

**BEEF CATTLE VALUE CHAIN ANALYSIS IN BORA AND DUGDA
DISTRICTS, OROMIA REGIONAL STATE, ETHIOPIA**

M.Sc. THESIS

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DEDICATION

I dedicate this thesis manuscript to my families for their unbroken contribution throughout my life.

STATEMENT OF THE AUTHOR

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

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ACRONYMS AND ABBREVIATIONS

AGP-LMD	Agriculture Growth Program- Livestock Market Development
CRS	Catholic Relief Service
CSA	Central Statistical Agency
ETB	Ethiopian Birr
GDP	Gross Domestic Product
IDRIC	International Development Research Centre
IFAD	International Fund for Agricultural Development
ILRI	International Livestock Research Institute
LIVES	Livestock and Irrigation Value chain for Ethiopian Smallholders
masl	meter above sea level
MoLFRD	Ministry of Livestock and Fishery Resource Development
MoT	Ministry of Trade
MVP	Multi Variate Probit
NGO	Non-Government Organization
NMM	Net Marketing Margin
OLS	Ordinary Least Square
SIDA	Swedish International Development Agent
SSA	Sub-Saharan Africa
TLU	Total Livestock Unit
UNIDO	United Nations Industry Development Organization
WANRDO	Woreda Agriculture and Natural Resource Development Office
WLFRDO	Woreda Livestock and Fishery Resource Development Office

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Beef Cattle Value Chain Analysis In Bora and Dugda Districts, Oromia Regional State, Ethiopia

ABSTRACT

This study was aimed at analyzing beef cattle value chain in Bora and Dugda districts, Oromia Regional State, Ethiopia. The specific objectives of the study were to:- identify major beef cattle value chain actors and their roles in beef cattle value chain in the study areas; Identify the major constraints and opportunities in beef cattle value chain; analyzing the determinants of smallholders farmers' market participation decision and quantity of beef cattle supplied to the market in the study areas; and identifying marketing channels and determinants of farmers' decision to choose market outlets. The survey was conducted in five purposively selected kebele administrations in the districts. About 120 smallholder beef cattle producers have been selected randomly from the five kebele administrations proportionally. Both primary and secondary data were collected from different sources. Primary data were collected from sample household farmers and traders using structured questionnaires. Secondary data was collected from woredas livestock and fisheries resource development offices and input suppliers using key informant interviews. Descriptive statistics and Econometric models were used to analyze the collected data. The value chain analysis results showed that the major value chain actors in the study areas are input suppliers, producers, traders, small feedlot operators, processors/butcheries and consumers. The study results also revealed that feed shortage, high prices of inputs, disease outbreak and poor managements are the major constraints that farmers were faced on behalf of production side. From market side, market price instability, low price offered for the commodity and involvement of intermediaries are the major constraints. The result of Heckman two-stage indicated that age of household head, sex of household head, education level of household head, family size, farm income and access to market information were determined households' decision to sell beef cattle. Distance to market, education level of household head, land holding size, farm income and access to market information were significantly affect the quantity of beef cattle supplied to the market. Multivariate probit model results indicated that family size, age of household head, current average selling price, herd size, accessed to extension services, off-farm income and access to market information were significantly influence the likelihood of farmers to choose the alternative market outlets. Improvements of market infrastructure, marketing information service, improving animal production and management, intensive land use, integrating crop- beef cattle production and upgrading beef cattle value chain were recommended for policy implications.

Key words: Value chain analysis, Beef cattle, market participation, market outlets, Heckman two-stage, Multivariate probit, Districts

1. INTRODUCTION

1.1. Background of the Study

In Ethiopia, agriculture is the main economic activity and more than 80% of population is dependent on agriculture in which livestock play a very important role (CSA, 2013). In Ethiopia, agriculture contributes about 50% to the overall gross domestic product (GDP), generates 90% of export earnings, and provides employment for 80% of the population (CSA, 2013).

Within agricultural subsector, livestock contributes 15 to 17% of GDP, 35 to 49% of agricultural GDP, 37 to 87% of the household incomes and 16-19% of total foreign exchange earning of the country (CSA, 2013). However, the contribution of this subsector in the national and agricultural economy of the country is low due to feed shortage, weak breed selection practice, insufficient market infrastructure, weak farm to market linkages and insufficient veterinary services are the major challenges livestock-dependent people (IGAD, 2011).

In Ethiopia, both farming and pastoral households are largely dependent on livestock for their livelihood systems. Livestock have diverse functions in the livelihood of Ethiopian farmers in the various farming system and serves as a source of food, traction, manure, raw materials, investment, cash income, foreign exchange earnings and social and cultural identity (Belete *et al.*, 2010). Among livestock species, cattle contribute significantly to the livelihoods of farmers. They serve as a source of draught power for the rural farming population, supply farm families with milk, meat, manure, and also as source of cash income, playing a significant role in the social and cultural values of the society. Cattle contribute nearly to all the draught power for agricultural production at smallholder level in Ethiopia (Melaku, 2011). They are also used to generate critical cash in times of scarcity, provide collateral for local informal credit and serve other socio-cultural functions in Ethiopia (Ulfina *et al.*, 2005). Despite the importance of

cattle to the farming community in particular and to the national economy at large, the sector has remained underdeveloped and underutilized.

The livestock population of Ethiopia estimates that the country has about 52.1 millions heads of cattle, 24.2 million sheep, 22.6 million goats and 44.9 million poultry. About 99.26 percent of the cattle population are local breeds. Cross-bred and pure exotic cattle account for about 0.64 and 0.1 percent respectively. From these total cattle population estimate about 12.5%, 24.73%, 0.8%, 21.93% and 3.67% are used for milk, draught, beef, breeding and other purposes respectively depending on their age category of 3-10 years (CSA, 2015).

Although Ethiopia owns large number of beef cattle populations, the contributions to the national economy and to smallholder's livelihood is low due to the production system is not adequately market-oriented. Smallholder producers that supply beef cattle to the market find it difficult to penetrate in to the markets because of failure to meet the quality of products demanded. The supply originates in small numbers from highly dispersed small producers that supply non-homogenous products to the markets, the low productivity of the animals and the absence of market-oriented production systems, the volume of marketed surplus is very low (Hailemariam *et al.*, 2009). Negassa and Jabbar (2008) also reported that the net commercial off-take (market supply) of beef cattle is low in Ethiopia.

Beef cattle are one of a few agricultural commodities from which the producers are rely their livelihood and obtain their income to fulfill their needs and economic gaps. Only a small fraction of beef cattle is raised in feedlots. Smallholders are fatten their beef cattle in backyard system. The majority of the producers are uses oxen for draught purpose, and then after finishing draught and become too old they sell for beef purpose. Additionally, barren cows, heifers and bulls are used for beef. But, mostly heifers and bulls are used for restocking. Most of the beef cattle produced is used for domestic consumption and very few is supplied to the central market due to low quality (LIVES, 2013).

The beef cattle value chain can be defined as the full range of activities required to bring a beef cattle to final consumers passing through the different phases of production, processing and delivery (IDRIC, 2012). There are many enterprises that are involved in

beef value chain, including supply of inputs and services for production of beef cattle and trading in beef cattle and beef products. These actors includes producers, collectors, small private and cooperative fatteners/feedlots, numerous middlemen, livestock trading cooperatives, individual traders, domestic and export abattoirs and live animal exporters (AGP-LMD, 2013).

