, 2007). It denies the livestock keepers the power to decide on marketing price but instead, become price takers. Despite the fact that livestock trade should be propelled by demand, socio-economic factors (cultural preference by pastoralists, inaccessible roads, illiteracy among others) have defined trading patterns in the Kenyan small ruminant stock market (Aklilu, 2002). For example, during extreme drought conditions the livestock keepers sell their livestock *enmasse;* creating a glut in the terminal markets which eventually leads to relatively low prices for the keepers and higher proceed returns for the livestock traders (Little, 2000). During cool and dry conditions the livestock keepers sell relatively at higher prices since they are not under pressure to sell.

Since livestock trading operates in an open market scenario of a *"willing buyer willing seller"* Bobby et al. (2003) observes that there exists price fluctuation. This fluctuation could be caused by information asymmetry, uncertain demand and supply responses from traders and livestock keepers (Rios *et al.,* 2008). The instability of the marketing system posed by varying

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[3] Source: DLPO Isiolo

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prices is more likely to threaten the rural livelihoods of the ASAL population whose sole economic activity is livestock production (Bellemare *et al,* 2006). Mahmoud and Hussein, (2003) observe that, livestock market in Kenya should exhibit strong linkage between livestock source and destined markets. In other words, the shorter the of the ruminant value chain, the more affordable the products are expected to become to the consumers (Williams *et al.,* 2003). On the contrary, the longer the supply chain, the higher the prices tend to be, leading to a more expensive small ruminant stock. The paradox is that many pastoralists do not benefit from longer value chain effect (higher prices of meat in destined market – Nairobi) since the livestock prices seem to have remained relatively constant over time (figure 2). In a similar context, Jose et al. (2009), affirms that shorter supply chains are preferred to longer supply chain. Even though the economic activities in Isiolo County are heavily built on livestock rearing, it is observed that major population in this county constantly live in poverty conditions (Mahmoud and Hussein, 2003), despite the potential to supply stock. The study focused on the nature and behavior of small ruminant market in Isiolo to Nairobi. The study evokes incisive view on price transformation and the key participants along the value chain between the livestock keepers and the main meat destination markets- for this case, Nairobi. Hilpi et al. (2007), found out that marketing is a very essential component in any production since it bridges traders an consumers.

1.2 Problem statement

In spite of the economic potential of the ASAL regions in Kenya which supports over 60% of the total livestock population, the livestock keepers are still living in poverty. It is observed that Isiolo County supplies significant number of small ruminant destined to Nairobi markets and its environs. From the collection points within the Isiolo County, the traders end up on varied terminal markets with the bulk of the stock off-loaded to Kiamaiko destined to various markets in Nairobi city for consumption. It is not very clear what informs traders of the market margins in Nairobi markets to justify the preference. It is also not clear why livestock keepers who are major supplies to these markets still live in poverty conditions – contrary to the expectation that they earn significantly from livestock sales. Additionally, there is insufficient information as to whether there exists an effective link between the livestock keepers and the traders to justify the existing trend of variant market prices despite high prices of livestock meat. This information gap continues to hamper efficient marketing of sheep and goat meat product.

To seal these gaps and develop a workable guide on marketing of small ruminants in ASALs, it is important to analyze the market structure, the Conduct and performance of the market participants along Isiolo-Nairobi trading route. This will ensure a complete understanding of this market with a view of suggesting possible policy recommendations aimed at empowering livestock keepers and other value chain participants to gain in the market framework.

1.3 General objective

The overall objective of the study was to analyze the structure, conduct and performance of indigenous small ruminant market in ASALs, focusing on Isiolo- Nairobi markets.

1.3.1 Specific objectives

The following were the specific objectives of the study:

1. To describe the players in the small ruminant livestock market on the Isiolo- Nairobi Markets?
2. To determine the structure of the small ruminant livestock value chain between Isiolo – Nairobi trading route.
3. To determine conduct and performance of the small ruminant livestock market participants along Isiolo- Nairobi trading route.
4. To identify gainers and losers along the Isiolo- Nairobi small ruminant livestock value chain.
5. To provide possible policy recommendations aimed at empowering small ruminant livestock value chain participants to gain in the Isiolo-Nairobi small ruminant market framework.

1.4 Research Questions

To achieve the above objectives, the following research questions were fronted to guide the study:

1. Who are the players in the small ruminant livestock market on the Isiolo- Nairobi trading route?
2. Does the small ruminant livestock trade depicted in Isiolo- Nairobi trading route exhibit a competitive market structure? And if so, what are the real and expected changes in small ruminant livestock market structure and performance?

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3. In overall, what is the conduct and performance of small ruminant livestock market exhibited in Isiolo- Nairobi trading route?

4. Who are the possible gainers and losers in the small ruminant livestock market in Isiolo-Nairobi marketing route?

5. What are the possible policy recommendations aimed at empowering small ruminant livestock value chain participants to gain in the Isiolo-Nairobi small ruminant market framework?

1.5 Justification of study

It is envisaged that an in-depth investigation of the extent of livestock keepers' participation in small ruminant livestock value chain will be important in the various dimensions. First, it will build a better understanding of the challenges facing livestock keepers' households in ASAL in marketing small ruminant stock. Informing the policy and the decision makers the best strategies to boost livestock productivity in ASAL by ensuring that livestock keepers gain in this market framework, since this is the main economic activity in this region. Ultimately, the study will add impetus to the long term driven objective of realizing the Millennium Development Goals (MDGs) of: alleviating Poverty, improving agricultural productivity and boosting the net income of the rural poor. The latter is among the long-term expected policy recommendation benefit of the study.

1.6 Scope and limitation of the study

The study was about the analysis of structure, conduct and performance of small ruminant livestock market in ASALs, with Isiolo as the source of small ruminant for Nairobi market and its environs. More specifically, the study focused on small ruminant livestock value chain and not a generalized study on all livestock species and markets. The reference point for the study was Isiolo County which is regarded as one of the major source of small ruminant livestock destined for Nairobi market and its environs. It is also important to note that there are many supplies of small ruminant stock to Nairobi markets. Such supply points include the Moyale, Marsabit, and Garissa among others. However, taking into consideration that these areas significantly influence the market performance, it is imperative to study each market segment with its unique characteristics; thereby ascertaining its unique contribution to the market. The

study is therefore limited to Isiolo-Nairobi market and not any other market or any other market segment.

1.7 Operational definition of Terms

1.7.1 How do we measure Market Structure Conduct and Performance?

The structure, conduct and performance are differentiated terms yet interrelated. The S – C – P paradigm is mainly focused on analyzing competitive conditions of the prevailing market framework. Basically, the participants of the market are evaluated based on the extent at which they affect performance and conduct of the market. According to Agricultural Technical Cooperation Working Group, (2008), the relationship of the market players affects the conduct (either negatively or positively) and consequently affects the market performance and vice versa. The model in which the three market characteristic (S-C-P) affects one another is an interactive system and therefore discussing the measuring criteria includes a deep understanding of the market participant behaviors as well as the external environment that may contribute to certain peculiar outcomes.

Market structure*:* This is a key component of S-C-P paradigm that relates to how market participants are organized in terms of the size and number of individual players in the market. In some cases, it denotes the institutional barriers to new entrants. In other words, market may exhibit a free entry and exit characteristics; hence referred to as perfect market structure. In this scenario, market demand and supply side remain the key determinants of the market outcome in terms of pricing, product quality, variety and functional characteristic. On the other hand, the market may exhibit purely monopolistic structure where supply side enjoys the majority command to production and supply of products in the entire market niche.

As opposed to a competitive market structure where all market players are presumed to operate and grow in an environment with unconditional freedom, monopoly structure has a conditional institutional framework that in many cases does not favor majority of the market players. Indeed the deviation of market structure from the perfect competitive framework may result to a decline in market inefficiency; given that at society level, market are key platforms for "creation of wealth" This is because, monopoly reduces competition and the entire market remains a "one man show" where created wealth does not flow to all the beneficiaries in

equitable ration. Arguably, it should again be noted that failure to enjoy such benefits may distort market operations and eventually lead to collapse of the agricultural systems.

Market conduct and its measurement: Conduct of the prevailing market include behaviors patterns which may be adopted by a player as a way of adjusting to the market conditions in order to fully enjoy the market benefits. In this case, the conduct is measured in terms of what price is set by individual players for which product and for which consumers? This behavior captures the survival strategies of the may be to deter effects of competitors in the market or adapt to market conditions. Entry barriers are also considered as part of market conduct measurement.

Market Performance and its measurement: Market performance is the ultimate result derived from the market and it encompasses the outcome from various market activities. To measure the market performance, an evaluation on its contribution to the overall economic welfare remains our key focus. Conventionally, market performance may be assessed by use of the generated profit margin so that, market benefits can be quantified and apportioned to particular players and ascertain who gets the largest share?

Market – A physical place or arrangement that brings buyers and sellers of small ruminant stock together with a view of exchange the small stocks for cash.

Market performance - the ultimate impact of the market to its participants in terms of pricing, volumes traded, and marketing costs. The affordable the markets prices against higher returns to the traders the better the market performance.

Market Structure - How a market is organized in terms of pricing strategies of the participants.

Small ruminants - Indigenous goats and sheep (local breeds of sheep and goats

CHAPTER TWO

2.0 LITERATURE RERIEW AND THEORITICAL FRAMEWORK

2.1 Introduction

This section presents a review of literature on areas that closely relate to this study. It entails issues of small ruminant production characteristics and marketing system along different marketing routes. Marketing dynamics of small ruminant stock, the economic efficiency and performance of market system is outlined.

2.2 The concept of Market Dynamics

Perhaps the most insightful view of market dynamics is the interaction of demand and supply side. Attaining marketing equilibrium where both traders and livestock keepers enjoy equitable returns from the small ruminant trade becomes a critical question at the onset of the study. That is in terms of how production units are organized to seize market opportunities. In a contextual comparison, Nyariki and Thirtle, (2000), views that there is plenty of evidence to suggest that agricultural production in Sub-Saharan Africa are characterized by high inefficiency and low productivity which significantly affect demand and supply side of the market. Nyariki (1997), believes that although agricultural production grew sharply in the sixties, it started slowing gradually in the 1970s and irrespective of many government efforts it has continued to deteriorate up to now. The author further allude that, one of the proposed solutions to this problem is to improve the per capita value of agricultural production by increasing yields through higher efficiency of farm resource application. This will be achieved by first enhancing the efficiency of smallholder farms with the view to optimize the returns from application of enhanced technology that can enable them practice mixed farming in less productive areas (over dependence on livestock production). The authors suggest that efficiency in production in smallholder farms has the potential to increase market value of their produce and earn them higher per capita income. Such efficiency may also help the livestock keepers produce healthier crops that can be more competitive in local and international markets. This piece of work is important to the study as it dwells on efficiency in smallholder agricultural production which is relevant for livestock keepers to improve their production and increase the market value of their livestock. According to GoK (2007), agriculture contributes over 25% of the Kenyan GDP and

employs close to 70% of the population and therefore, the slow growth rate is a major concern considering that the country has a high population growth and limited arable land.

FEWS NET Market Guidance report (2008), the performance of markets can directly and or indirectly influence the food security situation of rural households. Even though households participating in crop and livestock production largely depend on farm produce as direct food source; they also depend on the market in many ways. For instance, livestock keepers have to sell their animals, meat, dairy products and Hydes in order to obtain some necessities from the market. So, market in integral to households and it functionality is very imperative. This view corresponds to that of Holtzman (1996), who argues that lack of proper market performance may contribute substantially to food insecurity since many livestock keepers fail to obtain what they need and sell their produce in a profitable manner. FEWS NET Market Guidance report (2008), highlights, give the meaning of Structure, Conduct and Performance of the market by examining how the market is important in attaining food security. These views are very relevant for the study since livestock keepers depend on proper organization markets (in this case: of Isiolo-Nairobi trading route) in order to gainfully tap the market returns.

APEC, (2008), on the other hand, examines market liberalization and its relationship with market structure, conduct and performance on Food Processing Industry in ASEAN Economies. Basically, the structure-conduct-performance concept is widely applied in the analysis of competitive conditions in industries by examination of the relationship between industry structure and market conduct and performance. Although the paradigm was developed by Mason (1949) and Bain (1956), more recent studies have revealed that the relationship between the three is synergistic in nature. Structure- conduct- performance affects each other have a combined effect on the market (Clarke, 1985). The APEC Agricultural Technical Cooperation Working Group (2008) indicates that in most of the ASEAN Economies, food processing is a relatively new therefore driven by the need for value-addition for better export prices. In view of Isiolo-Nairobi markets for small ruminant is also envisaged to be driven by the need for value-addition for better prices. This can also be achieved through market integration.

A comparative view for Indonesia notes that integration of the manufacturing and the agricultural industry enabled the manufacturing and processing industry to contribute up to

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28.1% of the GDP in 2004 alone. This corresponds to the assertion of Clarke (1985) that liberalization of the markets is the most outstanding factor that can boost the agricultural processing industry by creating a competitive environment and redefining the market structure in a way that can raise performance of the processing industry. The lessons from the experience of these ASEAN Economies are very important for the study as they reveal ways in which the Kenyan agricultural sector can benefit more from value addition to produce through processing. This is important especially to the livestock sector.

2.3 Is Agriculture at cross-roads in Sub-Saharan?

The IAASTD Sub-Saharan Africa Report, (2009), identifies livestock agriculture as the most dominant in Sub-Saharan Africa. The report further indicates that even though agriculture dominates as the main economic activity with over 60% of the population depends on it for their livelihood; the high population growth rate in the region surpasses the food production growth rate by far thus leading to a considerable food deficit. Rosegrant *et al.* (2001), also views that livestock production is one of the major agricultural activities in the ASAL. On the contrary, even though studies reveal that the global demand for meat products will rise by more than 55% between 1997 and 2020 with the largest increase happening in developing countries, SSA livestock keepers are not well positioned to take advantage of this development. This is according to Temu and Temu (2006), who further point out that inability to take up market advantage could be due poor farming methods (mainly nomadic in nature) that hinder optimum production. The authors identify one of the major problems to be the underdevelopment of infrastructure to market livestock in SSA ASALs. In the long run, livestock keepers are "left" at the mercy of "scrupulous middlemen" who may significant sway livestock market prices to their advantage. The market challenges highlighted in IAASTD study captures the nature and state of agriculture in the Sub-Saharan Africa region.

On the other hand, MLDF (2003) indicates that sheep production as well as the production of other small ruminants in Kenya plays a very important role both at the national and household levels. Estimates given by MLDF show that sheep contributes about 15-20% of the total red meat consumed in Kenya. Kosgey *et al.* (2005) also reiterates that Sheep and goats have considerable economic value. However, the author notes that diseases and parasites affect productivity of these livestock. Livestock keepers face numerous challenges that indirectly affect

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the nature of the small ruminant market. Such challenges range for diseases infection to poor infrastructure. Backer et al. (1999), found out that gastrointestinal helminthes are parasites that affect the production of these livestock, consequently lowering their market value. Such infections have been associated with reduced and delayed productivity as well as increased cost of production. Gicheha *et al.* (2005) indicate that proper breeding methods aimed at developing resistance to these parasites have been identified as a means to improve the economic gains from these animals. According to Kosgey et al. (2003), the economic importance of breeding is to realize breeds that are resistance to helminthes because healthier animals will fetch greater market value and sell much easily than infected animals. This analysis is very relevant to the study as it links breeding techniques to market value of small ruminants.

Zander (2011) and Drucker (2009) were of the same view that livestock keeping and breeding in East Africa is greatly affected by environmental factors and unfavorable market conditions. Zander (2011) in particular points out that, several studies on breeding of Borana cattle and African black Sheep have revealed that most livestock keepers in Kenya have embraced crossing of indigenous breeds with exotic breeds; therefore diluting many local breeds. Zander and Drucker (2008), cite several studies that have revealed that local breeds attract greater economic values than other breeds. The authors emphasize that local breeds are common in Kenya. As such, most of the livestock that reach the markets are capable of attracting very competitive prices that can bring the livestock keepers good return because the meat market favors local breeds. Many middlemen will prefer to buy local breeds from the livestock keepers while lower prices are paid for cross-breeds. Consequently, the appeal for local breeds of small ruminant livestock by buyers in the market definitely affects the performance of the market since more preferred breeds will fetch relatively higher prices in the market. Peacock, (1998) indicates the economic importance small stock to pastoralist communities' substantial income. In line with this understanding, the Small Ruminant Collaborative Research Support Program in Kenya came up with a dual-purpose synthetic goat breed mainly for smallholder livestock keepers that could offer them greater economic returns.

Bett et al. (2007), emphasizes that the Kenya Dual purpose Goat (KDPG) has been recommended for utilization by smallholder systems in the country. These systems are basically located in areas with various production potentials and therefore the breed can benefit a large

number of smallholder livestock keepers according to Mwandotto, (2000). This breed is considered one of the most profitable and suitable breed for livestock keepers in Kenya, who are generally smallholder mixed livestock keepers. The high productivity of this breed has a direct impact on the market. If many smallholder livestock keepers rear this breed there will be more goat products in the market thus directly benefit the livestock keepers as they can earn more for their products. This analytical work is important to the study as it establishes a direct link between the preservation of the KDPG breed of goats and the economic value of that breed.