1.2. Statement of the Problem

In Ethiopia both farming/agro-pastoral and pastoral are the main beef cattle suppliers for domestic consumption and export. But the benefits they receive for their productive activities are constrained by lengthy marketing processes, high transaction costs, the informal cattle trade, over-exploitation by brokers, weak and unfriendly linkages between the major marketing actors and a lack of both market-oriented cattle production and profitable beef cattle marketing outlets (Hailamariam *et al.*, 2009). The entire beef cattle value chain in Ethiopia is further characterized by numerous intermediaries /actors namely: brokers, collectors; agents; animal trekkers, small, medium and big traders; wholesalers; abattoirs; butcheries; exporters; local authority and Department of Veterinary Services. This makes the chain unnecessarily long with increased transaction costs and without significant value added activities (Negassa *et al.*, 2011).

AGP-LMD (2013) reported that lack of pure competition, poor beef cattle management particularly with respect to the age of beef cattle when sold, weak policy and the enabling environment, and limited numbers of service providers are the major factors that impede the competitiveness of beef cattle value chain in Ethiopia.

East Shoa Zone is one of the potential Zone for beef cattle supplier for domestic consumption and export next to the Borana Zone of Oromia Regional State. Additionally, East Shoa Zone is one of the potential areas for beef cattle processing (modern abattoirs) at Modjo and Bishoftu, whole selling marketing at Adama. From East Shoa Zone woredas here the study areas Bora and Dugda woredas are the potential districts for beef cattle production and marketing. Although, these woredas are known as the major source beef cattle suppliers, feed and water problem, poor beef cattle husbandry and management, less

transparency of market information, high cost of inputs, poor market infrastructure, and low capacity of slaughter houses are the major problems that starts from input supply to the final consumption in the study areas (WLFRO, 2014/15). Due to these reasons most of the beef cattle supplied to the market is domestically consumed and very few is available for export due to low quality.

According to LIVES (2013) project baseline survey report the proportion of improved/fattened beef cattle sold by household are less than 1%. This data suggests that in the study areas improved beef cattle production and marketing is at infant stage. That means there is less value addition to beef cattle and the herders are simply sell their produce to overcome cash problems and purchasing of agricultural inputs. Hence, the producers may not get reasonable benefit from their marketed beef cattle supply unless appropriate improvement strategies are put in place. If production and productivity of the beef cattle improved, the actors like butcheries, hotels and traders will be supplied with quality beef cattle which will affect the whole value chain.

In addition to above problems, there is a little competition among the beef cattle traders; the market and pricing power is retained by traders, there are many unlicensed traders, brokers and traders within the beef cattle value chain who takes high profit than the producers. There is also weak linkage among the beef cattle value chain both horizontally and vertically (LIVES, 2013).

Analyzing value is essential to explain the connection between all the actors in a particular chain of production and distribution and who adds value and where, along the chain, and to identify entry points and make improvements in weaker links where returns are low (Schmitz, 2005). Given the woreda's potential for beef cattle production, processing, marketing and consumption, there is scanty information about the beef cattle value chain in the study areas. There is no formal research conducted on beef cattle value chain analysis in the study areas.

In response to these facts, beef cattle value chain analysis was initiated to investigate the source of the problems and attempts to bridge the existing information gaps that is help to identify entry points and make improvements (upgrading strategies), and clearly understood the follow of the product, actors and their roles in beef cattle value chain in the

study areas. The study also supposed to identify determinants of farmers to participate in beef cattle market and quantity of supply, and market outlets choice.

1.3. Research Questions

The study was tried to answer the following research questions:-

1. Who are the major actors and their roles in beef cattle value chain?
2. What are the major constraints hindering the beef cattle value chain actors at various levels of value chain and what the favorable opportunities exist for the success of beef cattle value chain in the study areas?
3. What are the major factors that influence the decision of farmers to participate in beef cattle marketing and the quantity of beef cattle supply?
4. What are the determinants that influence the farmers' to choice beef cattle market outlet?

1.4. Objectives of the Study

The general objective of the study is to conduct beef cattle value chain analysis in Bora and Dugda districts, Oromia Regional State, Ethiopia.

The specific objectives of the study were to:

1. Map of beef cattle value chain, and identify major beef cattle value chain actors and their roles in beef cattle value chain in the study areas;
2. Identify the major constraints and opportunities in beef cattle value chain;
3. Analyze determinants of participation decision and quantity of beef cattle supply by small-holder farmers in the beef cattle marketing in the study areas;
4. Identify beef cattle market channels, and determinants of farmers' decisions to choice beef cattle market outlets in the study areas.

1.5. Significance of the Study

The study is believed to generate useful information for all value chain actors; producers, traders, processors involved in the production, marketing and processing of beef cattle in the study areas. As a result, if framers, traders, processors, consumers and all the value chain participants are provided with all information within the value chain they will be encouraged in performing their activities and perhaps mandatory to restrain these activities that harm the value chain effectiveness. It also generates information for service providers and policy makers in designing appropriate policies that enhance efficient production and marketing of beef cattle. Developmental practitioners can also use the findings for intervention purposes. Moreover, the generated information can be available for small and medium enterprise who want participate in beef cattle fattening. It may point out the constraints and opportunities in beef cattle value chain. Furthermore, this study provide information on the determinants of participation decision and quantity of beef cattle supplied to the market, and the determinants of farmers' decisions to choice beef cattle market outlets. Researchers who want to undertake further investigation in the beef cattle will also benefit from the findings.

1.6. Scope and Limitations of the Study

This study was conducted in two woredas and important information were collected from sample households and marketing actors involved in the subsector organization in the study areas. Hence, the study was limited spatially as well as temporally to make the study more representative in terms of wider range of area, and time horizon. Furthermore, since Ethiopia has wide range of diverse agro-ecologies, institutional capacities, organizations and environmental conditions, the result of the study may have limitations to make generalizations and make them applicable to the country as a whole. The limitations that were faced during this study mainly reluctant of some respondents to provide accurate information on the variables such as income level, farm size, age, livestock number, output produced. Most of the beef cattle traders in the study areas did not have trade license and they are mobile from one market to another. They are only found on market days during selling and purchasing of beef cattle and some of them were involuntary to interview. Moreover, the study was limited analyze beef cattle value chain and it didn't contain the

extended value chain of beef cattle product (meat). These limitations may adversely affect the strength of the results, but a lot effort was done to reduce them. Having these limitations, the findings of this study may be useful for areas with similar context with the study areas.

1.7. Organization of the Thesis

This thesis was organized in five chapters. Chapter one deals with background, problem of the statement, research question, objectives, significances and scope and limitations of the study. Chapter two presents review of theoretical and empirical evidences of the study. Chapter three presents the research methodologies that were employed in the study. The results obtained were presented and discussed in detail under chapter four. Finally, chapter five presents summary, conclusion and policy implications of the study.

2. LITRATURE REVIEW

In this chapter, an attempt has been made to explain certain concepts in this study. In addition, this part is intended to critically review literature on both theoretical and empirical evidences of the previous studies in relevance to present study objectives.

2.1. Definitions of terminologies

Value Chain: Describes the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use (Kaplinsky and Morris, 2001).

Value chain actors: Are those involved directly in producing, processing, trading or consuming a particular agricultural product. The value chain actors are the main market actors related to specific product(s), exporters/importers, traders/retailers and an end consumers (Feyera, 2013).

Market channel: Is the path that goods follow from their sources of original production to their ultimate destination for final use (Mendoza, 1995).

Market outlet: Is the final market place to deliver products into which it may pass from different channels.

Market participation: Refers to actual involvement of producers as sellers in the output market (Berhanu *et al.*, 2015).

Quantity supplied: Is the quantity of a commodity that producers are sell at a particular price at a particular point of time.

2.2. Value Chain Concepts

Value chain is a concept proposed by Michael Porter in his book "Competitive Advantage" in 1985. In this book, Porter explains that "Competitive Advantage" is the ability for a firm to put "generic strategy" into practice (Michael Porter, 1985). *Approche Filière*, translated as Commodity Chain Analysis, CCA, is applied to the analysis of existing marketing chains for primarily agricultural commodities, assessing how public policies, investments and institutions affect local production systems. Gary Gereffi (1990) primarily focus on global commodity chain (GCC) analysis is the international trading system and the increasing economic integration of international production and marketing chains. It was developed primarily to analyze the impact of globalization on industrial commodity chains. GCC highlights power relations that are embedded in value chain analyses.

2.3. Importance of Value Chain

In this rapid era of globalization value chain analysis have got three main reasons. According to Kaplinsky and Morris (2001), these reasons are; first with the growing division of labor and the global dispersion of the production of components, systemic competitiveness has become increasingly important. In this case Value chain analysis plays a key role in understanding the need and scope for systemic competitiveness. The analysis and identification of core competences will lead the firm to outsource those functions where it has no distinctive competences.

Secondly, efficiency in production is only a necessary condition for successfully penetrating global markets. Value chain analysis has an important role to play here. What it does is to ensure that the analysis treats the whole cycle of production, including that governing connectedness to final markets. This forces the analysis to consider not just the efficiency of the production link in the chain, but also those factors, which determine the participation of particular groups of producers in final markets.

Thirdly, entry into global markets, which allows for sustained income growth, that is, making the best of globalization, requires an understanding of dynamic factors within the whole value chain. The reason why value chain analysis is important is that it helps to explain the distribution of benefits, particularly income, to those participating in the global

economy. This makes it easier to identify the policies, which can be implemented to enable individual producers and countries to increase their share of these gains.

In this regarded value chain allows farmers and any actor in the chain to create new market, differentiate their product from others and by doing so, they gain an advantage over their competitor as well as increased their market share or access. The key benefits that gained form the value-adding activities are enhance an existing product, introduce new product or new product use, increases or stabilizing profit margins and the outputs must appeal to the consumers (AAFC,2004).

2.4. Agricultural value chain

An agricultural value chain is usually defined by a particular finished product or closely related products and includes all firms and their activities engaged in input supply, production, production, transporting, processing and marketing (distribution) of the product or products. Agricultural value chain analysis is a dynamic approach that examines how markets and industries respond to changes in the domestic and international demand and supply for a commodity, technological change in production and marketing, and developments in organizational models, institutional arrangements or management techniques. The analysis should look at the value chain as a set of institutions and rules, set of activities involved in producing, processing, and distributing commodities, set of actors involved in performing the value adding activities (Anandajayasekerem and Berhanu, 2009).

An agricultural value chain can be considered as an economic unit of analysis of a particular commodity or group of commodities that encompasses a meaningful grouping of economic activities that are linked vertically by market relationships. The emphasis is on the relationships between networks of input suppliers, producers, traders, processors and distributors (UNCTAD, 2000).

2.4.1. Livestock value chain

The livestock value chain can be defined as the full range of activities required to bring a product (e.g. live animals, meat, milk, eggs, leather, fibre, manure) to final consumers passing through the different phases of production, processing and delivery. It can also be defined as a market-focused collaboration among different stakeholders who produce and market value-added products (IFAD, 2010). Livestock value chain analysis here is essential to an understanding of markets, their relationships, the participation of different actors, and the critical constraints that limit the growth of livestock production and consequently the competitiveness of smallholder farmers.

2.5. Methodology for Value Chain Analysis

Kaplinsky and Morris (2001) stress that there is no "correct" way to conduct a value chain analysis; rather, the approach taken fundamentally rests upon the research question that is being answered. Nonetheless, four aspects of value-chain analysis as applied to agriculture are particularly important.

Firstly, at its most basic level, a value-chain analysis systematically maps the actors participating in the production, distribution, marketing, and sales of a particular product (or products). This mapping assesses the characteristics of actors, profit and cost structures, flows of goods throughout the chain, employment characteristics, and the destination and volumes of domestic and foreign sales.

Second, value-chain analysis can play a key role in identifying the distribution of benefits of actors in the chain. That is, through the analysis of margins and profits within the chain, one can determine who benefits from participation in the chain and which actors could benefit from increased support or organization. This is particularly important in the context of developing countries (and agriculture in particular), given concerns that the poor in particular are vulnerable to the process of globalization.

Third, value-chain analysis can be used to examine the role of upgrading within the chain. Upgrading can involve improvements in quality and product design that enable producers to gain higher-value or through diversification in the product lines served. An analysis of

the upgrading process includes an assessment of the profitability of actors within the chain as well as information on constraints that are currently present. Governance issues play a key role in defining how such upgrading occurs. In addition, the structure of regulations, entry barriers, trade restrictions, and standards can further shape and influence the environment in which upgrading can take place.

Finally, value-chain analysis can highlight the role of governance in the value-chain. Governance in a value-chain refers the structure of relationships and coordination mechanisms that exist between actors in the value-chain. Governance is important from a policy perspective by identifying the institutional arrangements that may need to be targeted to improve capabilities in the value-chain, remedy distributional distortions, and increase value-added in the sector.

2. 5.1. Mapping a value chain

Mapping a value chain facilitates a clear understanding of the sequence of activities and the key actors and relationships involved in the value chain. This exercise is carried out in qualitative and quantitative terms through graphs presenting the various actors of the chain, their linkages and all operations of the chain from pre-production (input supply) to processing and marketing (UNIDO, 2010).

According to Kaplinsky and Morris (2001), mapping the chain means giving a visual representation of the connections between actors and tracing a product flow through an entire channel from the point of product conception to the point of consumption. Value chain can be complex and contain a big number of actors. Each actors can also be connected to more than one value chain. Therefore, it is important to know the aim of the study and the point of interest. It is illustrated either vertically or horizontally in such a way that they depict all upstream activities and functions (input supply, farming activities) and downstream activities like processing, wholesaling and retailing of products. Chain segments are normally represented by boxes that are linked by arrows in order to symbolize product, information or monetary flows.

2.5.2. Upgrading in value chain

According to Kaplinsky and Morris (2001), upgrading is a process of adopting innovation a process which recognizes relative endowments and the existence of rents. Here, innovation is continuous improvement in product and process development. Thus innovation has to be placed in a relative context how fast compared to competitors and this is a process, which can be referred to as one of upgrading. Focusing on the core competencies of the chain different four types of upgrading can be envisaged such as (a) process upgrading, meaning to increase the efficiency of internal processes, (b) product upgrading, that is the introduction of new products or improvement of existing products, (c) functional chain upgrading, increasing value added by changing the mix of activities in the firm, and (d) overall chain upgrading, meaning to engage in a new chain or improving the functioning of the existing one.