2.4 Small stock sources in Kenya

According to the pastoralist Bulletin (2008), Isiolo district, Moyale district and Marsabit district, like other ASAL areas in the North Eastern Kenya, received moderate to low rainfall in the year 2008 with the distribution being largely bimodal (long rains between February and May and short rains between October and December). However the distribution of the rains in the areas was generally irregular with some locations getting more rains than others over the year. The bulletin identifies the communities in this area as largely pastoralists with the districts recording negligible amounts of crop farming; the predominant pastoralist groups in these districts include Borana, Samburu, Somali and Turkana. Their herds include mainly cattle, camels, small ruminants (Mainly goats) and donkeys. The pastoralist Bulletin (2008) goes on to indicate that due to unreliable rainfall conditions the major hazards that are experienced by the herding groups include droughts, livestock epidemics, constant inter-community conflicts and occasional floods and flashfloods. Droughts and livestock epidemics cause a lot of losses to these communities because many animals die when these hazards occur. Livestock herding is the main economic activity of the population and is key to their survival. Droughts pose the greatest threat to the survival of these communities as they cause the greatest economic impact apart from affecting a large number of people due to their frequency and severity. Usually, livestock body conditions deteriorate with progressing drought and many animals start succumbing to lack of pastures and water. According to the bulletin, the remaining herds then become difficult to sell due to impenetrability of the market coupled by lack of willing buyers.

Goats are highly marketable livestock in ASALs with most households selling a large number of goats (Pastoralist Bulletin, 2008). Goat prices have remained relatively stable on an

upward trend and most of them are sold within the districts although a considerable number are sold in Central Kenya and Nairobi markets. Goats are largely resistant to droughts therefore their good body conditions throughout the year make them to enables them to maintain sustained high prices in the market. However, one factor that greatly destabilizes market structures and conditions in these areas is armed conflicts that regularly impeding access to markets in the counties and Nairobi. This is because middlemen cannot access the source points for fear being attached. The information in this bulletin is very important for the study as it outlines some of the factors that directly affect the performance of livestock markets in three regions that act as main source of small ruminant stock in Kenya.

2.5 Importance of effective Agriculture markets and marketing in Kenyan Economy

Making agriculture market work for the poor perhaps has been the most spoken policy isue in Africa and the world over. According to Dorward, Farrington and Priya, (2004), the perceptive view of many policy makers that agriculture having a higher multiplying effect on income of the poor households needs a complete review to capture agriculture productivity not as a measure of increment, but; also as a long term sustainable venture. In a similar scenario in Bangladesh, Hussain (2002) notes that agricultural productivity gains have elevated rural incomes by directly increasing livestock keepers' earnings. Particular significance to the poorest is by increasing employment opportunity and wage rates. Borrowing such a notion to Kenyan rural markets' scenario means that effective market coordination is needed to ensure that benefits of small ruminant livestock are actually felt by the poor pastoralists. In effect, efficient agricultural market will in the long run inspire and cultivate development of rural economy with a long run focus on growth (Dorward et al., 2003). There is no definite consensus on how to create a beneficial market to the poor, but; many researchers have agreed on strengthening production and capacity building to be the most effective market-led approach in responding to rural market challenges (Dorward and Morrison, 2000).

In summary, the key importance of effective Agriculture markets and marketing in Kenyan Economy is that of creating wealth at the rural level hence benefiting a larger group of market players through equitable returns (Fafchamps, 2004). But, in a comparative text that is applicable to Kenyan case, Jayne et al. (2002) affirms that market reforms in African should not only focus on apex policy implications but pay more attention on restructuring rural agriculture

economy to deliver direct benefits to the poor. The authors argue that it through this initiative that agriculture markets will have a bouncing effect on the rural livelihoods (World Bank, 2002). The general application of to the study is that of effective Agriculture markets and marketing of small ruminant in Isiolo-Nairobi route should be focused in creating wealth at the rural level hence benefiting a larger group of market players through equitable returns.

2.4 Focus on Isiolo and Nairobi livestock and livestock meat market

Isiolo County is predominantly habited by the Borana; Samburu; Somali; Sakuyie and Turkana Pastoralist groups who herd different stocks: cattle, goats, sheep, Donkeys and camels. Livestock keeping in this county is the major source the livelihoods and hence central to their survival. Livestock population in this area varies significantly. During drought or dry seasons; livestock keepers often trek to "greener" areas where they can find relatively good pasture for their stock. Based on a 7 year survey reported by the Ministry of Livestock in the document CB –LEWS bulletin (2008), heavy livestock concentration have been reported in Kulamawe and Kina; extending to Kipsing regions which formed part of the study. As indicated in figure (3) below, small ruminant stocks have relatively depicted higher concentration; depicting a favorable market opportunity. Markets are capable of rewarding the pastoralists equitably with traders. It will be interesting to diagnose which kind of market structure this segment represents. By extension, the nature of the market conduct and performance will definitely provide sufficient information on the best approach to realign this market to a competitive position. This view can be shared in the U.S and Canada Livestock case where, Miljkovic (2009), in a reference to U.S and Canada Livestock market trade, reported that once a country s "very trade dependant," then the market prices becomes very responsive to exogenous shocks which ultimately reduce market potential.
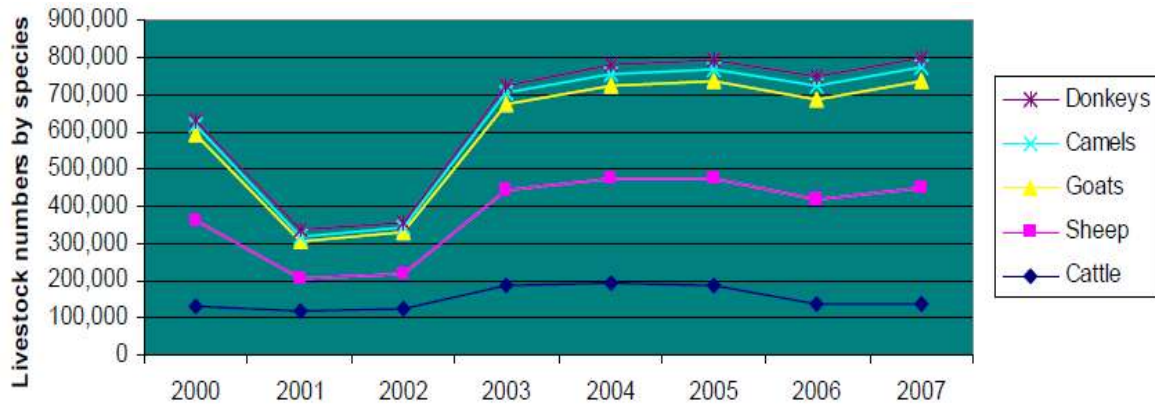
Figure 3: Isiolo County 2000-2007 Livestock population[4]

2.5 Making agricultural markets work for the poor. Is it possible?

Agricultural growth has been identified as one of the major ways of reducing poverty in developing countries. FAOSTAT (2004), revealed that in Eastern Asia poverty reduction has been more successful in areas where there have been significant gains in productivity in agriculture. In Sub-Saharan Africa, on the other hand, poverty has continued increasing since most countries attained independence and it can be linked to stagnating or even declining agricultural productivity as manifested in many countries (Nkamleu *et al.,* 2003). On a different note, DFID (2004) identifies several major ways as the 'transmission mechanisms' through which agricultural growth and productivity can aid in reduction of poverty in SSA. However, for these mechanisms to work properly towards poverty reduction through agricultural growth, a working market is very vital. In SSA, the mechanisms often fail to realize their potential because the contribution of markets is overlooked. DFID (2004), goes on to add that the reasons causing the market to fail include inefficient allocation of resources and breakdown of transmission mechanisms resulting from the social exclusion of people from the markets. Inefficient allocation of resources causes market failure because little growth is achieved, leaving the poor with only small dividends.

Poverty reduction through agricultural growth and productivity can only be achieved if and when all stakeholders start considering markets as an important component of the whole

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[4] Source: DLPO Isiolo

process and allocating resources for the growth and stability of markets. The major contribution of this analysis is that it directly links agricultural growth and productivity to the market. Market conditions are very important for livestock keepers because they determine the level to which the livestock keepers will benefit from their produce. Many livestock keepers remain poor and earn relatively little income due to poor market conditions. According to Bobby *et al.* (2003), integrated marketing system is a unique marketing scheme that encompasses mass marketing, one-to-one marketing and consumer producer direct marketing. This directly links small ruminant market. It is more effective for marketing system that captures different but related essentials; market players. This system is more likely to respond to customers' needs since it maximizes the fit of offer within a diverse category of consumers. Three major strength of integrated marketing system are: 1). It offers a wider opportunity for more finely tuned segments in the market 2). It offers time and other dimensions of customer behavior, meaning that customer service oriented is more enforced. 3). It offers a better platform and a launching pad to measure market opportunities.

Borrowing from Bobby *et al.* (2003), we can have a clear understanding of which marketing system is presented in the small ruminant stock marketing in Isiolo- Nairobi Nairobi among other trading routes. The study has acted as a precursor to the understanding of free marketing system which occurs in the livestock industry in Kenya (Hilpi, 2007). Just as illustrated in their mode of trade, livestock keepers are free to choose whether to sell or not and on what routes of trade notwithstanding the compelling climatic factors that sometimes force the livestock keepers to sell at relatively cheaper prices. However, within this context, the study provides an opportunity for more researches to illuminate on the possible challenges in achieving marketing efficiencies and marketing opportunities. This sentiment was also illustrated in Bellemare *et al.* (2004) who reiterated that at household-level, livestock marketing assumes an integrated marketing system where livestock keepers sell livestock to traders through the middlemen to the ultimate consumer.

2.6 Small Ruminant Markets in Kenya

Naturally, Small ruminant stock especially goats are well adapted to arid areas and form the largest number of livestock head in Isiolo County (Barrett *et al*., 2001). This is because these regions are too harsh for crop production, and since sheep and goats are browsers, their

domestication forms the backbone of ASAL economy (Hilpi *et al.,* 2003). Bellemare *et al.* (2004), looked at household-level livestock marketing behavior among Northern Kenyan and Southern Ethiopian Livestock keepers. The findings of the study showed that the northern livestock keepers are still far from autarky market conditions and the major driving factors that influence marketing of livestock in the area is adjustment to drought shocks. It further indicated that market participation widely varies from region to region and from season to season with an ultimate effect of trading routes for destined market traders. Complimentary to this, Barrett *et al.* (2004) analyzed the livestock pricing in northern Kenyan rangelands specifically on Moyale and Marsabit towns; where it was observed that the final destination for most of the livestock from Moyale is Nairobi town market - which is the largest beef market in East Africa. The bulk of these markets are in Kariobangi area which is specialized for sheep and goat meat, Njiru in Dandora, and Dagoreti both majorly for beef.

A closer link to this observation comes from Little *et al.* (2000), who reiterates that; the Njiru market accounts for the sale of over 3,500 cattle per year for the Nairobi market. This means that, there is large demand for livestock meat majorly in major towns with Nairobi just an indicative measure of demand. The study by Barrett *et al.* (2000) provides supportive information to the study since it defines the trading routes for the major livestock products. There is a clear illustration of Moyale- Nairobi trading route, Marsabit- Nairobi trading route but there is silence on Isiolo- Nairobi; Isiolo- Nakuru, Isiolo- Mombasa and Isiolo - Kisumu trading routes for small ruminant stock. The study has not given a specific attention to small ruminant stock but has rather explored the trading pattern of livestock in Moyale and Marsabit to the destination markets. It is important therefore for the study to examine the trading pattern specifically for small ruminant stock in ASALs, the most favorable trading routes for small ruminant stock and thereof, identify the possible gainers and losers in the small ruminant stock market. Moreover, the study will focus on livestock trade with Isiolo being the source market. Heike, (2006) looks at the role of contract and trust as a social capital in reducing transaction cost and observed that food value chain is facing a lot of huddles including but not limited to market failures (especially in case of monopolies; information asymmetry and inadequate infrastructure), policy failures as well as farmer related problems such as illiteracy, and cultural setbacks (Jose *et al.*, 2009). This

has forced the local livestock keepers to heavily rely on the extent of market liberalization (Hilpi *et al*., 2007 and Rios *et al.,* 2009).

In reference to this case study on Kenyan potato value chain, it is important to note that market structure plays a major role in determining the extent of market gains. This sentiment has also been echoed by Ayieko *et al*. (2005) who concluded that fresh fruit and vegetable consumption patterns and supply chain systems in urban Kenya exhibits low price elasticity in towns than production points in the rural areas. The study conclusion contributes in the understanding the relationship between the market supply responses to demand along the value chain. This is a key component in examining the small ruminant stock trading in Isiolo – Nairobi trading route. Pastoralist marketing behavior has been key interest to many researchers. Sharon *et al*. (2003) in a study conducted in northern Kenya and southern Ethiopia examined factors that limit livestock keepers marketed off- take response to conventional rise and fall in the livestock productivity and the possible remedies to foster more responsive pastoral livestock marketing in Kenya and Ethiopia regions. The study extensively explored the ASAL pastoralist livestock marketing behavior and observed that: there is insufficient information for livestock keepers and traders to plan for incurring transaction costs especially in times of uncertainty such as drought period. These sentiments were also shared by Mutuku *et al*., (2009). Additionally, the study further highlights that undefined market system confines livestock keepers to be price takers in the market.These findings are similar to those highlighted by Perin, (2002).

Muriuki, (2001) together with Rangnekar, (2001) also found out that market challenges faced in ASAL are also faced in the dairy industry. Sharon *et al*. (2003) further concludes that there exists no clear relationship between the price of animals offered on the market and the market off-take; leading to scenario where the livestock market traders and keepers incurring high transaction costs (Barrett *et al*., (2006). Devendra, (2005) and Perin (2002), touch on the contribution of livestock production to food security and poverty alleviation. The findings showed the effect of climatic change on livestock productivity on ASAL rural households. This is in reference to general knowledge that ASAL rural economy is purely supported by livestock production (Kosgey, 2007). Climate change factors 1.e. drought, contributes to poor livestock market performance (Nin *et al*. (2007). Livestock keepers dispose off their livestock during extreme dry weather conditions to escape the risk of losing their livestock. The welfare

implications resulting from poor market performance remain a key indicator to assess the successes of market systems with regard to participants along the value chain (Rabah, 2001). Conventionally, it is expected that the strong power of either market participants (supply side Verses the demand side) creates a barrier to entry thereby leading to an imperfect market competition. Analytic work by Dawe, (2002) demonstrate that apart from quantitative indicators, barriers of entry into a market through imperfect competition is depicted by high price elasticity, low expansion of market niches as well as restricted gain between the market players; which eventually results into slow growth of the overall industry.

The Devendra, (2005) and Perin (2002), studies offer comprehensive quantitative investigation into the market structure and the performance of small ruminant stock. The findings n trading routes provided an insight into the nature of Kenya shoats' market. Generally, there are many studies done on livestock production in Kenya and more specifically in ASAL regions. However, as a point of departure for the study, there is a missing link of understanding the market structure and general performance of small ruminant stock market based on Isiolo-Nairobi trading route. By and large, attempts to understand what informs the market players of specific trading routes and identifying the major characteristics of the market players has been missing in the literature. The study therefore provided adequate link and insight on factors that significantly influence the behavior and performance of small ruminant stock market.

2.7 Theoretical Framework

The study focused on small ruminant value chain. The livestock keepers and the market traders are the key actors on whom efficient and effective marketing process depends on. The market traders in this context include the small ruminant livestock brokers, trekkers, Stock bulkers, commission operators and any other participants that link the livestock keepers to the ultimate buyer. The major incentive for marketing is to create utility with an ultimate goal of improving exchange efficiency (place utility) and bridge the operating supply with the current demand. Place utility is therefore the core drive to distribute products. This is because it creates value to the ultimate consumer. Conversely, ordinal utility which is often referred to as the real value function since it provides a stronger basis for product distribution. For instance, when more than one distribution outlet alternatives are present in a market situation, one alternative

will be most preferred to the other based on the value of utility. That is, if $V(x_1) > V(x_2)$ and the outcome X_1 is preferred to X_2. Then an ordinal preference of choice is created.