2.5.3. Value chain governance

Value chain governance is a central concept of value chain analysis. It has to do with the coordination function in a value chain, particularly how and by whom it is performed. Moreover, it also refers to rules and regulations which are set up by actors within the chains or by those who lie outside the chain like government, NGOs and ISO organizations (Nguyen, 2011). It can be described as the enforcement of instruction relating to what products are to be produced (product design), how they are to be produced (process control) when to producing or timing (Humphery, 2006).

2.6. Market map

The market map is a conceptual and practical tool that helps us identify policy issues that may be hindering or enhancing the functioning of the chain and also the institutions and organizations providing the services (e.g. market information, quality standards) that the different chain actors need in order to make better informed decisions (Kaplinsky and Morris, 2001). The Market map is made up of three inter-linked components:-

- ❖ Value chain actors (Major actors)
- ❖ Enabling environment (infrastructure and policies, institutions and processes that shape the market environment) and
- ❖ Service providers (the business or extension services that support the value chains' operations)

The enabling environment consists of the critical factors and trends that are shaping the value chain environment and operating conditions, but may be amenable to change. These “enabling environment” factors are generated by structures (national and local authorities, research agencies etc.), and institutions (policies, regulations and practices) that are beyond the direct control of economic actors in the value chain.

In most effective value chains the actors who actually form the chain (i.e. transact the main product) are supported by business and extension services from other enterprises and support organizations. There is an on-going need for chain actors to access services of different types both market and technical. The third component of the Market map is concerned with mapping these services that support, or could potentially support, the value chain's overall efficiency. The service includes input supplies, market information, financial services, transport services, quality assurance, and support for product development and diversification.

2.7. Beef Cattle Value Chain Actors in Ethiopia

AGP-LMD (2013) identifies major beef cattle market participants who are described below. These are:-

Producers: These are pastoralists, agro-pastoralists and farmers producing cattle. Although these are the main source of marketed beef cattle, they are located in the rural areas where access to the market is very difficult.

Collectors: These important market agents collect animals, usually from remote locations and gather animals to the producer areas where watering points are found.

Large feedlot operators: Have large facilities and herd sizes ranging from 350 to 5,000 cattle and are mostly located in the growth corridors. These operators buy feed both roughage and concentrate, hire workers, take care of the animal health issues like deworming and spraying against internal and external parasites respectively and vaccinate their animals. They fulfill the SPS requirements and regulations of the countries to where they export. Estimated age of animals destined for export market is 2 to 3 years and mostly sourced from pastoralists in the lowlands.

Small feedlot operators: Target the domestic market and make an attempt to synchronize the cycle of fattening with holiday markets like New Year, '*Meskel*' and Easter. The animals used for this purpose usually come from the highland and are often older i.e. more than 4 years of age.

Traders: There are both animal traders buying on average 100 animals per week and small traders (usually buying on average 15 animals per week) in the market. Large traders, which are few in number, are those who are permanently operating in the live animal and meat value chain business and are known for purchasing large numbers of animals from a variety of sources in order to supply their key buyers (abattoirs and live animal exporters). Smaller traders, on the other hand, are large in number relative to big traders. At times, they are the only outlet to markets that many smaller collectors have.

Brokers/Middlemen: An important feature of the livestock marketing system in most of the livestock markets in Ethiopia is the involvement of brokers/middlemen in many segments of the marketing chain. They match buyers and sellers and facilitate transaction, and in some cases they indeed provide for a valuable service.

Live Animal Exporters: There are hundreds of legal live animal traders and exporters operating throughout Ethiopia. They are also some of the most highly paid actors along the value chain, garnering profit margins ranging on average between ETB 2000-3000 per cattle. Animals are supplied mostly by traders or small scale fatteners while sometimes animals are purchased directly from producers. The primary export markets for live

animals are Egypt, Somalia, Djibouti, Somaliland, Yemen, Saudi Arabia and Sudan, whereas meat is exported to a number of Middle East and African countries, mostly through formal channels, supplied mostly by small scale fatteners.

2.8. Review of Empirical on Related Studies

2.8.1. Value chain approach

Getachew *et al.*, (2016) identify major constraints and opportunities in value chain analysis of cattle fattening in some selected Districts of Western Oromia, Ethiopia. Demand fluctuations, feed shortage, lack of medicines, weak extension service and lack of improved feeds were among the major constraints.

Gezehagn (2015) conducted beef cattle value chain analysis in Konso District, Southern Nations, Nationalities and Peoples' Region of Ethiopia using value chain approach to identify major constraints and opportunities in beef cattle value chain. The major constraints hindering the beef cattle value chain are inadequate of water supply for beef cattle, inadequate of infrastructure, inadequate of basic beef cattle health clinics, drought and poor access to beef cattle marketing information. Introduction of improved and cultivated elephant grass for forage, high demand for consumption of beef, access to extension services, emerging cooperative organizations and training farmers' on beef cattle fattening by developmental agents are the major beef cattle value opportunities identified in this study area.

Gebremariam *et al.*, (2013) employed value chain approach to study the Ethiopian live cattle and beef value chain. He pointed out feed, water shortage and lack of veterinary care are amongst cattle raising-related problems, Problems of cattle purchase focus to some extent on distance to market and credit. Problems of cattle sale are dominated by complaints about the payments system late payments are apparently frequent and disrupt smooth timely operations. Low demand and low prices also appear as claims, but appear to be of less importance than the payment issues.

Hailemariam *et al.*, (2009) Characterizes live animal and meat export value chains to determine constraints and opportunities for enhancing the efficiency of meat export from Ethiopia using value chain analysis approach. Accordingly, the market information system, poor market infrastructures like road, seasonality in production, competition of the domestic and the export sector, problems in the production system, or a combination of several factors are the major problems.

Pastoralist Livelihood Initiative, Livestock Marketing Project (2006) used value chain approach to analysis Livestock Value Chain in Borena and Southern Somali Areas Ethiopia. According to this study report weak relationships between actors, lack of a clear and coordinated effort by the various levels of the government bodies, lack of appropriate funding for livestock industry related activities, lack of easily accessible market information, such as end market quality and quantity requirements and delivery time and mistrust among the value chain actors are the major livestock value chain constraints.

2.8.2. Determinants of market participation and quantity of beef cattle supply

Gezehagn (2015) investigated determinants of beef cattle market participation decision and quantity of beef cattle supplied to the market in Konso District, Southern Nations, Nationalities and Peoples' Region of Ethiopia using Heckman- two stages. The first Heckman- two stage (probit) regression model result showed that out of the 13 variables expected to affect probability of market participation of the sample household, seven variables (Sex of the household head, age of the household head, household size, distance from farmland to provide feed, veterinary service access, body condition of beef cattle and access to credit service) were significantly and positively explained the probability of farmers participation in the beef cattle market. The second Heckman two-stage (OLS) estimation result found that four explanatory variables (access to veterinary service, household income, distance from the nearest market and access to credit) have significantly explained the quantity supply of beef cattle to markets.

A study by Simeon *et al.*, (2009) analyzed factors affecting livestock market participation and sales in the mixed crop-livestock farming system of the highlands Amhara and Tigray regions of northern Ethiopia using Heckman-two stage. The findings showed that

ownership of different species of livestock, land holding, education, crop income and non-farm incomes are the main factors influencing market participation and sales. Asfaw and Jabbar (2008) also found that household size and TLU of livestock ownership affected positively and significantly sales of livestock while landholding negatively affected supply.