Based on the ordinal utility theory, addition of a constant to the value function or multiplying it by a positive constant does not alter the relationship of the preference. That is; $V(x_1) > V(x_2)$ if the outcome X_1 is preferred to X_2, then; $a + bV(x_1) > a + bV(x_2)$. Suppoes we have probabilistic distribution function of f_{x1} (x_1) and f_{x2} ($X2$) then (x_1) > (x_2) if and only if; $E_1[U(X_1)] > E_2[U(X_2)]$. Based on the assumption that the probabilistic outcome of X_1 and X_2 are known with certainty E_1 and E_2 denotes the expected values of the utility functions $U(X_1)$ and $U(X_2)$ respectively. For example if f_{x1} is characterized by discrete possible outcome X_{11}..., X_{1n} with probabilities P_{11}..., $P_{1n.}$ and f_{x2} is characterized similarly by outcome X_{21}..., X_{2m} with probabilities P_{21}..., P_{2m} then f_{x1} is preferred to f_{x2} iff;

$$\sum_{i=1}^{n} U[X_{1i}]P_{1i} > \sum_{j=1}^{m} U[X_{2j}]P_{2j}$$

The involvement of different individuals in the market leads to discriminate treatment of the trading route choices. This is a similar observation made by Johnson, 1971.

2.7.1 Operationalization of the ordinal utility concept within choice of trading routes

It is assumed in the study that the basic choice of which route to take by individual traders is influenced the expected level of return associated with specific route. In other words, the traders have numerous options of which route to take when trading. For Example, a trader can take Northern Province bulk stock directly to Nairobi; take Garissa-Isiolo- Nairobi route; Isiolo-Marsabit-Nairobi route or assume direct trading channel with individual markets. The study assumed that there were numerous possible trading routes that can yield relatively better margins. Suppose that U_i and U_j represent a trader's utility for two route choices, which are denoted by R_i and R_j respectively.

$U_i = \beta x_n + \varepsilon_i \ and \ U_j = \beta x_n + \varepsilon_j$ …..………. **Equation 1: (trader's utility for route choices)**

Where, U_i and U_j are perceived utilities associated with specific route choices R_i and R_j, respectively, X_n is the vector of explanatory variables that influence each route choice, B is a parameter to be estimated, ε_i and ε_j are error terms assumed to be independently and

distributed (Greene, 2000). The variables that are associated with route choice in the trade are assumed to be;

S_e – security associated with transport of stocks

S – No of stock available on a specific route/ market point

F – Finances needed in the trade

T – Transport

D_e – Demand

P – Stock prices

N_G – Net market gain

ε – Other inherent factors

Therefore, suppose R_i is associated with a number of variables such as security, stock numbers and demand the its utility preference is noted as;

$UR_1 = f(S_e, D, N_G, S, \varepsilon)$………………………………......…**Equation 2: Utility Preference 1**

$UR_2 = f(S_e, D, T, N_G, S, \varepsilon)$………………………...…..…**Equation 3: Utility Preference 2**

$UR_3 = f(S_e, N_G, \varepsilon)$…………………………………………**Equation 4: Utility Preference 3**

$UR_4 = f(S_e, D, N_G, \varepsilon)$……………………………....…**Equation 5: Utility Preference 4**

Where UR_1 – utility associated with route 1

UR_2 – utility associated with route 2

UR_3 – utility associated with route 3

$UR4$ – utility associated with route 4

And suppose; UR_1, UR_2, UR_3 and $UR4$ are associated with actual trade choices, then, the choice will depend on individual traders' preference. In other words, each and every route choice has a specific set of variables of influence. Depending on the traders' best combination of variables, the trader assumes a preference for a specific route that would yield higher utility compared to other routes. Market gain is a key consideration among other factors. Based on ordinal utility concept, the traders are assumed to prefer R_3 to other routes. That is;

UR_3　UR_1　UR_2　UR_4 …………..……………..… **Equation 6: Ordinal Utility theory concept.**

The Utility preference in equation 6, defines the possible reason for choice of trading along Isiolo to Nairobi in the mall ruminant meat market.

2.7.2 The Empirical framework

The backbone of the study is the choice and preference for specific trading routes of small ruminant trade in ASALs based on a number of factors.
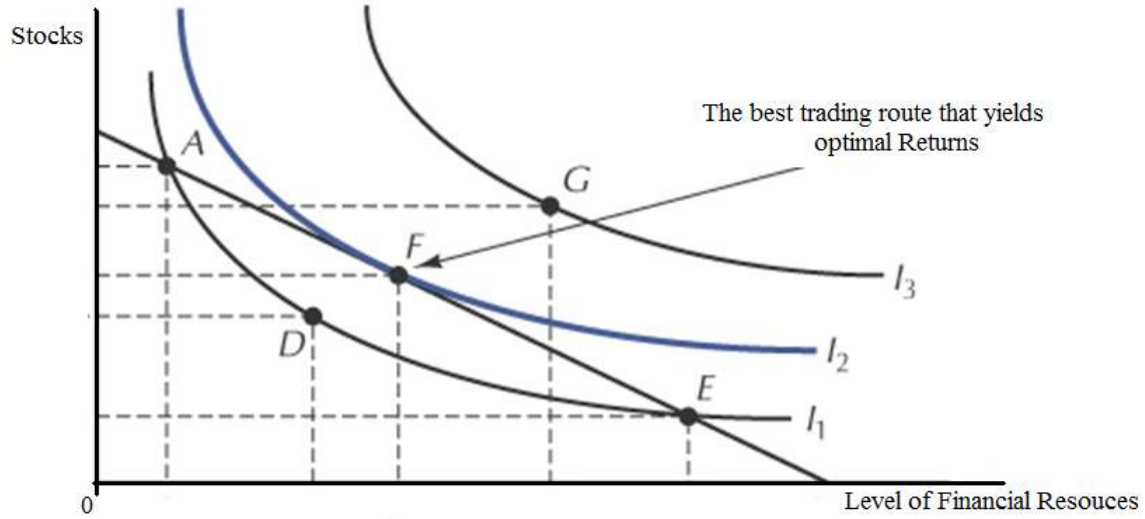
Figure 4: Graphical representation of Utility preference based on different trading routes

Trading cash together with stock availability is major consideration. Therefore, let's assume that; for points;

$A = UR_1 = f(S_e, D, N_G, S, \varepsilon)$…………………**Equation 7: Optimal ordinal utility trading point 1**

$D = UR_2 = f(S_e, D, T, N_G, S, \varepsilon)$……………**Equation 8: Optimal ordinal utility trading point 2**

$F = UR_3 = f(S_e, N_G, \varepsilon)$……………………..**Equation 9: Optimal ordinal utility trading point 3**

$G = UR_4 = f(S_e, D, N_G, \varepsilon)$……...………...**Equation 10: Optimal ordinal utility trading point 4**

Traders take route 3 that yields optimal returns based on trade factors such as demand, net gain among others.

2.8 Conceptual Framework

Figure (5) indicates a flow diagram of the conceptual framework for this study. This framework is a modified structure, conduct and performance framework which provided a visual view of interactions between the livestock keepers' internal and the external environmental factors within the small ruminant marketing chain. At the onset of this framework, livestock keepers characteristics such as age factor, education level of the individual keepers, sex and the institutional factors (such as livestock input credit access, informal groups and presence of trade

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contracts) influence the level of livestock production. Positive interaction between institutional factors and the farmer characteristic positively dictates production attributes of small ruminant livestock production in Isiolo County.

However, production constraints have been observed to be a major overall challenge that determines marketing characteristics of livestock in ASALs (Muriuki, 2001). Observably, the production constraints (for example; land size, climatic change, distance from the market among others) have direct influence on the choice of marketing route which subsequently leads to direct implication on the type of small ruminant livestock market structure. This is because when the production is more constrained, the marketing system tends to imperfect structure. This situation ultimately impact on the market performance which in this regard is captured by number of stock traders, price variation and possible gainers and losers within the marketing system. The government plays a supervisory role in this conceptual framework. This is envisaged to directly boost the overall productivity of small ruminant livestock in ASALs.

An extended effect of this role is the contribution of competitiveness in small ruminant stock marketing in Kenya. On the other hand, production constraints are also seen to influence the level of government efforts in supporting small ruminant markets (Njanja et al., 2003). That is, climatic change, fixed land size and transhumance nature of the livestock keepers hamper the effort of the government to instill productivity in the small ruminant livestock markets. However, despite the weight of these constraints, the government faces a challenge to remain relevant and effective in harmonizing the behavior of market players through policy controls, price controls and extension services among other preferable measures. Finally, the nature of market performance becomes the sole measure in ensuring that all the market benefits are passed on to the livestock keeper. In the long run, it expected that such benefits will translate to reduced poverty levels as well as improved lived production and marketing.

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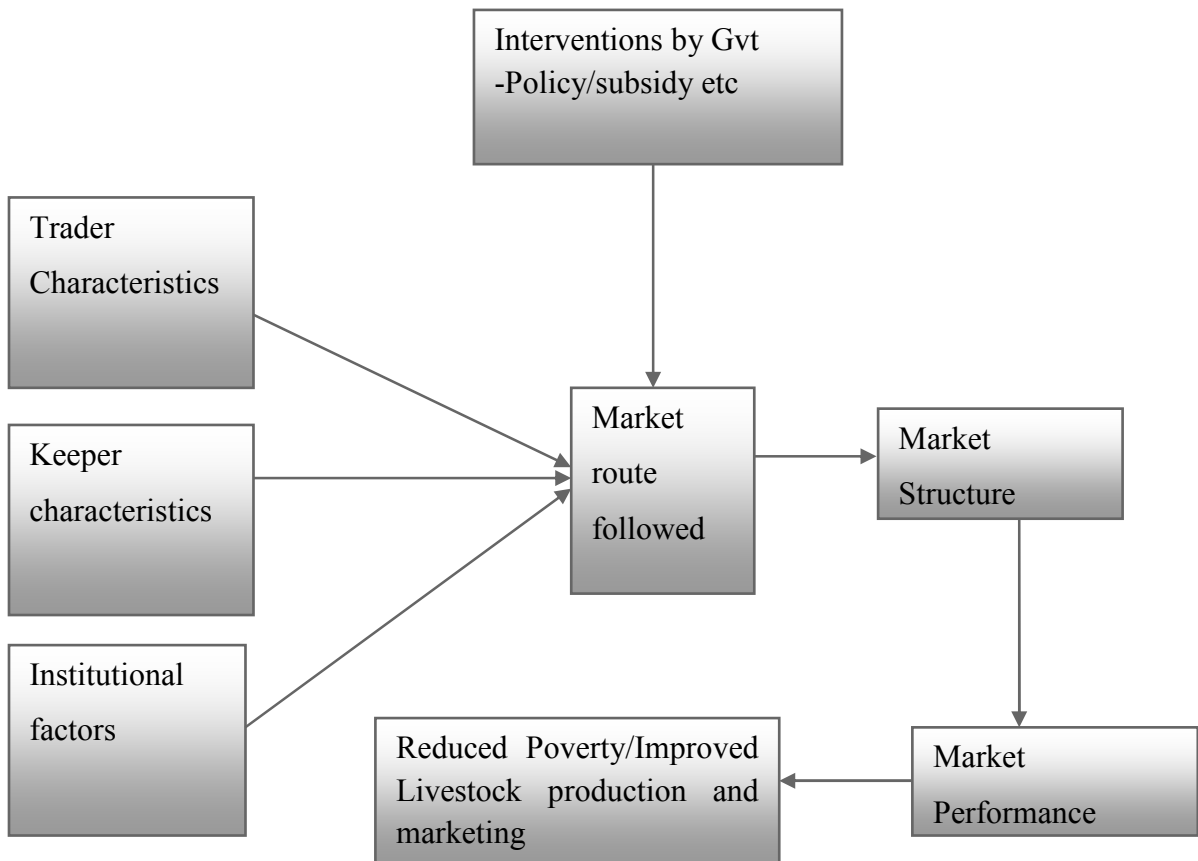
Figure 5: Market Structure and Performance conceptual Framework

Modified from APEC, 2008

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 The study area

The study area covered Isiolo County which is in the Eastern part of Kenya extending to Nairobi area. Isiolo is one of Counties in the Eastern part of Kenya. The County covers an area of 25,605 square kilometers and is currently divided into 6 working administrative divisions namely Central, Garbatulla, Sericho, Merti, Oldonyiro and Kinna. This region is classified as 100% ASAL since it is characterized by semiarid and desert like conditions (Draft National ASAL Policy, (DNAP), 2004). Additionally, the households are majorly pastoralist with sheep and goat forming the largest herd of livestock together with camels and donkeys. This region was intentionally selected due to its potential and capacity in small ruminant livestock production. Its location advantage to Nairobi meat markets was a key determinant in assessing market performance. The Nairobi destination market was selected due to its huge population density and the potential for meat consumption.

In this area, the livestock keepers encounter numerous challenges in marketing the livestock and livestock products due to poor roads and harsh climatic conditions. For example; during the livestock keeping period, the livestock keepers have a choice of when and where to sell their animals either in need of cash or in response towards drought which has been viewed as the primary threat to livestock rearing (Mendelssohn *et al.,* 2007). During drought, there is water shortage and forage is very scarce leading to high livestock mortality which pushes the livestock keepers to sell their animals before they succumb to drought (Barrett *et al.*, 2004). This scenario has therefore propelled a mixed reaction on both the traders and livestock keepers. In major cases, the keepers are subject to the traders who take advantage of market information asymmetry and exploit the keepers. It was observed that the traders assume different levels of participation in the major Isiolo market segment to Nairobi terminal market. Given the different scenarios represented, it was imperative therefore to assess the level of market performance with Isiolo to Nairobi terminal market so that we can determine who are the possible gainers and losers in the market arrangement.

3.2 Data collection

The study used primary and secondary data. The Secondary sources of data included extensive review of relevant literature on small ruminant market statistics, monthly bulletins and other published materials by the Ministry of Agriculture (particularly Isiolo), among other policy documents and past surveys as well as through direct observation and focus group discussion. The primary data were collected using self administered questionnaire. From Isiolo, respondents were livestock keepers, brokers and traders. In the trading centers, use of informal discussion groups supplemented real data collected. Short informal discussion was employed due to the transitional nature of the livestock trekkers and low literacy levels.

3.3 Sampling procedure

Sample Size Determination

The following formula was employed to come up with an appropriate sample size of livestock keepers and traders for the study. Given that the variance of the population between the two is not known, a multistage stratified sampling was used to arrive at 210 sampling units that were then distributed between livestock keepers, bulk traders (wholesalers), trekkers (small scale traders), Abattoirs, butchers and brokers. To obtain this number, the proportionate to size sampling approach by Anderson, (2007), was used as indicated below:

$$n = \frac{(z^2 pq)}{d^2}$$ ………………………....……**Equation 11: Sampling size by Anderson, (2007)**

Where n = the sample size

z = 1.96

P = Population proportion (the proportion of livestock keepers, and traders in Isiolo County as well as the traders and brokers in Nairobi Markets). However, since the area is Isiolo country is purely known for livestock rearing as the main economic activity, the best guess of 0.5 proportions was used because the exact proportion was unknown. Additionally, this guess was also applied in determining the traders in the cases of Nairobi market.

d = the significance level set at 95% confidence level. This corresponds with a z value of 1.96.

q = is a weighting variable computed as 1-P.

Due to high variability in determining who is a trader and livestock keeper in the population, the study applied acceptable error of 12.65%, the study sample size was calculated as follows:

$$n = \frac{(z^2 PQ)}{d^2} = \frac{((1.96)^2 \times 0.5 \times 0.5)}{0.126517^2} = 60; \text{ For livestock keepers and traders in Isiolo region.}$$

With a high precision of finding trader in Kiamaiko (Nairobi open market), the study applied acceptable error of 8.946%. For Nairobi market therefore, a total of 150 respondents were surveyed as shown below:

$$n = \frac{(z^2 PQ)}{d^2} = \frac{((1.96)^2 \times 0.5 \times 0.5)}{0.0894613^2} = 120; \text{ For traders in Nairobi region.}$$

Additionally, category of butchers was also observed in order to capture the prices of shoat's meat at the end of value chain. The Nairobi region represented the consumption area and therefore a total of 18 abattoirs and 12 butchers were randomly picked to obtain average prices. This brings to a total of 150 sampling units in Nairobi region.

Sampling Design

Stage	Category			Sampling method	Sample size
Stage: 1	2- regions (Isiolo & Nairobi)			Purposive random sampling	210 (sample frame)
Stage: 2	**ISIOLO REGION**			Purposive random sampling	**60**
	Garba	Isiolo (area)	Kina Market		
	Traders= **6** Keepers=**6**	Traders= **8** Keepers=**8**	Traders= **18** Keepers=**18**		
Stage: 3	**NAIROBI REGION**			Purposive random sampling	**150**
	Kiamaiko	**Kiserian**	**Abb &Butchers**		
	Carcass traders = **30** Live Traders = **30** Brokers = **30**	Live traders = **15** Carcass traders = **15**	Abattoirs = **18** Butchers =**12**		

1) First, a multistage random sampling procedure was employed to select the sampling units. The first stage involved purposive sampling procedure, whereby Isiolo and Nairobi were chosen out of the possible trading markets that deal in small ruminant livestock.

2) Secondly, Purposive random sampling procedure was employed to select 3 regions in Isiolo: Garba, Isiolo town (area) and Kina market; 2 regions in Nairobi: Kiamako and Kiserian (Ngong).