2.8.3. The determinants of beef cattle farmers' market outlets choices

There is scanty literature on determinants of livestock market outlets choices in Ethiopia as a general specifically on beef cattle market outlets choices. Mamo and Degnet, (2012) analyzed determinants of livestock farmers' choice of marketing channels at micro-level evidence in Ethiopia. The results of Multinomial Logistic Regression showed that compared to the base category (traders), household head sex, education, free aid, spent time to reach the market, extension visit and loan determined the selection of consumers as market options while the variables membership to cooperatives, volume, spent, market information, extension visit and loan affected the choice of market outlet by other individuals. Sarma *et al.*, (2014) analyzed the factors influencing the preference of beef cattle marketing channel in Pabna and Sirajgonj districts of Bangladesh using multinomial logistic regression model. The findings showed that gender, group marketing, herd size, price information, marketing under contract and vehicle ownership significantly influenced the choice of cattle marketing channels. The Literature shows that most of the researches conducted were used multinomial logistic regression model to analyze factors affecting market channel choices. However, there was no literature on the determinants of farmers' choice to beef cattle market outlets using Multivariate Probit Model (MVP).

2.9. Conceptual Framework

The conceptual framework followed in this research was based on the theoretical framework of value chain developed by Kaplinsky and Morris (2001). The value chain includes:- input suppliers, traders, processors, consumers, small feedlot operators, and individual farmers for draught purposes who are directly involved in the beef cattle value chain. Service providers and enabling environment are indirectly involved in the beef cattle value chain. Additionally, this study also based on the theoretical framework developed by

(Gebremdhin *et al.*, 2015; Barret *et al.*, 2008; Ehui *et al.*, 2003) for the determinants market participation decision and quantity of beef cattle supplied to the markets, and market access. Here market access is outlets choices for farmers to sell their beef cattle (Fig. 1).

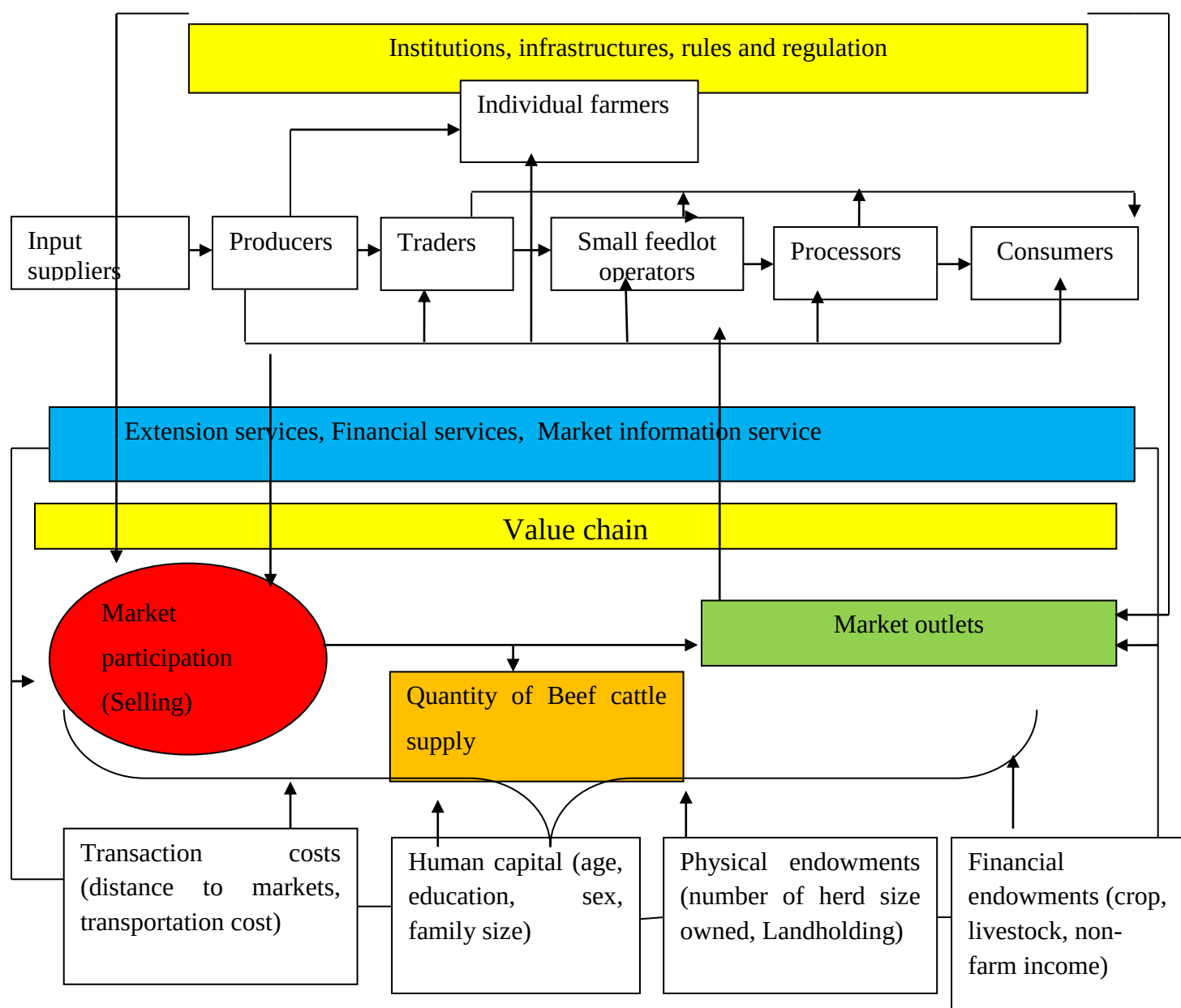


Figure 1: Conceptual framework

Source: own sketch

3. RESEARCH METHODOLOGY

This chapter presents description of the study areas, data types and data sources, methods of sampling, methods of data collection and analysis.

3.1. Description of the Study Areas

3.1.1. Description of Dugda Woreda

Dugda is one of the ten Woredas found in East Shoa Zone of Oromia Regional State, Ethiopia. The Woreda is composed of 36 rural kebeles and 3 urban kebeles. Dugda Woreda is located about 260 kms south of Addis Ababa and 160 kms east of Adama town.

The Woreda had total population of about 157,770 of which 118,362 were rural population and 39, 408 were urban population. The woreda had total farmers household head about 19,729, of which 16, 877 were male household head and 2, 852 were female household head (WBoANRD, 2013).

Dry Weina-Dega and Weina-Dega which covers about 55% and 45% respectively are characterized agro-ecological zones of the Woreda's climate. The altitude of the district ranges from 1600 to 2020 meters above sea level. The annual average temperature is 25°C where as the minimum and maximum temperature is 22°C and 28°C respectively. The Woreda receives average annual rainfall of 750 mm, which is bimodal and erratic in distribution. The main rainy season in the Woreda is from February to mid-May and from July to end of August. The economy of the Woreda is dominated by crop farming mixed with livestock husbandry. The major crops produced in the Woreda include teff, wheat, Maize, vegetables (potato, cabbage, onion, and tomato) and haricot bean (WBoANRD, 2014).

The woreda's livestock population is estimated to be 475, 512, ox 44, 137, cow 62,046, bull 33,296, heifers 50,764, calves 33,036, sheep 43,978, goats 46,126, donkey 17,890, horse 3,243, mule 1,248 and poultry 109, 748 (WBoLFRD, 2013).