3) Thirdly, purposive random sampling procedure was used to select units among the sampled strata.

3.4 Structure conduct and performance paradigm

Since the major purpose of the study was to analyze the structure and performance of the small ruminant market in ASALs focusing on Isiolo-Nairobi terminal market, the S-C-P framework provided was the identified to be the most credible approach. At the end the end of the study, the model has determined whether there exists a pure market structure or a monopolistic market framework. The study borrowed its arguments on the measure of the market structure from the indicators that CARE (CARE is a leading humanitarian organization fighting global poverty) to measure poverty index and income concentration among households. This framework shows that main market characteristics such as level of concentration of key players, competitiveness (a qualitative characteristic measurable) and market power. The absolute concentration measures and Herfindahl-Hirschman index were comparatively among the best index that could have been used but it was easier to use the Gini-coefficient and the Lorenz curve to depict the market structure and performance as compared to the two models. The interaction among market participants remains our main focus in this framework. We highly hypothesized strong relationship between market power, behavior (conduct) and performance in general. The figure (6) bellow indicates the unit of measurements for the structure, conduct and performance.

Market Structure Indicators
- Gini-coefficient
- Lorenz Curve

Market Conduct Indicators
⇨ No. of brokers: who makes the decision on price?
⇨ No. of traders: who makes the decision on price?
⇨ Sub categories of traders: who makes the decision on price?
⇨ No. of and role of regulating agencies
⇨ pricing structure

Market Performance Indicators
- Gini-coefficient
- Lorenz Curve

Figure 6: The indicators for market structure, conduct and performance

3.4.1 Degree of market power measure

In order to measure the market power, the SCP framework uses the Lerner index. This index will determine whether small ruminant stock market in Isiolo-Nairobi trading pattern is monopolistic or competitive in nature. In other words, the Lerner index measured the difference between stock prices and marginal cost (MC). This index is given by;

$$L = \frac{P-MC}{P} \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \text{....} \textbf{Equation 12: Lerner Index Equation}$$

Where; P – price of the small ruminant stock and MC- Marginal cost of small ruminant stock. The Lerner index varies within the range of 0 to 1. As the Lerner index value approaches 1, the higher the degree of monopoly power while as the index approaches zero it is an indicative of competitive market and therefore the livestock keepers, traders and consumers have less control in the market (market actors are all price takers). However, based on the Lerner index that was calculated, it was possible to determine the optimal MC that enables the realization of a competitive market structure.

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From equation 12, making Price (P) the subject;

$$L = \frac{P - MC}{P} \rightarrow P = \frac{1}{1-L}(MC) \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \textbf{Equation 13}$$

Where $\frac{1}{1-L}$ is the mark up factor (MF); whereby if L=0, the MF=1 and this shows existence of a competitive market structure. .For instance if the Lerner index is 0.6, the MF = 2.5 meaning that market price should be 2.5 times the marginal cost. However, price is a key determinant of market structure and therefore, another equation that captured price elasticity was used. Implying that, just like any other traded commodity, livestock keepers should experience a downward sloping demand curve. This was analyzed using the profit maximization function given by;

$$\pi\,(q) = \ Pq - c\,(q) \dots \dots \dots \dots \dots.. \dots \dots \dots \dots \dots \dots \dots \dots \dots \text{....Equation 14: Profit maximization function}$$

Where π - profit for the small ruminant livestock keepers

C –is the total cost function (TC)

The derivative of equation 3 with respect to quantity is given by; $\frac{d\pi\,(q)}{dq} = \ \left[\frac{dp}{dq}q + \frac{dq}{dq}p\right] -$

$\frac{dc\,(q)}{dq} = \ \left[\frac{dp}{dq}q + p\right] - \frac{dc\,(q)}{dq} \ since \ \frac{dq}{dq} = 1$

$$= p\left(\frac{dp}{dq}\frac{q}{p}\right) + p - \frac{dc\,(q)}{dq} = 0 \rightarrow F.O.C \dots \dots \dots \dots \dots.. \textbf{Equation 15: Optimization principle}$$

When equation 4 is re-arranged, the price elasticity (P^e) is obtained as;

$$P^e = \ \left[\frac{dp}{dq}\frac{q}{p}\right], \text{ this can be further expended to } \rightarrow P\left(1 + \frac{1}{P^e}\right) = MC \quad or \ P = \left(\frac{MC}{1 + \frac{1}{P^e}}\right)$$

This equation $\rightarrow P\left(1 + \frac{1}{P^e}\right) = MC$ shows that the amount price exceeds MC depends upon price elasticity. Meaning that as $P^e \rightarrow \infty$ demand and supply are more elastic thereby attaining P= MC condition which is for a competitive market structure. In this study, it was assumed that the market price is the retail price for small ruminant stock sold in the market at the butchery. In this aspect, the study was capable of determining which market structure exists in Isiolo small ruminant stock market. Since the major objective of every trader is to maximize profits within a selected trading route, the Lerner index depends on the price (see equation 12) which subsequently depends on the level of price elasticity. Meaning that, as $P^e \rightarrow \infty$ the index approaches 0; and thereby creating a competitive market structure scenario. In the profit maximization objective of the traders and all the market players, (in major instances; otherwise some of the market players do not objectively participate within profit maximization objective) it

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therefore means that as cost of market increases, so does the marginal cost (MC). In the long run, this weakens the price power and therefore results into a market situation where $P \neq MC$ which favors a monopolistic competition. It will therefore translate to traders gaining more in the trade than the livestock Keepers. In this case, the price that earns market player the monopoly power inhibits new entrants into the market since the marginal cost of the player will be relatively lower than the real marginal cost. Meaning that, all the costs are passed on to the consumer.

3.5 Analyzing the gainers and losers in the market: Price spread analysis

In order to identify the gainers and losers in the market along the meat market value chain and quantify the level of gain and loss, the study used a combination of price spread analysis model and Gini-coefficient by plotting Lorenz curve. This involved estimating various cost components that contributed to the final selling price (consumer price). In this context therefore, the cost components included; transport, shoats' rearing cost, security cost, cost of commission, and warehouse cost. It was realized that in the price spread analysis model, a joint picture of the market gain share by the traders and livestock keepers was provided. In other words, the price for Isiolo sourced goats and sheep sold in different market destinations provided the mean retail price of analysis. The common equation adopted for this analysis is given by;

$$TG = P_s - TC$$ where TG – Total Trader Gain

$$P_s - \text{Selling Price}$$

$$TC - \text{Total Cost}$$

Hence; Total Trader Gain = (Selling Price - Total Cost). Since examination of who gains and lose in the trade is closely linked with income distribution, the gains from the price spread were used as the proxy for income of the livestock keepers and traders. For example, to obtain a Lorenz curve which is a graphical representation of cumulative proportion of income to the cumulative proportion of individuals; the x-axis recorded the cumulative proportion of traders and livestock keepers (ranked by net profit level - as a proxy for income) and the y- axis recorded cumulative proportion of income among and between the traders and livestock keepers. There resulted into two graphs that displays in visual terms, the inequality in terms of income distribution between the two groups (traders and livestock keepers). The Gini-coefficient derived from Lorenz curve was used to measure the income distribution between and among the

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population group (traders and livestock keepers) where the cumulative proportion of income was plotted against the proportion of the individuals in a reverse ranking order.

As proposed by Lorenz, (1905), the Lorenz curve is able to provide a visual presentation of which proportion of the Small ruminant stock market population gain in the current Isiolo-Nairobi trading route. The Gini coefficient is a ratio that indicates a share of profit margin (Net income) between the two market players: traders and the livestock keepers. This model was relevant in the study since it captured the covariance between the profit ranks and the cumulative share of income between the traders and the livestock keepers. The coefficient is more flexible in evaluating impact of market share since it can employ different dimensions of inequality parameters. The income share was calculated by taking the cumulated net profit (proxy for income) of given share of population- in this case 30 since the equal number is represented by livestock keepers, divided by the total income (defined as Y) as indicated below;

$$L\left(\frac{k}{P}\right) = \frac{\sum_{i=1}^{k} y_i}{Y} \; ranges \; between \; 0 \; and \; 1 ………..\textbf{Equation 16: Gini-coeficient income share}$$

Where;

K =1….n is the position of each individual in the income distribution;

I =1…..k is the position of each individual in the income distribution;

P is the total number of individuals in the distribution;

y_i Is the income level of the ith individual in the distribution

$\sum_{i=1}^{k} y_i$ Is the accumulated income up to the kth individual

Given the proportionality represented by $\sum_{i=1}^{k} y_i$, the values ranges between 0 for k=0, and Y, for k = n, therefore resulting into the ultimate value of; $L\left(\frac{k}{P}\right) = \frac{\sum_{i=1}^{k} y_i}{Y} \; ranges \; between \; 0 \; and \; 1$. After the presentation of the Lorenz a computation of Gini-coefficient which was defined as a ratio of the area of the Lorenz curves. The area between the equidistributed lines (Perfect equality) was indicated by A-C. Since the area under the curve is 0.5, the Gini-coefficient was therefore defined by (B+C/0.5) = 2(B + C). However, since the ranking of the population, and mean income were known, the index was simplified using the Deaton, (1997) formula shown below;

$$G = \frac{N+1}{N-1} - \frac{2}{N(N-1)\mu}\left(\sum_{i=1}^{n} P_{iX_i}\right)\dots\dots\dots\dots\dots$$**Equation 17: Operationalized income share**[5]

Where u – represents the mean income of the population

P_i - is the income rank p of person *I* with income *x.* The ranking was weighted in such a way that the richest person received the lowest rank 1 and the poorest the highest rank N. This is important in order to maintain the Gini transfer principle.

3.6 Charting Income Inequality: Why the Lorenz Curve?

The Lorenz curve is a very popular way of representing income distributions and as such has been applied widely in representing income inequalities. This tool was proposed by Lorenz (1905) and is used to represent income distribution by showing the proportion of income which is in the hands of a particular percentage of the population. Cowell (1977), indicates that every population will generally have inequalities in income and the extent of inequality may be attributed to different factors in the economic system of the society. The most important thing here is that in the case of populations which depend on income from selling activities, the incomes of the population members will seriously influence the structure of the market and its conduct and performance. According to EASYPol (2005), a market with a greater inequality in income may be complicated in conduct and structure due to the difference in behavior of consumers and suppliers.

The Lorenz model is therefore regarded relevant to the study because livestock marketing depends on the nature of the market; disparities in income existing in the market areas will definitely affect the demand of livestock products apart from determining the conduct of sellers and influencing prices.

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[5]**Deaton, (1997)**

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 General description of players involved in small ruminant trade

The findings in the study reveal that, there exist numerous marketing channels through which the small ruminant stock and meat move from first point of sale (livestock keeper and meat from abattoirs). Generally, the flow was depicted in two different market segments. The livestock segments and the small ruminant stock segment in Nairobi markets. These channels include the following;

1. First point of sale (Isiolo open market) _____Via keeper_____ Local markets (e.g. Kipsing) _____ Purchased by wholesale loaders/traders _____ Terminal Market in Nairobi (Kiamaiko) _____ via brokers ____ Abattoirs ___ via broker ___ Meat markets (e.g. City market).

2. First point of sale (Isiolo open market) _____Via broker_____ Local markets (e.g. Kipsing) ___ via broker _____ Purchased by wholesale loaders/traders _____ Terminal Market in Nairobi (Kiamaiko) _____ via brokers ____ Abattoirs ___ via broker ___ Meat markets (e.g. City market).

3. First point of sale (Isiolo grazing fields) _____Via brokers' _____ Purchased by wholesale loaders/traders ____ Abattoirs ___ via broker ___ meat markets (e.g. City market).

4. First point of sale (Isiolo grazing fields) _____Via brokers _____ Purchased by wholesale loaders/traders ____ Same trade Abattoirs ___ Same trade supplies___ meat markets (e.g. City market).

5. First point of sale (Isiolo open market) _____Via Brokers _____ Purchased by wholesale loaders/traders ____ Abattoirs ___ via broker ___ meat markets (e.g. City market).

6. Isiolo open market ____ Traders _____Terminal market Nairobi __ Abattoirs__ Butcheries.

7. First point of sale (Isiolo open market) _____ Purchased by wholesale loaders/traders ____ Abattoirs ___ distributed to meat markets (e.g. City market).

8. First point of sale (Isiolo open market) _____ Purchased by wholesale loaders/traders ____ Abattoirs ___ Distributed to Institutions (hotels, hospitals).

In the first channel small ruminants are bought by keepers from Isiolo open market which is a first point of sale and sold through the smaller local markets in Kipsing to wholesale traders and loaders. These traders/loaders transport the animals in Lorries to the terminal market in Nairobi, usually a place called Kiamaiko. At Kiamaiko the animals are sold through brokers to abattoirs and then via brokers again to meat markets all over Nairobi like the City market. In this channel, brokers play a central role in the final stages of the sale of the stock and meat. Here the brokers have a prime chance to influence prices since the meat prices in the market generally determines livestock prices in the source markets (Barrett et al. 2003). The brokers significantly sway prices of the stock. The second channel involves the stock being purchased from Isiolo open market through brokers and delivered to local markets where they are sold on to wholesale loaders or traders through brokers again. The latter deliver the stock to Nairobi terminal market where like in the first channel brokers participate in their sale to abattoirs and meat markets in the city. It is quite evident in this channel that brokers play a major role in sales at all the stages. The fact that the brokers have to make profit in all these stages causes a price build up along the value chain. Nzuma, (2008), supports this observation by indicating that livestock keepers get much lower animal prices than what the animals fetch in terminal markets due to brokers' influence in the market.

The third channel indicates the major role played by brokers in the livestock market. It involves purchase of the stock by wholesale loaders and traders through brokers from the grazing fields of Isiolo and transportation to abattoirs in Nairobi. Once in Nairobi Kiamaiko market, they are sold through brokers destined for the Nairobi meat markets with all transaction done by brokers. As rightly pointed out by Barrett *et al.* (2003), possible moral hazardous behavior of brokers at every level of livestock marketing deprives livestock keepers of their right share of income and creates an imbalance in the livestock markets in favor of the brokers. In the fourth channel small ruminants are bought from grazing fields in Isiolo via brokers by wholesale loaders and traders who sell them on to abattoirs. The meat is then bought by suppliers and distributed to meat markets; in this case there are no brokers in the last two stages. Livestock keepers in this channel suffer the scrupulous practices of brokers since they often have to use brokers in order to sell their stock to wholesale traders. The fifth channel involves sale of small ruminants from the Isiolo open market by wholesale loaders through brokers and sell to abattoirs.

The meat is finally sold on to meat markets but this time through brokers again. This means that brokers have a chance to determine the prices at the Isiolo market and thus take advantage of prices at source markets so as to gain higher incomes.

The sixth channel involves buying from the Isiolo open market by traders who then sell to the terminal market in Nairobi where the animals end up in slaughter houses and abattoirs; brokers play no part in this channel. The seventh channel involves direct purchase of stock from the Isiolo open market by wholesale loaders and traders and their subsequent sale to abattoirs before distribution to meat markets in Nairobi; again brokers play no part in this channel although small traders are also eliminated. In the final channel, the animals are bought directly from the Isiolo open market by wholesale loaders and traders and delivered to abattoirs where the meat is then distributed directly to institutions like hotels and hospitals. In this channel as in the previous two, no brokers or small traders are involved. In this channel, brokers have been eliminated. These would be the ideal high income channels for animal keepers to sell their animals but unfortunately the channels are not often followed in the market because brokers cannot allow that to happen as it deprives them income. According to McPeak (2003), brokers have great influence and control over livestock markets to the extent that very little goes on without their direct or indirect involvement.

4.2 Stock movement along the value chain

First point of sale (Isiolo open market) (65% of the total stock)		
Via Broker	Open market is ignored 35% of stock Via Broker	
Wholesale Trader	Wholesale Trader	Trekkers/Small traders (80% of the total Stock)
Via Broker	**Via Broker**	
NRB Terminal Mkt	NRB Terminal Mkt	Whole traders/Haulers
Abattoirs	Abattoirs	Abattoirs
Via Broker	**Via Broker**	
Distributed to Butchers for final Consumers	Distributed to Butchers for final Consumers	Distributed to Butchers for final Consumers

Figure 7: Case study analysis of the stock movement to ultimate meat markets

As displayed in figure (7) above, about 35% which represents a third of all small ruminant sales taking place outside Isiolo open market. However, brokers play part in this alternative channel. The 65% of sales that takes place in the Isiolo open market is largely controlled by brokers since they can be seen in six out of the eight stages required to get the animals from the keepers to Nairobi terminal market. They have great advantage in price control and other market practices. Possibly, they can use this advantage to exploit livestock keepers and other traders if there is information asymmetry.

4.3 Stock movement and price-build up

First point of sale (Isiolo open market)

(65% of the total stock); Average Market trading price estimated at KES.

Via Broker Commission KES 270

Open market is ignored 35% of stock

Wholesale Trader Av. KES 3,095.

Wholesale Trader Av. KES 3,205.

Trekkers/Small traders/ Stock keepers (80% of the total Stock)

Via Broker; Bk Com, KES 200

Via Broker Comm. KES 130

NRB Terminal Mkt Av. KES 3, 540

NRB Terminal Mkt Av. KES 3, 540

Whole traders/Haulers

Abattoirs; Av. KES 4,024

Abattoirs

Abattoirs

Via Broker. Comm. KES 102

Via Broker Comm. KES 89

HH Consumers

Distributed to Butchers for final Consumers @ KES 300/kg

Distributed to Butchers for final Consumers @ KES 300/kg

Distributed to Butchers for final Consumers @ KES 370/kg

Figure 8: Price build up along channels of stock to destined

The figure (8) above reveals the small ruminant price-build up through various channels. It is evident that channels in which the open market is avoided by brokers the price goes up by over KES 300 per animal. This means the livestock keepers lose that margin to brokers. Even through in the Isiolo open market channel brokers are rife in significant channels, it is estimated that they take home an accumulated income of over KES 600 per animal. This additional margin contributes to price build up leading to the final consumer paying higher prices per Kg of the meat. The main losers in this situation are livestock keepers because their income per animal remains low on the average; the other traders cannot accept losses and adjust prices accordingly to cushion their investments. This situation is well elaborated by Devendra (2005).

4.4 Respondents' Characteristics

4.4.1 Education level

Table 1: Respondents' Education level[6]

Education level	Isiolo	Garba	Ngong'	Nairobi	Overal	Std Err
Primary	9%	19%	14%	39%	53%	0.73%
Secondary	31%	11%	33%	33%	15%	0.92%
College level	0%	1%	38%	15%	8%	0.48%
Informal education (No formal education)	60%	69%	15%	13%	24%	0.55%

Primary level which is the basic education had the majority of the respondents at 53% followed by informal education at 24%, secondary and college at 15% and 8% respectively. Garba Tula livestock keepers recorded the highest level of informal education at 69% while Nairobi traders also recorded the highest number of those with primary level education at 39%. The informal education in this case represented those traders and pastoralist who did not attend any formal classroom teaching but instead on family and clan teachings. These percentages are relatively low in view of the fact that for a education level is a major factor in technological adoption, market participation, as well as environmental and natural resource management among other things (Lanyasunya *et al.,* 2001). Education level is a key ingredient in enhancing trade through information sharing, market costs and margin forecasting, prices awareness as well as input choices among others. The dominance of primary level of education among the market participants would indicate that the shoats market suffers from faster uptake of technology (in this case: technology would capture any aspect of market innovation both at demand and supply side). If there is no equal platform for participation of both primary and secondary traders, then, an imperfect market emerges. This market could be controlled by buyers who may have more market information regarding price and consumer preferences. Therefore, the more advantaged group of livestock traders exercise market control (persuade pricing decisions) at the terminal

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[6] Percentages refer to those who responded to each category of education level in each region (e.g. 60% of the respondents in Isiolo had no formal education).

market, the disadvantaged group of livestock keepers on the other hand becomes absolute price takers (Juma *et al,* 2010).

4.4.2 Age of the respondents

Table 2: Respondents' age: Descriptive Statistics

Age Category	Age	Nairobi	Isiolo	Garba	Ngong
less than 30	Mean	67	37	49	67
	(Std Dev)	-3.32	-0.71	-0.89	-3.41
	Mean Std Error	0.032	0.02	0.01	0
31 – 45	Mean	41	37	39	37
	(Std Dev)	-3.36	-4.86	-3.83	-3.38
	Mean Std Error	0	0.03	0.02	0
61 – 75	Mean	65	-	68	67
	(Std Dev)	0.5		0.4	0.53
	Mean Std Error	0.6	-	0	0.03
76 and above	Mean	-	80	-	0.89
	(Std Dev)	-	1.2	-	.004
	Mean Std Error	-	0.23	-	0.5

Just like the other determinant variables (gender and education level), age form key informants on the extent of which age groups are integrated into the market function process. As indicated by the results (see table 2), mean standard age of the respondents in all the study regions ranges between 65 and 69 with the smallest age of 37. This is an indication that majority of the traders and keepers are relatively old. This finding is very important for policy formulation and inference since it is known that age limit poses advantage on experience rather than physical participation (Muendo and Tschirley, 2004). In other words, age could be a limiting factor in full realization of active economy since aged population least actively participates in economic activities. In regard to the small ruminant market chain, the mean age of 69 poses a challenge for keepers to walk long distances as well as the traders. The trade is organized in such a manner that keepers are the major participants at the production (supply) side while brokers and end of market chain traders on the demand side. It is therefore expected that the older the livestock keepers, the less active they are in the production lane. This will lead to low supply of stock leading to acute stock shortage in the future. Nairobi and Ngong represented the demand side and equally under the challenge of old traders.

Table 3: Stock ownership

	N	Proportion	Minimum	Maximum	Mean	Std. Deviation	Mean Std Error
Sheep	30	26%	4	800	124	156	0.00
Goats	29	25%	8	200	107	65	0.01
Cattle	17	15%	2	200	31	50	0.01
Camel	11	10%	2	80	24	28	0.02
Donkey	18	16%	1	10	5	3	0.01
Poultry	9	8%	1	20	12	6	0.087

It was found out that the mean average stock holdings for sheep among the livestock keepers was at 127 while for goats it was 107 heads. However, there exists larger discrepancy in ownership since others have up to 800 heads. This could be explained by varied preference and motivation to sell by the keepers who feel to hold stocks expecting improved conditions; while others decide to dispose. Some keepers prefer selling during harsh drought conditions while others are on season sellers thereby contributing to wide variation in ownership. Due to harsh climatic conditions, poultry was discovered to be less popular among the pastoralist with a mean of 11 heads per households.

Table 4: Descriptive of small stock trading to Nairobi market

Valid Locations		Frequency	Percent	*Mean Std Error*
	Isiolo	62	36.00%	0.035
	Garba Tula	19	11%	0.08
	Magadi	7	4.10%	0.002
	Shompole	5	2.90%	0,009
	Kipeto	2	1.20%	0.002
	Marsabit	10	5.80%	232
	Narok	4	2.30%	0.111
	Moyale	30	17.40%	0.321
	Garisa	13	7.60%	0.322
	Wajir	20	11.60%	0.097

Kipsing Market in Isiolo is occasionally used as the bulking point for stock route from near market environs to Nairobi terminal market. This is due to its strategic location for livestock keepers to trek their shoats. Consequently, Shompole, Kipeto, Magadi and Narok represent supply chain to Kiserian market which is also a main stream to Nairobi market both for carcass and live shoats. It was observed that Dagoreti is mainly specialized for large stock carcass trade with relatively smaller supply of shoats' carcass to Nairobi markets hence no live carcass is transported out of Dagoreti market. The respondents were therefore distributed as indicated in the table 4, with Nairobi region taking the majority share since it is the destination market.

It was noted that northern trading route is majorly inhabited by larger traders (wholesale/Bulkers) due to large capital and logistics required for transportation of the shoats to the ultimate market in Nairobi. This is contrary to the smaller traders (trekkers) who explore the within market trade. For example, in Isiolo, the small traders explore the Nyeri, Nanyuki, Kangeta, Maua, Kabras among other nearer markets since it relatively affordable in terms of transport and other market logistics. Due to constant movement by the livestock keepers, the trading pattern is expected to change during the year depending availability of pasture for the small stock. During slight rains, in Garba and Kipsing areas; there is heavy traffic of stock traded. This applies to Isiolo regions. This is affirmed by Muthee, (2006), that, the stock trading may extend to neighboring countries of Ethiopia, Somalia, Sudan as well as Tanzania depending on favorable stock trade conditions. Exceptionally, from this study, it was found out that the trading patterns closer to source markets are based on trekking to the primary markets (such as within and across Isiolo regions) to secondary and terminal markets. In most cases that involve larger distances- moving stock is by tracks.

Table 5: Respondents' distribution by region

Region	Frequency	Valid Percent	Mean std error
Isiolo	12	6.04%	0.002
Garba	48	21.54%	0.220
Ngong	30	14.08%	0.001
Nairobi	130	57.73%	0.009
Total	210	100.00%	

4.5 Demographic characteristics of the market participants

4.5.1 Gender

Equal Gender participation is very key in any market functions (for example the role of women in buying and selling is equally important as that of men). This is affirmed by Owuor *et al.,* 2004, who noted that within an institution (in this case, the small ruminant market), the individual roles cohesively promote the overall success of an organization. The markets or market outlets form part of the organizations in this context and effective role of both men and women therefore determines the extent of markets conduct and performance as indicated by price.

Figure showing "Gender Category by region _ Isiolo region" with horizontal bars for Female and Male across axis 0% to 100%.

	Male	Female
■ Series1	81%	19%
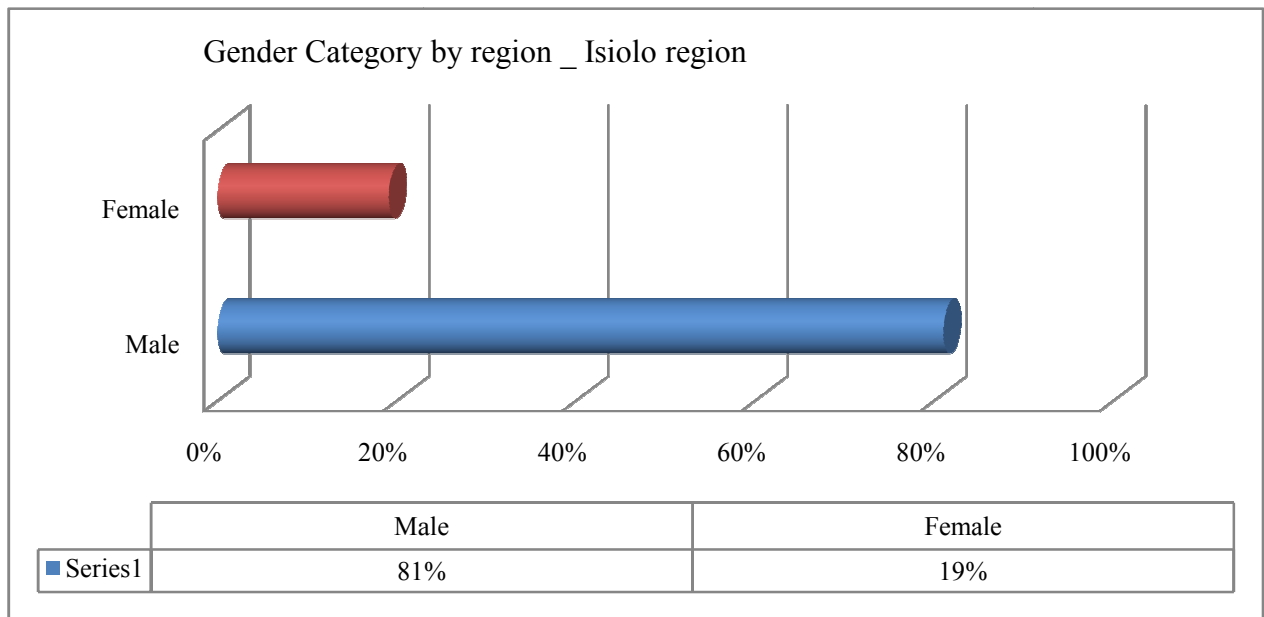
Figure 9: Percentages of traders in the small ruminant business in Isiolo in terms of gender

The figure (9) above indicates that women make up only about a fifth of the whole population of small ruminant traders in the Isiolo region. The fact that women make up only about 19% of the total market with the remaining 81% reveals a serious gender imbalance in the business where women are allowed to play a very minor role. This situation may have a great impact on the market in terms of market practices and conditions are concerned.   Significant

numbers of research have discovered that women play a central role in keeping small ruminants in the ASAL communities where the livestock is very popular. Hulela (2010) indicates that women play very significant roles in the local and national economic development of many of the countries in the sub-Saharan Africa. He explains that in the horn of Africa, women are involved in livestock keeping and ownership especially small ruminants (sheep and goats) especially because of the ease involved in handling these animals. The fact that there are very few women participating in the trading of these animals is an indication of an anomaly in the gender balance of the market in Isiolo.

IFAD (2004) reported a large number of women in the sub-Saharan region participating in the farming of small ruminants but also indicated that very few of them participate in their market or even gain substantial benefits from their sales. This later role has been dominated by men for their own economic gain in a practice that is seen as highly discriminatory (Moses, 2006). This practice is very evident in the results from Isiolo indicating women as greatly outnumbered by 4:1 in the small ruminant market.

Gender Category by region _ Nairobi region
Male   Female
24%
76%
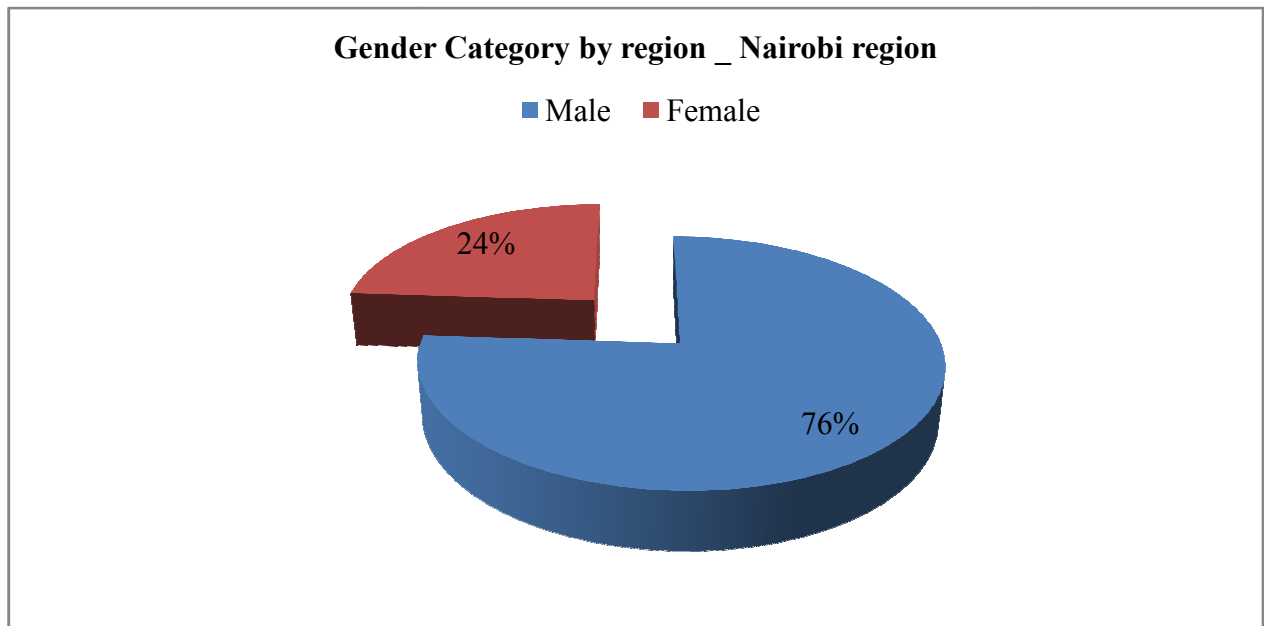
Figure 10: Proportion of male and female participating in small ruminant markets in Nairobi

In these results it can be noted that there is only a minimal increase in the percentage of women participating in the small ruminant trade from 19% in Isiolo to 24% in Nairobi. Men still dominate the small ruminant market even in a terminal market in the main Kenyan capital

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irrespective of the belief that there is more gender balance in many activities in the city. IFAD (2007) reports that even though women provide labor and ideas for the different activities in livestock rearing, they are not allowed to fully participate in livestock marketing as this is considered a preserve of men in the society. For example, it has been noted that women play the largest role in the production of small ruminants but they may not decide on the marketing of the animal without consent from their husbands or even their sons. As indicated by IFAD (2007) "men's de-jure ownership rights over animals are guaranteed by near universal set of inheritance rules that are inherently gender biased and rooted in religion and patriarchal kinship". In Nairobi men still dominate the livestock markets largely because over the years women throughout the region have been made to believe that trade in animals is a 'man's thing' (Kossylin and Rosenberg, 2000).