3.1.2. Description of Bora Woreda

Bora Woreda is one of the ten Woredas found in East Shoa Zone of Oromia Regional State, Ethiopia. The Woreda is composed of 18 rural kebeles. Bora Woreda is located about 238 kms south of Addis Ababa and 138 kms east of Adama town.

The Woreda had total population of about 79,032 of which 63,157 were rural population and 15, 875 were urban population. The woreda had total farmers household head about 12, 518 of which 11,409 were male household head and 1,109 were female household head (WBoANRD, 2013).

Dry Weina-Dega covers about 100% characterize agro-ecological zones of the Woreda's climate. The altitude of the district ranges from 1650 to 2020 meter above sea level. The annual average temperature is 25°C where as the minimum and maximum temperature is 22°C and 28°C respectively. The Woreda receives annual rainfall of 750-805 mm, which is bimodal and erratic in distribution. The main rainy season in the Woreda is from February to mid-May and from July to end of August. The economy of the Woreda is dominated by traditional cash crop farming mixed with livestock husbandry. The major crops produced in the Woreda include teff, wheat, Maize, vegetables (potato, cabbage, onion, and tomato) and haricot bean (WBoANRD, 2014).

The woreda's livestock population is estimated to be 255, 115, cattle 91,210, sheep 58,902, goats 48,030, donkey 8,180, mule 674 and poultry 48, 119 (WBoLFRD, 2013).

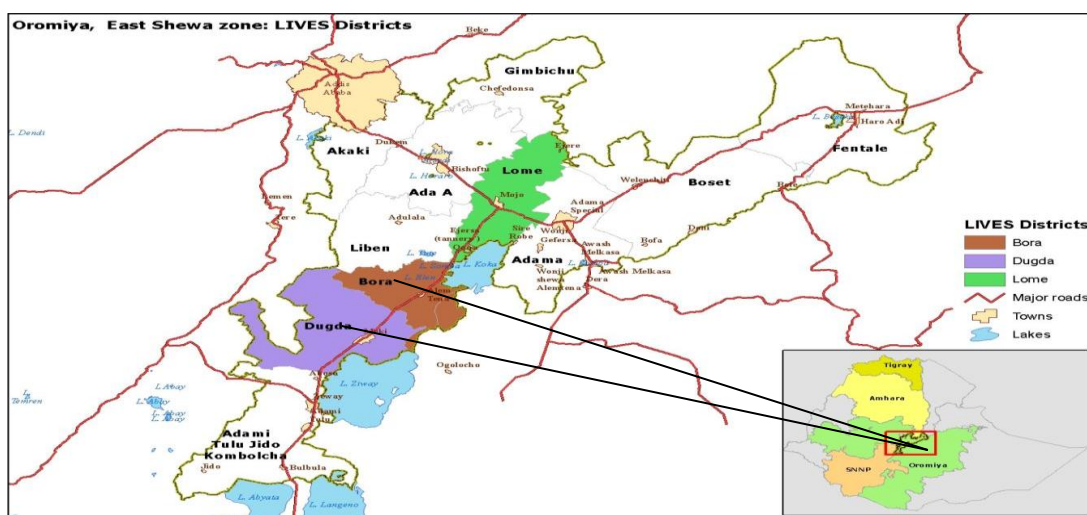


Figure 2: Location of the study areas

Source: Adopted from LIVES Zonal diagnosis & Intervention Plan for East Shoa, 2013

3.2. Types, Sources and Data Collection Methods

The data used for this study was collected from primary and secondary sources. Formal and informal sample survey methods were used to collect primary and secondary data. The informal survey used Rapid Market Appraisal (RMA) technique using checklists. The formal survey was undertaken through formal interviews with randomly selected farmers, traders and processors (butcherries and hotels) using a semi-structured questionnaire for each group. Additionally, primary data was collected from input suppliers and service providers through a key informant interview.

The secondary data was also collected from Woreda's Bureau of Agriculture and Natural Resource Development (WBoANRD), Woreda's Bureau of Livestock and Fishery Resource Development (WBoLFRD), Woreda's Bureau of Trade and Market Development, Livestock & Irrigation Value chain for Ethiopian Smallholders Project (LIVES), and other published and unpublished sources.

Data were collected on household characteristics; household asset ownership including land holding, herd size; access to physical and institutional infrastructure; and cash earning of household. Additionally, data on constraints and opportunities of the actors involved in beef cattle value chain and in the study areas and others related variables were collected.

Survey was conducted in 2016 from April 27 to June 16 and referred 2014/2015 production season.

3.3. Sampling Procedure and Sample Size

For this study, in order to select a representative sample a multi-stage sampling technique were implemented to select beef cattle producer kebeles and sample farm households. In the first stage, Bora and Dugda woredas were selected purposively based on their potential for beef cattle production and LIVES project interest. In the second stage, with the consultation of Woredas livestock experts and development agents, out of 36 and 18 kebeles of Dugda and Bora Woredas 3 and 2 sample beef cattle producers' kebeles namely Abona-Gebrel, Dodota Danbel and Wayo-Gebrel, and Bartasami and Malimabari were purposively selected from Dugda and Bora woredas respectively.

In the last stage, from the total 5,938 number of household involved in beef cattle production in both woredas about 120 sample farmers were randomly selected based on proportional to the population size (PPS). The sample size is decided by using Yemane (1967) formula. Accordingly, the required sample size at 95% confidence level with degree of variability of 5% and level of precision equal to 9% are recommended to obtain a sample size required which represent a true population.

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

Where, n = sample size, N= Population size and e = level of precision assumed 9%.

Table 1. Distribution of sample beef cattle producer farmers included in the survey by *kebeles*

Woreda	Kebeles	Total number of household heads	Number of Sampled households
	Abona-Gebrel	356	22
Dugda	Dodota-Danbel	370	23
	Wayo-Gebrel	390	24
	Bartasami	410	26
Bora	Malimabari	406	25
Total		1,932	120

Source: Woredas Bureau of Livestock and Fishery Resource Development, 2015

In addition to the producers, primary data was also collected from the beef cattle traders at different levels. The traders survey was conducted at woredas' market towns during the market days where transaction takes place were selected as the main beef cattle marketing spot in the study areas. Here, sampling was the very difficult task due to absence of recorded lists of population of traders. Hence, interview was conducted with purposively selected beef cattle traders, small feedlot operators, butcherries and hotels, individual farmers who were purchased beef cattle for draught purpose at the market place. Both licensed and unlicensed traders were also included in the traders' survey.

As a result, totally 16 beef cattle traders, 9 butcherries and hotels, 4 small feedlot operators, and 10 individual farmers were purposively selected and interviewed from both woredas. Totally, about 39 beef cattle traders at various level were selected and interviewed (Table 2).

Table 2. Number of traders interviewed and their location

Traders	Dugda (Meki town)	Bora (Bote town)	Total
Beef cattle traders	10	6	16
Small feedlot operators	2	2	4
Butcheries and hotels	6	3	9
Individual farmers	6	4	10
Total	24	15	39

3.4. Methods of Data Analysis

Descriptive and inferential statistics, and econometric analysis were used to analyze the data collected from the producers, and descriptive statistics were used to describe traders socio-economic characteristics at various levels.

3.4.1. Descriptive and Inferential Statistics

Descriptive statistics such as mean, standard deviation, frequencies, percentages and additionally tables were used to analysis the data. Additionally inferential statistics like Wald-(chi2) test, and P-value were used test hypothesis for the statistical significance of probit and multivariate probit estimation.