According to Gustafon (2002), many women prefer to engage in many other business activities rather than venture into livestock markets. This phenomenon is being witnessed in the Nairobi market where women form only about a quarter of the total number of small ruminant traders although it is established that they participate largely in the rearing of the animals. This trend is evident in the Ngong' market which is an intermediary market and only 24% of women participate in the small ruminant trade. According to United Nations Economic and Social Council, (1997), there is "positive correlation between increased economic opportunities for women, and overall economic benefits to families, communities and national development." This means that gender gap in small ruminant market hampers economic growth for those households that are disadvantaged to participate in this market.
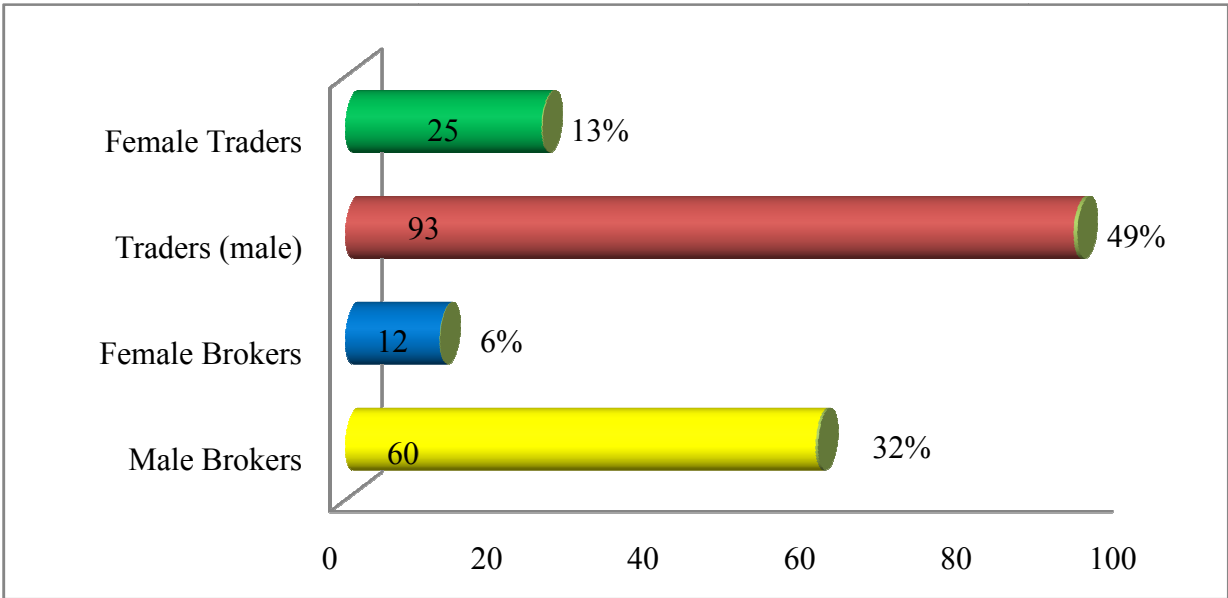
Figure 11: Comparisons of proportions of male and female traders and brokers in the small ruminant market

It is evident from the proportion in figure 11 above that both in small ruminant trading and in brokering; women play a small part while men dominate the market. The total amount of women participating in the trade is only 19% with the remaining 81% taken by men. This indicates the stranglehold that men have established in the small ruminant market just like in the overall livestock market. It is worth noting that the "role" played by women in livestock keeping and trading can be explained mainly by sociological theories that point out what people are expected to do and their attitudes towards work in livestock (Myers, 2004). In essence several traditional presumptions and attitudes keep women from widely participating in livestock trading and imparting their expertise and experience in the trade. The World Bank report (2000) stated that "women are one of Africa's hidden growth reserves and they provide most of the region's labor and agricultural production, however their productivity is hampered by widespread inequality and traditional practices and beliefs". This is exemplified by the market conditions in small ruminant trade in Kenya.

According to Briefing notes on critical gender issues in Sub-Saharan Africa, (2005), it is noted that "improvement of the women's acquisition of resources may improve productivity in sub-Saharan Africa by at least 20%. IFAD, (2007), points out that women are supposed to be

given the capacity to participate in livestock trade by being enabled to access funding and provided with incentives and licenses to participate in small ruminant markets. There is also the need to break with tradition and allow women to fully participate in all economic activities involving small ruminants including their trade so as to enable them get their fair share of proceeds from the animals. This will greatly improve the economic plight of many families because women invest directly in the well being of the family (Gustaafon, 2002).

4.6 Socioeconomics dimensions of market participants of shoats' trade

It is observe that the characteristics of the market players especially within the Isiolo Nairobi trading are highly varied. For example, Isiolo area captured the aspects of livestock keepers while the Nairobi markets were included to capture the dimensions of traders.

Table 6: Frequency distribution of respondents' category

Category	N	Percentage	Std. Error
Traders	117	56%	0.10
Livestock keepers	63	30%	1.09
Abattoirs	12	6%	0.07
Butchers	18	9%	1.13
Total	210	100%	

The butcher information was obtained at Kiamaiko- Huruma market, the Kiserian market and within Nairobi meat supply residential estates. Since the major aim of the study was to establish the market structure for the shoat's trade, it was important to ascertain the value of meat being distributed from the slaughter houses to the ultimate consumers. The Price value of the one kilogram meat at the slaughter houses and at the butcher became the unit measure. Therefore the portion of the respondents in Kiamaiko was proportionately larger 57% than the rest of the regions (see table 6).

4.7 Market Structure and Performance

The findings of the study on the organization of the shoats' markets within the context of Isiolo-Nairobi trading route was indicated by the level of Lerner index while price spread and participants share gain is indicative of performance.

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4.7.1 Which market structure does the shoats' market represent?

After the analysis and description of all the players in the shoats' market it was important to identify which market structure emerges. This was important in order to elucidate the performance of the market. It is assumed in microeconomics that the ideal market structure that is closer to reality is a competitive framework where each and every participant is a price taker. In this regard, the study considered the average price of mutton and chevon since the two products are not traded in isolation. It emerged that, the average price for the Nairobi market (which in the study is our terminal market) is 279 Kenya shillings per unit (kg) (see table 7, below).

Table 7: Average Chevon and mutton prices in Nairobi markets

Variable	Obs	Mean	Std. Dev.	Min value	Max Value	Std error
Sheep Butcher price	16	279.375	51.82905	220	400	0.067
Goat meat Butch price	16	311.875	60.90635	250	450	0.002

With a mean carcass weight of 14.5 kg for the shoats, an equivalent selling value to the meat traders is obtained to be 4287 Kenya shillings. Using the marginal effect values; it was also realized that the marginal cost is 210 Kenya shillings (see table 8, below). Since the major purpose of the study was to analyze the structure and performance of the small ruminant market in ASALs; Market Structure and Performance (S-C-P) framework provided crucial insights into the meat marketing in ASALs with a specific attention to Isiolo as market source for Nairobi terminal market. Also read more i.e. similar findings from other previous studies elsewhere or related

Table 8: Market marginal costs

Variable	Coef.	Std. Error	t	P>|t|	[95% Conf. Interval]	
Q	210.0045	21.47507	9.78	0.00	167.25	252.7495
__Cons	8794294	8767899	1.00	0.319	-86577	2.629012
The Marginal effects (dy/dx)						
Variable	dy/dx	Std Error	Z	P>|z|	[95% C.I.]	X
Quantity (Q)	210.45*	21.475	9.078	0.00	167.914 252.095	331.963

Q is the total number of sheep and goats sold, *statistically significant at 95% confidence interval.

To measure the market power, the SCP framework used the Lerner index. This index determined whether small ruminant stock market is monopolistic or competitive in nature. In other words, the Lerner index measured the difference between prices and marginal cost (MC) of the meat price. Where P is the average price of the small shoats' meat, MC is the Marginal cost involved in the trade. By plugging the values obtained, the market powered was measured as indicated below;

$$L = \frac{P-MC}{P} = \frac{4287-210}{4287} = 0.95091,$$ Significant at *95%, P < 0.05.*

Since the Lerner index varies within the range of 0 to 1, that is; as the Lerner index value approaches 1, the higher the degree of monopoly power while as the index approaches zero it is an indicative of competitive market and therefore the livestock keepers, traders and consumers have less control in the market (market actors are all price takers). Given the value of the Lerner index (0.95) obtained in this study; it is indicative of Monopolistic market structure. In reference to this, it was concluded that the shoats market represents a monopolistic market. Contrary to the expectation of the free market economy, the Learner index should be closer to or near Zero so that the P=MC condition for free market is achieved. It therefore means that the market traders mainly for meat do not bare full cost involved in the market thereby leading relatively low marginal costs. By intuition therefore, it means that the shoats market are disintegrated in such a manner that price levels does not relay from the livestock keepers to the final meat market traders. It is expected that prices reflect the opportunity cost of selling live shoats and carcass. The monopoly power in this case lies with the meat traders who are at the end of the chain. Since the livestock keepers purely depend on livestock for their livelihoods, it was noted that traders take advantage of the market information to exploit the keepers through under pricing. Most importantly, it was also observed that the large truck traders along the Isiolo to Kiamaiko Route were of the same clans; putting into question the efficiency of the trade, market information and control as well as the possibility of exploitation.

Indeed, it was observed that the principle of free market through bargaining is distorted once a new market entrant is discovered. For example, buying at a relatively fair price requires one to have known the local language at the primary market (completely portray clanism). This means that without close relation with the market brokers; one is subjected to price

discrimination. This is one of the attributes of a monopolistic market portrayed by the Lerner index in this study. Since the market is flooded by brokers at all the chain terminals; it is very difficult to assess the efficient market price and general information. It was observed that there exists larger number of market brokers both for meat and live animals and in many cases; the brokers hold much needed information so as maximize on the commissions. Monopoly market structure violates the principle of equity between the traders and the livestock keepers. This is because the larger share of the market gains remains with end of chain traders thereby denying keepers a chance to realize the economic gains in livestock production. Since the study is based on ASAL small ruminants, it indicates that in order to motivate the keepers and subsequent stimulation of livestock production, there is need to reorganize the end chain trade pattern to reduce the monopoly power. More importantly it was reported that the number of shoats traded and the market marginal costs is statistically significant at 95% confidence interval.

4.8 Implications of monopoly market structure

It is argued that market integration is key to ensuring that free market framework is realized. Meaning that, market products as in this case the shoats' meat flow between and among market terminals on the same market information basis (Ochieng' *et al.,* 2006). It implies in the study that given the way shoats move from Isiolo to Nairobi, the market information changes along the chain creating a vacuum for opportunism among the end chain traders. As argued in Ochieng' *et al*. (2006), the free flow of products on the same terms is supposed to increase the level of market efficiency through efficient price transmission hence the law or one price (LOP). However, this requires a complete removal of market barriers key of which is the existence of brokers. All of the goats and sheep traders interviewed operating in Nairobi market also operate in other markets. The results of the study affirmed that the Somali and Burji are the major tribes operating in Isiolo and Garba region and significantly contribute to market price distortion in order to maximize the returns. The livestock price trend indicated that shoats' prices in Isiolo are low at (30-45) % of the final price in Nairobi. Since the shoats' market was observed to be exhibited by few tribes, there is tendency of coalition among the traders to form trade cartels thereby denying penetration by other willing and able traders to participate in this market. Therefore, in as much as the market displays a monopoly structure, within it; is a complete organized cartels that are able to control the market prices.

4.9 Identification of the possible gainers and losers in the growing small ruminant stock market.

In order to identify the gainers in the trade and by what share does the gain spread across the population, the use of Lorenz curve was applied. Since the study comprised of 30 livestock keepers and 150 traders, in order to compare the share of gains by the two groups it was necessary that equal number of traders and keepers be examined in the Lorenz curve plot. The ranked net income gain for both keepers and traders were paired[7]. However due to heterogeneity across the trader categories such as brokers, carcass traders and live traders, the Lorenz curve analysis merged the traders in one category and therefore considered as one unit of comparison against the livestock keepers The Lorenz curve provide a clear picture of income distribution both within and between groups; and by plotting the cumulative percentile income proportions of the livestock keepers and traders- Cumulative (A) and Cumulative (B) respectively, the Lorenz curve was obtained. Figure 12, below, indicates the shape of the obtained Lorenz curves in the case of the two income distributions B and C for livestock keepers and traders respectively. Line A is an equidistributed income line that assumes equal income distribution between the traders and livestock keepers. However, it is practically impossible but the most important message is that, it provides visual examination of income distribution that is closer to the desired state of equal income distribution.

4.9.1 Distribution of market gains

At the background, Kenya just like other East African countries has its small stock produced by smallholder pastoralist farmers. That actually leads us to the main question of who benefits in the trade and by what magnitude? According to ILRI (2003) this livestock is marketed by entrepreneurs who operate as a market chain to collect, regroup and distribute the livestock and related products to intermediary and terminal markets. Isiolo livestock market serves as one of the large intermediary livestock markets in Kenya. However, as pointed out by Turner, (2005), and FAO (2007), market monopoly structures limits the income of market players (source market participants); in this case, the smallholder livestock, thus impacting negatively on their livelihoods. The results of this research seem to concur with the observations

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[7] This is indicated in table 6

by FAO and other major players in agriculture and livestock in East Africa that many livestock keepers are getting a raw deal in the market. Although Mulugeta *et al.* (2007) indicates that income from livestock prices has increased in the past few years due to better prices in the region, there is strong evidence suggesting that this income is not shared equitably between all the players in the trade; in fact livestock keepers have been shown to get the smallest income from their products. These results show comparisons in income distribution between livestock farmers, marketers and brokers in both the Isiolo market and the Nairobi terminal livestock market. All the Lorenz curve income distribution diagrams show livestock farmers as having the lowest income of all players.

4.9.2 Income distribution between livestock keepers and Traders in Isiolo livestock market

The Lorenz curve diagram below shows income distribution between livestock keepers and traders in the Isiolo livestock market.
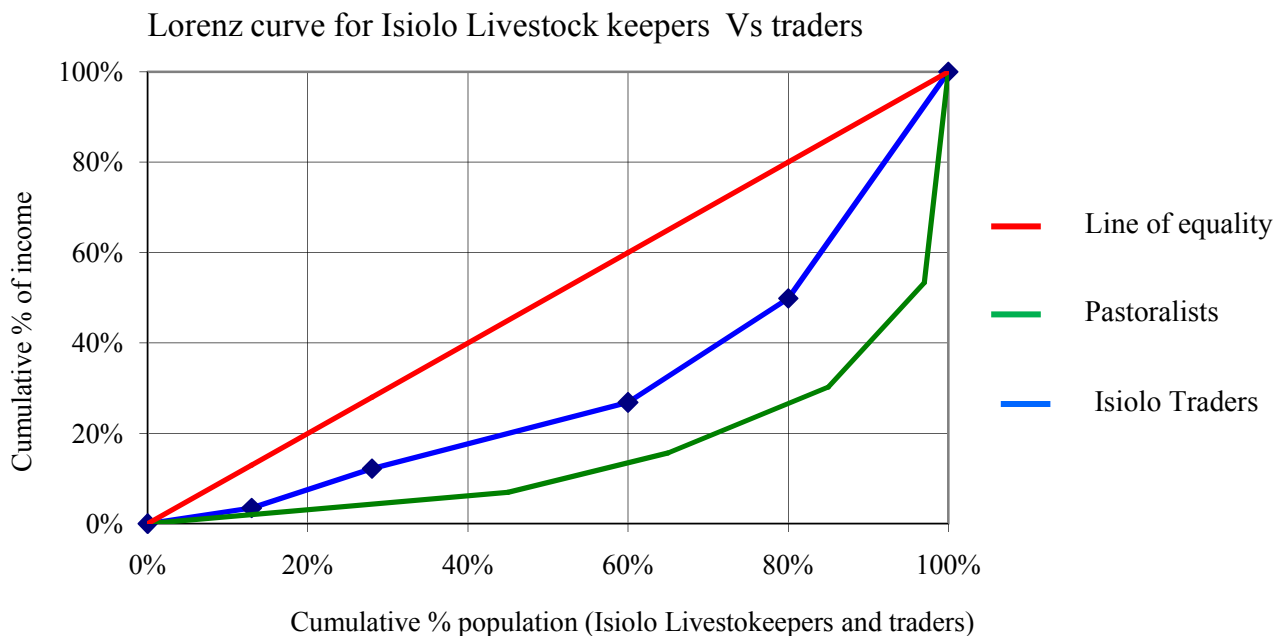
Figure 12: Lorenz curve for Isiolo Livestock keepers Vs traders

The large gap between the two curves representing traders (Blue) and keepers (Green), and the line of absolute equality (Red) indicates the existence of a considerable level of inequality in income in the livestock market between all the players. Some traders seem to earn far much more than their counterparts; the same is also true for the livestock farmers. This

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observation is strongly supported by similar observations by ILRI (2006) in the West African region where glaring inequalities in income have been observed between all players in livestock trade. However it is the large gap between livestock traders and farmers that is raises concern in this case. The Lorenz curves show that the farmers' income curve is skewed so much towards the line of absolute inequality than the curve representing traders which is comparatively closer to the line of absolute equality.

This observation reveals a large gap in income between farmers and traders with traders earning considerably more from livestock sales than farmers although the latter are the actual owners of the product. This observation indicates unfair practices in pricing whereby the traders either buy the products from farmers at unfairly low prices or sell them to the consumers at much higher prices gaining more. This trend has been observed by various researchers including Perry et al (2005) and FAO (2007) who pointed out that farmers are earning much less than their fair share of market income. Similar observations have also been made in the West African livestock markets by ILRI (2003) where livestock traders are seen to be by far the greater beneficiaries of livestock sales. However the convergence of the income inequality curves at the apex reveals that some farmers get top prices for their livestock suggesting that they may be selling directly to the consumers in the Isiolo market.