3.4.2. Value Chain Analysis

The value chain analysis describe and analyze value chain performance against key actors, product flow, core actors and their transactional and relationships, inputs and services, other supporting actors and enabling environment. Thus, this study was employed value chain analysis to understood the product and information flow, showing value adding/upgrading strategies, indentifying core actors, their relationships with other actors in the chain and measured distribution of their benefits and governance structure.

3.4.3. Econometric analysis

Econometric models which are useful to analyze determinants of market participation and quantity of beef cattle supply in beef cattle marketing, and determinants of beef cattle farmers' market outlets choices were discussed below.

3.4.3.1. Determinants of market participation and quantity of beef cattle supply

To analyze the determinants of participation and quantity of beef cattle supply in beef cattle marketing, the Heckman (1979) two-stage selection model was used. The model consisted of two steps; firstly, selection equation was estimated using a probit model and secondly, an outcome equation was estimated using OLS regression. A Probit model predicts the probability of whether an individual household participated in the beef cattle market or not as shown.

$$P(Z_i) = \begin{cases} 1, & z_i^* > 0 \\ 0, & z_i^* \leq 0 \end{cases} \quad (2)$$

$$Z_i^* = \alpha w' i + u_i \quad (3)$$

Where,

Z_i an indicator variable equal to unity for small-scale beef cattle farmers that participated in the marketing, α is the vector of coefficients to be estimated, and u_i the error term assumed to be distributed normally with a mean of zero and a variance ($\sigma^2=1$).

In the second step additional regressors are included to correct selection bias, what Heckman (1979) refers to as the inverse Mill's ration (λ) which is computed from the parameter estimates of the selection equation for each observation in the selected sample (Greene, 2003) and is represented by:

$$\lambda_i = \frac{\phi(z_i^*)}{1 - \Phi(z_i^*)} \quad (4)$$

Where, ϕ and Φ are the density and distribution functions respectively.

The quantity of beef cattle supplied, Y_i specified in equation (5), is observed only if $\alpha w_i' + u_i > 0$, and is estimated by ordinary least squares (OLS), where the vector of inverse Mill's ratio is included as an additional regressor.

$$Y_i^* = \beta x_i' + \lambda \theta + \varepsilon_i \quad (5)$$

Where, Y_i^* is the quantity of beef cattle supplied, x is a vector of independent variables determining the quantity of beef cattle supplied, and β is the vector of the corresponding coefficients to be estimated and $\varepsilon_i = N(0, \sigma)$. The error terms of market participation and the amount of beef cattle supplied are correlated as the Heckman procedure assumes that the decisions to market participation and the amount of beef cattle supplied are interdependent. The correlation coefficient for the error terms u_i and ε_i is represented by ρ . Where they are bivariate and normally distributed.

$$\text{corr}(u_i, \varepsilon_i) = \rho \quad (6)$$

3.4.4.2. Determinants of beef cattle farmers' market outlets choices

Determinants of the market outlet choices were identified by using multivariate probit model. Some recent empirical studies of market outlet choices assume that farmers consider a set (or bundle) of possible outlets and choose the particular marketing outlet that maximizes expected utility. Multinomial Logit Model (MLM) is appropriate econometric model when individuals can choose only one outcome from among the set of mutually exclusive or collectively exhaustive alternatives. However, in the study areas more than one marketing outlet is available and farmers are more likely to simultaneously choose more than one market outlet in order to address their multiple needs. In this case, the dependent variables are the dichotomous variables indicating whether sales are made through the relevant marketing outlets. The market outlets preferred were beef cattle traders, small feedlot operators, butcheries and hotels, individual farmers who purchase beef cattle for draught and restocking, and consumers. Each farmer can use one or more marketing outlets or several combinations of different outlets which maximize the expected

utility and due to this there is some overlapping and many farmers sell on more than one market outlet.

The multivariate probit model takes into account the potential interdependence in market outlet choices and the possible correlation in the choice of alternative outlets. The probability of preferring of any particular market outlet is estimated conditional on the choice of any other related outlet. The multivariate probit model assumes that each subject has distinct binary responses, and a matrix of covariates that can be any mixture of discrete and continuous variables. Multivariate probit model assumes that given a set of explanatory variables the multivariate response is an indicator of the event that some unobserved latent variable falls within a certain interval. The multivariate probit is an extension of the probit model (Greene, 2003) and is used to estimate several correlated binary dependent variables jointly. The model is specified as follows:

$$Yi_m^* = \beta_m' xi_m + \varepsilon i_m \quad (7)$$

Where, Y^*im ($m = 1...k$) represent the unobserved latent variable of market outlets chosen by the i^{th} farmer ($i = 1...n$). Therefore, in this case ($k =$ Beef cattle traders (Y_1), *Small feedlot operators* (Y_2), *Butcheries and hotels* (Y_3), *Individual farmers* (Y_4), xi_m is a $1 \times k$ vector of observed factors that determine the market outlets choices, β_m is a $k \times 1$ vector of unknown parameters to be estimated, εi_m , $m = 1, \dots, M$ are the error terms distributed as multivariate normal, each with a mean of zero, and variance-covariance matrix V , where V has value of 1 on the leading diagonal and correlations. Therefore, the equation for each market outlet shown bellow (8) from the general model specified in equation (7). The equation is jointly estimated using maximum likelihood method.

$$\begin{aligned} y_1^* &= \beta_1' x_1 + \varepsilon_1, & y_1 &= 1 (y_1^* > 0) \\ y_2^* &= \beta_2' x_2 + \varepsilon_2, & y_2 &= 1 (y_2^* > 0) \\ y_3^* &= \beta_3' x_3 + \varepsilon_3, & y_3 &= 1 (y_3^* > 0) \\ y_4^* &= \beta_4' x_4 + \varepsilon_4, & y_4 &= 1 (y_4^* > 0) \end{aligned} \quad (8)$$

3.5. Definition of Variables and Working Hypothesis

To identify factors affecting the dependant variable in both models, a number of independent variables were considered in the estimation model taking into account previous studies as well as the nature of the study. Accordingly, in order to investigate the determinants of market participation and quantity of beef cattle supply, and market outlets choices the following variables were constructed.

3.5.1. Dependent variables

Beef Cattle Market participation (MKTPRT): The households decision to participate in selling beef cattle market (Dummy 1= market participant as seller, 0 = otherwise).

Quantity of beef cattle Supply (Qty): It is a continuous variable in the second stage of Heckman two stage estimation equation that represent the amount of beef cattle supplied to the market in 2015 by producers measured in (TLU).

Market outlets (MKTOT): Household preference of beef cattle marketing outlets is categorical because it is chosen among other alternative outlets. (Beef cattle traders (Y_1), Small feedlot operators (Y_2), Butcheries and hotels (Y_3), Individual farmers (Y_4)).

3.5.2. Independent variables

The independent variables hypothesized to affect the dependent variable (s) were presented as follows.

Age of the households head (AGHH): It is a continuous variable and measured in years. It is expected to be has negatively associated with market participation and market outlets choices. As the age of the household heads becomes older they are less participated in the market oriented production than subsistence production activities. (Ehui *et al.*, 2003; Mamo and Degnet, 2012) investigated negative relationship between age households head and farmers' participation in livestock market in Ethiopia. Sarma *et al.*,(2014) also found

out the negative relationship between age of household heads and beef cattle market participation in Pabna and Sirajganj of northern Bangladesh. As the age of the household heads increasing, they are less prefer to the profitable market outlets like butcheries and small feedlot operators. Young farmers have a preference for selling to the urban market, while the older farmers prefer rural market outlets (Zegeye *et al.*, 2001).