4.9.3 Income distribution between pure traders and brokers in Isiolo livestock market

The Lorenz income distribution diagram below displays the income distribution between pure livestock traders and brokers in the Isiolo livestock market. The diagram shows that brokers earn considerably higher than pure traders; the income distribution for brokers is very close to the line of perfect equality and towards the apex of the distribution it even surpasses perfect equality suggesting abnormally high income. Considering the nature of the market, which has been described by Mulugeta et al. (2007) as being biased towards brokers, it is evident that the brokers manipulate market prices to their own advantage.
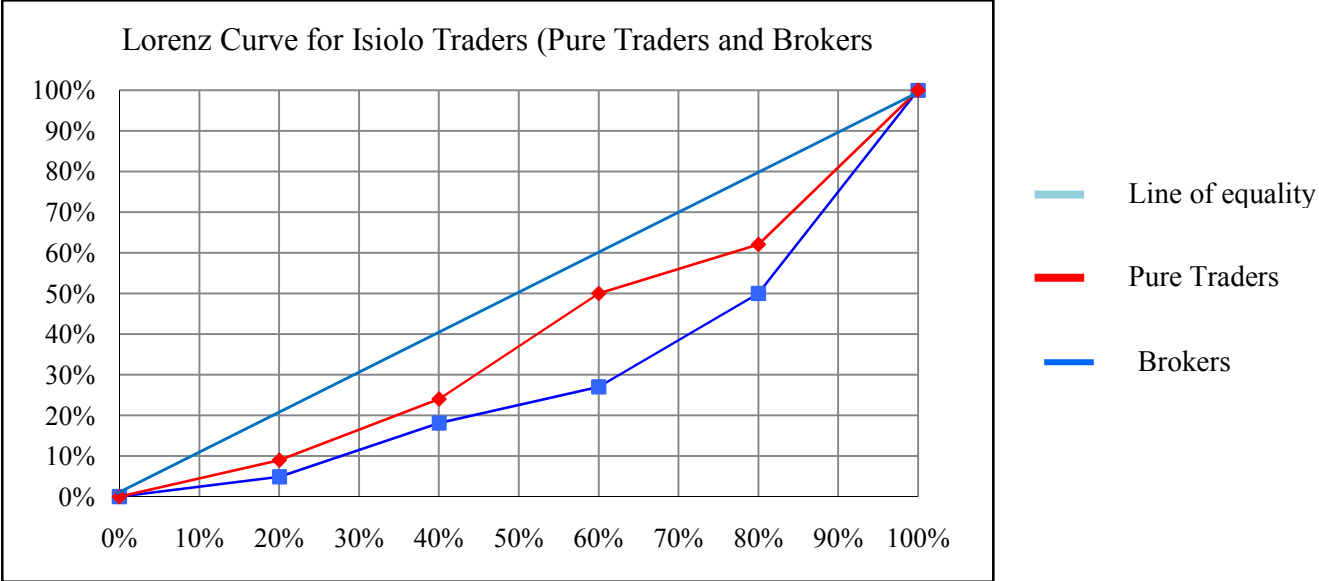
Figure 13: Lorenz Curve for Isiolo Traders (Pure Traders and Brokers)

The gap in income between pure livestock traders and brokers indicates that whereas the income distribution between pure traders is skewed towards the line of absolute inequality, brokers are doing quite well. According to the SNV Practice Brief (2012), this large difference in income between brokers and pure traders can be attributed to unfair and dishonest pricing practices by the brokers who actually dominate most livestock markets. Similar observations have been made in livestock markets in Benin by SNV. IIRR (2006), argues that although the main purpose of brokers was originally to act as intermediaries between livestock sellers and buyers with the aim of helping farmers to negotiate their way in the market and acting as guarantors, the brokers have now turned to exploiting both livestock farmers and traders and their relevance in a healthy market is now under question. As indicated by Nkamleu et al. (2003), brokers have completely distorted market structures in livestock trading by manipulating market dynamics for their own benefits. This in turn contributes to the high inequality in income between brokers on one side and farmers and pure traders on the other side. This inequality is one of the contributory factors towards poverty among livestock farmers as pointed out by Jayne and Jones (1997).

4.9.4 Income distribution between keepers and brokers in the Isiolo livestock market

The Lorenz income distribution diagram below shows the difference in income distribution between brokers and farmers in the Isiolo livestock market. The glaring gap between

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the brokers and keepers is very evident with the income curve for livestock farmers being heavily skewed towards the line of absolute inequality (Figure 14, below).
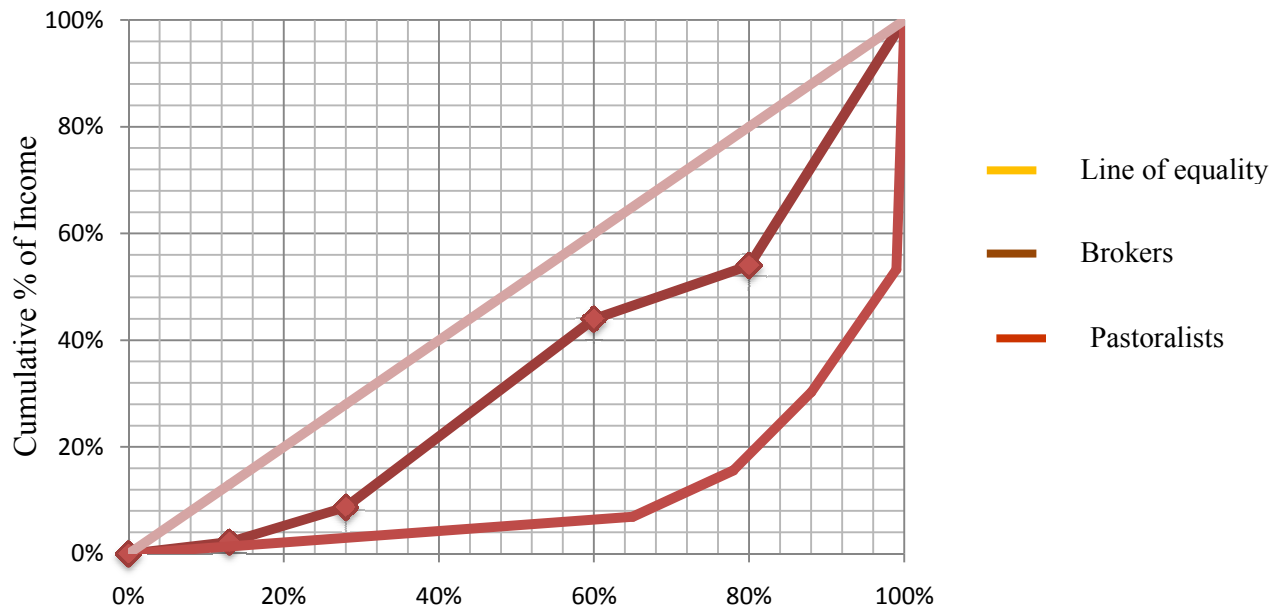
Figure 14: Cumulative % of Population (Livestock Keepers Vs Brokers_ Isiolo Market

In fact between 60% cumulative income and 100% cumulative income, the income of livestock keepers is almost absolutely unequal similar to that between 0% and 15%. On the other hand the inequality in income distribution between brokers is not very large and is much closer to the line of absolute equality. This gap in income distributions is illustrative of the fact that brokers get much higher returns from livestock sales than keepers, the latter of who are actually the owners of the product. This trend indicated poor market structure and practices that according to Nkamleu *et al*. (2003) are largely determined by brokers for their own benefit. The fact that only a small percentage of the total income is in the hands of livestock keepers indicates that the livestock middlemen share the rest between themselves. The previous Lorenz diagram illustrated that brokers get considerably more than pure traders and it is therefore logical to assume that the brokers take the largest share of earnings from livestock sales. The SNV Practice Brief, (2012), confirms this observation by indicating that in all of the African livestock markets brokers get larger profits due to their unrelenting control of market prices and processes. Records from FAOSTAT, (2004), indicate that even though livestock prices have strengthened since the year 2000, many livestock keepers continue earning low income from their animal sales. This

observation can be interpreted alongside the one by IIRR, (2006), that shows brokers are highly satisfied by market trends to mean that the brokers benefit from a larger share of the market income.

4.9.5 Income distribution between pure traders and brokers in the Nairobi livestock market

The Lorenz curve below indicates the income distribution between pure traders and brokers in the Nairobi livestock market. Unlike the case in the Isiolo livestock market, it is evident that in the Nairobi market difference in income between pure traders and brokers is very minimal suggesting a much more stable and controlled market.
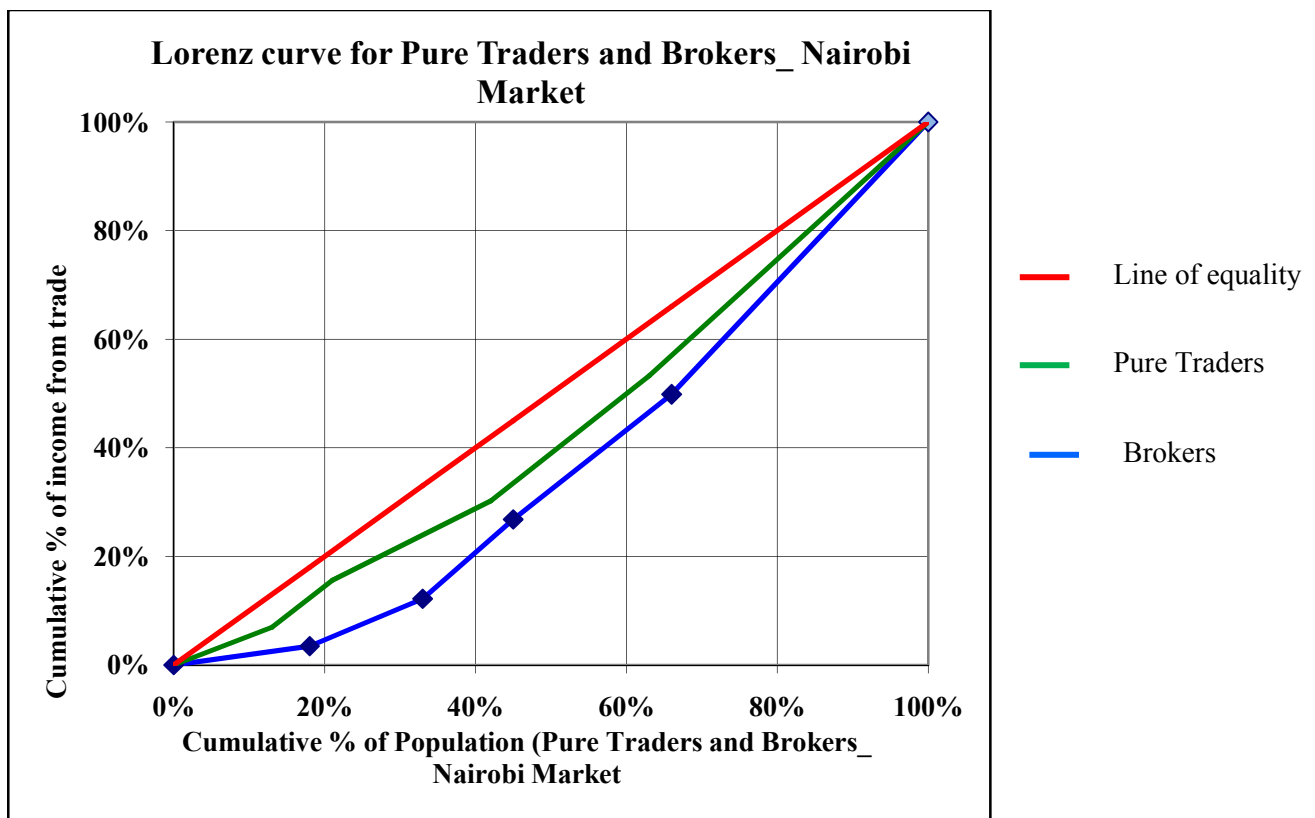
Figure 15: Lorenz curve for Pure Traders and Brokers_ Nairobi Market

Even though brokers have an edge over pure traders in the livestock sales income, the gap in earnings is not large and the inequality in income in this market is much smaller as indicated by both curves being closer to the line of absolute equality. This observation in the Nairobi

market can be attributed to its nature as a terminal market. Nzuma and Baltenweck, (2008), argue that in many terminal livestock markets, there is relative stability of prices and quality of the livestock being sold. They further point out that brokers do not play a prominent role in the determination of prices and market structures although they have some influence in the market trends. Jayne *et al.,* (2003), attribute the relative equality in income distribution between traders and brokers in terminal livestock markets like Nairobi to proper market structures and greater government control.

The main reason why brokers continue having a small edge over pure traders in terminal livestock markets has been suggested by the SNV Practice Brief, (2012). It showed that brokers do not actually make real monetary investment in the livestock trade and therefore they face no serious losses, brokers do not also incur operation costs including transport of livestock to the market. A similar stability of income in markets has also been observed in the West African region where ILRI, (2003), indicates that brokers and pure traders earn almost similar profits.

4.9.6 Income distribution between livestock keepers and traders in the entire livestock market

Irrespective of the relatively stable conditions in terminal livestock markets, it is evident that all livestock traders in the entire market (Both terminal and intermediate markets) have far superior incomes to those of livestock keepers. The Lorenz chart below indicates that while the income distribution of livestock keepers is heavily skewed towards the line of absolute inequality as far as the entire market is concerned, the income for livestock traders is much higher and closer to the line of absolute equality. This observation can be logically attributed to the sum of the dynamics of the entire market. Logically, even though the terminal markets offer better terms for income to both brokers and pure traders, very few livestock keepers can directly access these markets and are left at the mercy of scrupulous brokers and unfair market practices in the intermediary markets like Isiolo.
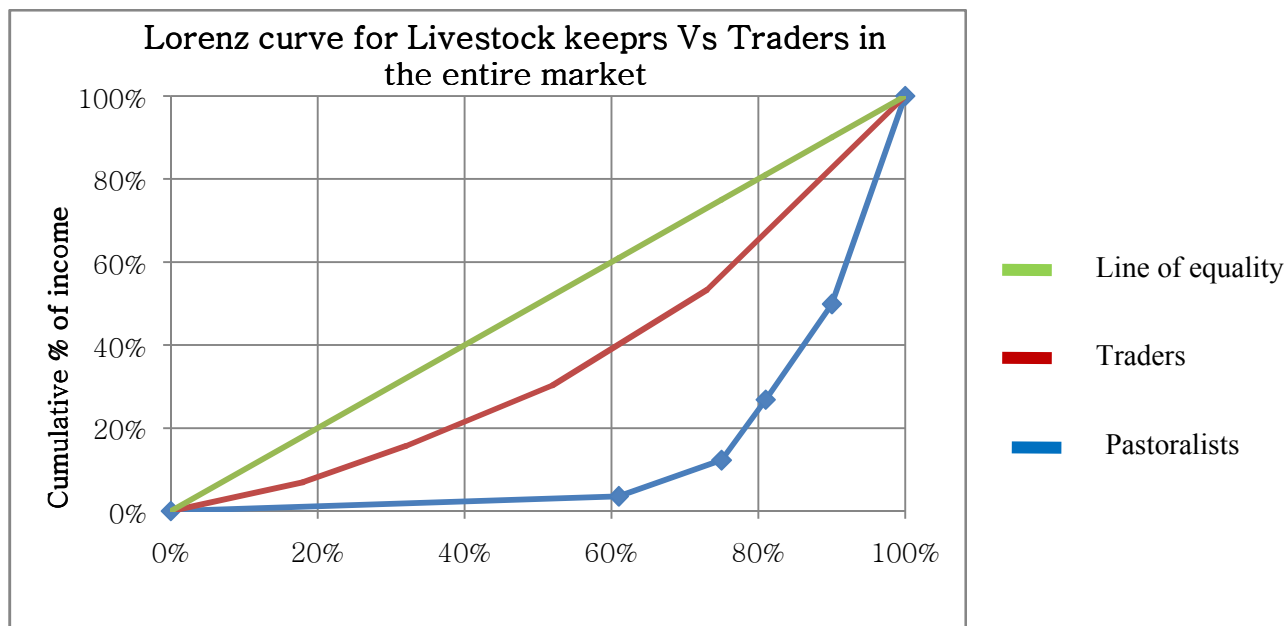
Figure 16: Cumulative % of Population (Livestock keepers Vs Traders in the entire market)

This point is also brought out by Otte and Chilonda, (2002), in their examination of livestock production systems where they argue that as long as brokers and dishonest traders continue controlling livestock markets in the Horn of Africa region keepers will continue being exploited. Jayne and Jones, (1997), recommend that better livestock marketing and pricing policies are supposed to be put in place in East and Southern Africa in order to give livestock keepers their fair share of income and help reduce poverty among pastoralists. In general, livestock traders and brokers get better terms in the livestock market because market structures favor them and they actually control livestock markets especially terminal markets like Isiolo. Several researchers including ILRI, (2003), and SNV, (2012), propose better policies and restructuring of livestock markets to give livestock keepers a voice in the market and enable them to have effective contribution toward market prices. Jayne and Jones (1997) point out that this is the only way livestock keepers can earn more and be able to defeat poverty.

Analyses of Nairobi markets shows that the gap between pure traders and brokers was narrow although the pure traders receive higher returns than brokers, the returns from the system were close to equality as in situation where the cumulative population was above 80%. Livestock market analyzes found that pastoralists receive much lower return from the sale of their livestock than the traders as well as the brokers. At 20% cumulative population, traders receive 20% of

income higher while at 60%, the gap widens to 38%. Above 80% of cumulative population, the gap narrows, but higher than when the market has few participants. It is worth noting in that given the current level of income distribution between the traders and livestock keepers, there exists a wide inequality between the livestock keepers and traders with the latter taking the largest share of income from the trade. The wide variation in the income gains is attributed to the heterogeneity in traders with majority being the brokers whom due to drive for commission commits to opportunism and information asymmetry. The brokers are therefore able to hold key market information that is essential for better prices in favor of the mainstream traders along the chain. This scenario results into buildup of market costs that are transferred to the livestock keepers who in many cases have no alternative means of earning income if not from livestock.

A popular approach of examining inequality is to exploit the concept of "population size distribution" so that within the population it is possible to conclude the "gainers" (Deaton, 2000). According to the results of this study, within group income distribution for livestock keepers shows that the income levels for livestock keepers are closer to equidistribution line while for the traders, there is a wide gap; showing a significant inequality between the traders and keepers. It can therefore concluded that livestock keepers have a better share of income to each other across the group (almost every pastoralist get an equal gain of income) while for the traders, income share is highly invariant. In other words, some of the traders get larger share of trade gain than the others in a disproportionate manner. Inequality between the traders and livestock keepers in the shoats' value chain has been indicated by the more convex Lorenz curve of the traders. The curve has tended to a kinked shape showing that majority of the population proportion enjoy disproportionately larger share of income than the others.

The study adopted Gini-coefficient approach used by Deaton, (1997), which is a simplified version that employs use mean income of the population against the population rank from the richest to the poorest which are then weighted in reverse order; such that the person with the highest level of income has a weight of 1 and the richest assuming weight of N. Using the adopted formula (shown below), Gini-coefficient of 64% was obtained. Given that Gini coefficient is a 0-1 measure whereby the level of inequality if is of an increasing degree; as the coefficient approaches 1, so does the high rate of income inequality. The arithmetic Gini coefficient of 0.64 (64%) is a summary measure that 64% of the traders are the greatest

beneficiary of shoats trade. Imbalanced monetary gain this inequality is attributed to high market transaction costs coupled with acute market information asymmetry that characterizes the shoats' trade from Isiolo to terminal market in Nairobi. The long distance of trade requires huge finances and enough market information reliable enough to stimulate effective demand and supply. Based on the Lorenz curve and the Gini-coefficient value, it is conclusively ascertained that shoat's traders are the greatest beneficiary in the trade; therefore; leaving the livestock keepers as losers in the shoats' trade. This is because the largest share of the gain is only at the hands of the traders.

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The study found out that Shoat's trade presented more varied market preference with brokers commanding the largest number of traders. The market marginal costs indicated a significant skewed benefit to the traders. At 95% percent confidence interval, the market marginal cost was reported to be KES. 210 compared to market price of KES. 4,287. It was concluded that the market represents a monopoly market structure since the Lerner index was found to be 0.95 which is closer to 1; thereby indicating higher degree of monopoly power by the traders. The participants were found to be operating under monopolistic market structure. The monopoly nature of the meat market denies the source market (Isiolo) the equal share of the market gain. The gains are largely with the traders living the pastoralist's poor. The gains considered in the study for the traders are instant within a period of one week of trade. It means in the long run, still traders get the huge share of the market gain.

The Lorenz curves indicated that the difference in income distribution between livestock keepers and traders widens as population proportion increases; for instance, at 80% cumulative population the traders were reported to earn higher than pastoralists by 22% while at 40% cumulative population the income gap amounted to 37%, representing was about 15% difference. The reported indicates a skewed pricing adopted in the market; which benefits traders more than the real producers (livestock keepers). On the other hand, there was an uneven distribution of income between pure traders and brokers of livestock trade in Isiolo market, the gap in income widens as more participants join the system, at 40% cumulative population, pure traders earn more than brokers by about 12% while at 60% it is more skewed towards the pure traders by 22%. As the system expands pure traders receive more than the required proportion.

Based on the study findings and the results presented, it is concluded that; Shoats trade value chain players are male dominated with majority of traders along the chain being brokers. Moyale, Wajir and Garissa supply significant amount of shoats in addition to Isiolo. There is a huge potential in shoat's market, Nairobi being a vibrant terminal market that hosts huge population with ready demand. Shoat trade along Isiolo to Nairobi route is monopoly in nature.

Meaning that traders; especially the brokers contribute to price inflation and high transaction costs. The market gains from the shoat meat trade are unequally distributed among the market players, with traders taking the largest share of the market gain.

5.2 Recommendations

The study found out that the major challenge for the livestock keepers which form pillar of the supply side in the market chain is poor road infrastructure that sometimes hinders accessibility for the traders and even pastoralist to transport the shoats to the market. It is therefore recommended that a deliberate government effort to open up rural roads be initiated so as to spur the shoat market growth through efficient market access. The study also found out that the shoat's trade at all the levels of the value chain is male dominated. This means that role of women in trade is not fully utilized in the ruminant meat markets. The study recommends that the government in collaboration with financial institutions provide affordable financial services to women in order to enable them participate in the market. More importantly insecurity was found to be a major challenge that scares women out of shoat's trade. The study suggests that enough security through government security organs be improved. During harsh weather conditions, majority of the livestock keepers lose significant size of the livestock. There only option therefore is to dispose-off the stock at "*throw away price*" making the livestock keepers very vulnerable to climate change and subsequently encouraging opportunism and exploitation by potential traders. The study recommends that the government through Kenya meat commission to widen the scope of livestock intake as additional market channel to reduce the risks of losing the stocks. This will be regarded as a coping up strategy for climate change.

The study recommends that livestock keepers (pastoralists) should be facilitated to form vibrant groups (farmer groups) in ASALs to strengthen their participation in the Livestock market. This is because strong and vibrant farmers' organizations can provide opportunities to farmers to effectively play a role in the livestock market economy and largely benefit from it by improving household income. However, identifying and promoting authentic farmers' organizations that are capable of empowering livestock keepers should be considered by both for governments and development partners.

5.3 Future Research Recommendation

Based on the outcome of the study and the experience gained from this study; it recommended that an in-depth study be carried out to investigate the role of institutional linkages in price formation along the value chain of small ruminant trade.

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APPENDICES

Annex1: Structured questionnaire

EGERTON UNIVERSITY/KARI-KASAL PROJECT

N/B: The purpose of administering this questionnaire is purely for academic, in addition to generating knowledge on sheep and goat marketing in Isiolo County. As a respondent, your participation is highly appreciated and you are assured that all the information provided is secure and confidential.

Questionnaire Number _____

Date of interview _____

Interviewed by _____

Division   _____

Location   _____

Sub Location _____

PART 1: GENERAL CHARACTERISTICS OF THE RESPONDENTS

1. Name of the respondents

_____

2. Gender   Male   [   ]   3. Age **(age)**

                   Female [   ]   _____

4. Education Level   1. Primary   [   ] **(1)**

                          2. Secondary   [   ] **(2)**

                          3. College   [   ] **(3)**

                          4. None of the above [   ] **(4)**

5. Are you involved in sheep or goats business?

Yes   [   ]

No   [   ]

6. If yes, please indicate the product you trade in:

live sheep   [   ]

live goats   [   ]

goat meat   [   ]

Sheep meat   [   ]

7. If yes in Question 5, what do you do?

Small ruminant livestock keeper)   [   ]

Small ruminant trader   [   ]

Broker   [   ]

(Broker between _____ and _____)

Small ruminant bulker/wholesaler   [   ]

Small ruminant trekker   [   ]

Small ruminant trucker/transporter   [   ]

Meat transporter   [   ]

Butchery owner   [   ]

Meat eating business owner or institution   [   ]

Service provider for small ruminant traders   [   ]

Slaughter house owner   [   ]

Flyers   [   ]

Meat inspector   [   ]

PART 2: LIVESTOCK KEEPERS

1. Please indicate the kind of animals you keep (current herd structure)

Livestock type	Total Number owned
Sheep	
Goats	
Cows	
Camels	
Donkeys	
Poultry	

8. Do you sell your sheep and goats?

Yes   [   ]

No   [   ]

9. How long (in moths) does it take for a sheep and a goat to be ready for selling?

Sheep_____

Goat_____

10. If no, why?

_____

_____

11. If yes, please indicate how many you sold in the last three months

Type of animal sold	How many sold in the last three months	Selling price for the animal	What was the weight of the animals sold
Sheep			
Goats			
Camels			
Cattle			
Donkeys			
Poultry			

12. Where did you sell the animals indicated in table 4 above?

Type of animal sold	Where were the animals sold	To whom did you sell to?
	Options: 1. Sold from home (spot market) 2. Took to local market 3. Took to a slaughter house 4. Others : please specify	Options: Neighbour/friend Broker Trader Butcher others: please specify
Sheep		
Goats		
Cattle		

Camels		
Poultry		
Donkeys		

Which is your most preferred market for sheep?

The preferred market	Why do you prefer this market for sheep?
1.	High price for the sheep [ ] Short distance to the market [ ] (How many kilometers from home? _____) Because it is safe to sell in that market [ ] Because there is transport to that market [ ] I am assured of sale in that market [ ] Others: Please specify
2.	High price for the sheep [ ] Short distance to the market [ ] (How many kilometers from home? _____) Because it is safe to sell in that market [ ] Because there is transport to that market [ ] I am assured of sale in that market [ ] Others: Please specify

Which is your most preferred market for goats?

The preferred market for goats	Why do you prefer this market for sheep?

1.	High price for the sheep [ ] Short distance to the market [ ] (How many kilometers from home? _____) Because it is safe to sell in that market [ ] Because there is transport to that market [ ] I am assured of sale in that market [ ] Others: Please specify
2.	High price for the sheep [ ] Short distance to the market [ ] (How many kilometers from home? _____) Because it is safe to sell in that market [ ] Because there is transport to that market [ ] I am assured of sale in that market [ ] Others: Please specify

When selling sheep, who is your most preferred buyer?

Neighbour/friend   [   ]

Broker   [   ]

Small ruminant bulker/wholesaler   [   ]

Small ruminant trekker   [   ]

Small ruminant trucker/transporter [   ]

Meat transporter   [   ]

Butchery owner   [   ]

Meat eating business owner or institution   [   ]

Why?

_____

_____

_____

When selling goats, who is your most preferred buyer?

Neighbour/friend   [   ]

Broker   [   ]

Small ruminant bulker/wholesaler   [   ]

Small ruminant trekker   [   ]

Small ruminant trucker/transporter   [   ]

Meat transporter   [   ]

Butchery owner   [   ]

Meat eating business owner or institution   [   ]

Why?

_____

_____

_____

What are the main inputs in rearing sheep and goats from birth to sale?

Input type (eg labour, medicine, etc)	Quantities used per month	Cost of input	How many animals its used on

For you to sell sheep or goats, what are the costs you have to meet?

Cost type (broker fees, Cess and taxes, transport etc)	How much in Ksh	How many goats or sheep is this cost based on

What are the main challenges you face in marketing sheep and goats?

_____

_____

_____

PART 3: LIVE SHEEP/GOATS TRADERS

Which year did you start doing this business? _____

How did you raise capital to start the business?

_____

_____

_____

What are your day to day functions in business

_____

_____

_____

_____

_____

_____

Please indicate the source of the your sheep and goats

Type of animal	Where animal is bought from (area)	To whom the animal is bought from Small ruminant keeper Broker Other trader 4. Others, please specify
Sheep		
Goats		

Please indicate the numbers of sheep and goats you buy each day of the week

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Sheep							
Goats							

22.   Please indicate the sources of your sheep and goats?

Buying market point	How far is that market from your operational market (KM)	Buying price		Number of sheep bought from that market per week	Number of goats bought from that market per week
M1		Sheep	Goat		

85

M2					

Where do you sell the sheep and the goat?

Selling market point	How far is that market from the buying market (Kms)	Selling price		Number of sheep sold to that market per week	Number of goats sold to that market per week
		Sheep	Goat		

For you to sell sheep or goats, what are the costs you have to meet?

Selling market point	Cost type (labour, broker fees, Cess and taxes, transport etc)	How much in Ksh.		How many goats or sheep is this cost based on
M1		Sheep	Goat	

M2				

What are the main challenges you face in marketing sheep and goats?

_____

_____

_____

PART 4: ABATTOIRS

What are the steps and associated costs in slaughtering sheep or goat?

Steps involved	Cost (labour, fees, Cess and taxes etc)	How much in Ksh per goat	How much in Ksh per sheep

What are the main products from a sheep?

Product or parts (e.g. carcass, head, skin, tripe, liver, heart etc)	Approximate weight in KGs	Ex-slaughter price for goats	Ex-slaughter price for sheep

What are the main products from a goat?

Product or parts (e.g. carcass, head, skin, tripe, liver, heart etc)	Approximate weight in KGs	Ex-slaughter price for goats	Ex-slaughter price for sheep

PART 5: SHEEP/GOAT MEAT TRADERS

Where is your business located? _____

Where do you buy your sheep or goat meat from?

Meat type	Meat buying point	How far is it from your business premise (Kms)?	From whom at that market Options: 1. Direct for the slaughter house, 2. From brokers, 3; From other traders, 4. Others, please specify	Cost of meat per Kg
Mutton (sheep)	1			
	2			
	3			
	4			
Chevon (goats)	1			
	2			
	3			
	4			

Please indicate how much meat (Kgs) you buy each day of the week

	Market	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Mutton	M1							
	M2							
	M3							
Chevon	M1							
	M2							
	M3							

To whom to do you sell meat?

Meat type	Meat selling point	How far is it from your business premise (Kms)?	From whom at that market Options: 1. Direct for the slaughter house, 2. From brokers, 3; From other traders, 4. Others, please specify	Cost of meat per Kg
Mutton (sheep)	1			

	2			
	3			
	4			
Chevon (goats)	1			
	2			
	3			
	4			

For you to sell sheep or goat meat, what are the costs you have to meet?

Markets	Type of customer Direct to consumers, 2. To other traders, 3. To institutions, 4. Others, please specify	Cost type (labour, broker fees, Cess and taxes, transport etc)	How much in Ksh	How much meat in (Kg) is this cost based on
M1				
M2				

M3				

What are the main challenges you face in marketing mutton and Chevon?

_____

_____

_____

END

Annex 2: Identification of the possible gainers in the Lorenz

In order to identify the gainers in the trade and by what share does the gain spread across the population, the use of Lorenz curve was applied. Since the study comprised of 30 pastoralists and 127 traders, in order to compare the share of gains by the two groups it was necessary that equal number of traders and keepers be examined in the Lorenz curve plot. The ranked net income gain for both keepers and traders were paired. However due to heterogeneity across the trader categories such as brokers, carcass traders and live traders, the Lorenz curve analysis merged the traders in one category and therefore considered as one unit of comparison against the pastoralists (Table 9).

Table 9: Lorenz curve and the net gain (Income) distribution amongst traders and keepers

Individuals (Population)	Pastoralist Net income distribution (A)	Traders net gain distribution (B)
1	(88,926.81)[8]	(99,598.02)
2	(37,905.40)	(42,454.05)
3	(18,543.89)	(20,769.16)
4	240.55	269.41
5	7,113.18	7,966.77
6	12,362.50	13,846.00
7	15,940.89	17,853.80
8	16,959.92	18,995.11
9	19,451.12	21,785.26
10	23,038.30	25,802.90
11	38,630.47	43,266.12
12	43,262.14	48,453.60
13	43,636.90	48,873.32
14	45,301.04	50,737.16
15	54,432.41	60,964.29
16	57,956.37	64,911.13
17	58,843.81	65,905.07
18	60,784.86	68,079.05
19	61,353.96	68,716.44
20	82,101.23	91,953.38
21	85,578.46	95,847.87
22	117,719.45	131,845.78
23	119,088.86	133,379.52
24	120,956.38	135,471.15
25	150,198.35	168,222.15

[8] There is no Negative income but it means the keepers borrow from later period to sustain current trade.

26	151,880.66	170,106.34
27	189,950.16	212,744.17
28	196,155.35	219,693.99
29	236,676.52	265,077.70
30	326,174.81	365,315.79
Total	**2,190,412.53**	**2,453,262.04**