Sex of the households head (SEXHH): A dummy variable taking zero if female household heads and one if male household heads. It is also expected to influence market participation and market outlets choices positively. Male-headed households to have a positive effect, especially with respect to selling beef cattle. Mamo and Deginet (2012) found that sex of the household head has statistically significant effect on whether or not a farmer participates in the livestock market and his/her choice of a market channel. The study also revealed that male-headed households prefer the consumers market outlets. This study also expects that male-household heads prefer profitable market outlets than female household heads.

Family Size (FSIZE): This is a continuous independent variable that is measured in the number of members in a household. Mamo and Deginet (2012) found household size positively and significantly influenced the decision towards livestock market participation. As the number of family size increases more labour can be utilized for livestock production. In this study it is therefore family size have positive relationships with the market participation with the same reason explained above. It is also expect to positively affect the quantity of beef cattle supply to the market because as the family member increases the producers are selling beef cattle for urgent expenses like for schooling and related expenses (Hangara *et al.*, 2011).

Mamo and Deginet (2012) found household size was positively related and insignificantly affect farmers' livestock market outlets choices. So, in this study it is also expected that family size have positive relationships with the market outlets because as the family size increases there is availability of labour to trekking beef cattle to the market (Barret *et al.*, 2008).

Education of the household heads (EDUHH): It is a dummy variable measured in terms of whether the household has a formal education or not which takes a value one if a

household have formal education and zero otherwise. Education enhances the skill and ability to better utilize market information, which may reduce marketing costs and make it more profitable to participate in the market (Ehui *et al.*, 2003). According to this study there was a positive relationship between education of household heads market participation and quantity of supply. Therefore, education of the household heads is expected to have positive relationships with market participation and quantity of supply. In addition there is a positive relationship between education of the household heads and market outlets choices. Mamo and Deginet (2012) investigate as the formal education of household heads increases the farmers were choices profitable livestock market outlets. Therefore, this study also expected to have there was positive relationships between education of household heads and market outlets choices.

Distance to woredas market (DMKT): Distance to woredas market is a continuous variable measured in kilo meter from home of the respondents up to the place of marketing. The closer the urban centre, the lesser would be transaction and marketing costs. Ehui *et al.*, (2003) found negative relationships between distance to districts market place and market participation and sales of live cattle in a case of study in Ethiopia. In this study, distance from the woredas market hypothesized to influence negatively or positively the farmers' market participation and quantity of beef cattle supply, and influence negatively the decision of farmers to choose the profitable market outlets.

Woreda (Woreda): It is a dummy variable of locations of household heads, taking the value 1 if the Woreda is Dugda and 0 if the Woreda is Bora which consists of a number of characteristics of the Woredas like woreda's in access to market information, access to market infrastructure and production potential etc. (Asfaw and Jabbar, 2007) found the positive relationships between market participation and sales of cattle with Amhara and Oromia regions. In this study, the woreda has hypothesized to influence positively the farmers' market participation and quantity of beef cattle supply.

Access to extension services (AEXT): A dummy variable taking a value of one if beef cattle producers household heads has received any extension services and zero otherwise. In this study access to extension services was expected to influence market participation and quantity of beef cattle supply positively or negatively. Extension enhances the skill and ability to better utilize market information, which may reduce marketing costs and make it

more profitable to participate in the market and assisted the farmers to be the market oriented production which may in turn increases the marketed surplus. On the other hand, with a crop focus, extension received is expected to increase the profitability of crop production relative to beef cattle, reducing participation in beef cattle markets (Ehui *et al.*, 2003; Holloway *et al.*, 2000). It was also expected to influence market outlets choices positive or negative.

Size of landholding (LSIZE): It is a continuous variable refers to the total area of farmland the farmers' owned in hectare. In this study landholding size was expected to influence market participation and quantity of beef cattle supply positively or negatively. Landholding size is used for forage production and grazing purposes which may have positive impact on beef cattle production. As landholding size increases the farmers may keep more beef cattle and also sell their beef cattle for purchasing of agricultural inputs. Contrarily, if farmers are allocated more land for crop production or biased to crop production, the probability of beef cattle market participation decreased because of earning profit from selling of crop (Lubungu *et al.*, 2012; Ehui, *et al.*, 2003).

Access to credit/loan (CREDIT): This is a dummy variable taking the value one if the household takes loan and zero otherwise, which indicates credit taken for beef cattle production activities (such as fattening, and purchasing and selling of beef cattle) is expected to have positive effects on participation and quantity of beef cattle supply, and market outlets choices.

Farm income (FINC): It is a continuous variable and measured with the annual income earned (birr) by the households earning from farming activities (selling of crop, livestock and livestock products). It was expected to influence the beef cattle market participation and quantity of supply positively. As the farm income increases, the farmers may have adequate income for purchasing of inputs used for beef cattle production which in turn boosts beef cattle production. the income from selling of beef cattle may reduced. Sarma *et al.*, (2014) found the positive relationships between farm income and market participation and quantity of beef cattle supply in the beef cattle market. It was also expected to has positive relationships with market outlets choices.

Non/Off Farming Income (OFFINC): It is a dummy variable measured in terms of whether the household obtained income from off and non-farming activities. It is one if the household is involved in non/off farm activities and zero otherwise. Similarly, off-farm income was expected to influence the beef cattle market participation and quantity of supply negatively. (Mamo and Degnet, 2012; Asfaw and Jabbar, 2007) found the negative relationships between off-farm income and market participation in cattle market.

Herd size (HERD): Is a continuous variable that reflects the number of beef cattle owned by the small-scale beef cattle farmers. Large herd size was expected to have positive relationships with the market participation and negative relationships with profitable market outlets choices. (Mamo and Degnet, 2012; Asfaw and Jabbar, 2007; Holloway *et al.*, 2000) found positive relationships between large herd size and cattle markets. Sarma *et al.*, (2014) found negative relationships between large herd size and beef cattle market outlets choices.

Market information (MKTINF): The variable is considered dummy, one if a farmer get price information and zero otherwise. Farmers marketing decisions are based on market price information, and poorly integrated markets may convey inaccurate price information, leading to inefficient product movement (CIAT, 2004). Therefore, in this study it was hypothesized that market price information is positively related to market participation and quantity beef cattle supply, and negatively influence beef cattle market outlets choices.

Average of beef cattle price (PRICE): It is the continuous independent variable that is measured in Ethiopian birr, which was given for the beef cattle by different market outlets per head in 2014/15. Hence, it was hypothesized that price offered by different market outlets positively related with market outlets choices.

Table 3. Summary of dependent and independent variables used in the econometrics

Variables	Measurement unit	Expected sign on outcome		
		Market participation (MKTPRT)	Quantity of supply (Qty)	Market outlet choice (MKTOT)
Sex of household head	Dummy (1= Male, 0= Female)	+ve	+ve	+/-ve
Age of household head	Continuous (years)	-ve	-ve	-ve
Education level of household head	Dummy (1= formal education, 0 = otherwise)	+ve	+ve	+ve
Family size	Continuous (persons)	+ve	+ve	+/-ve
Woreda	Dummy (1= Dugda, 0= Bora)	+ve	+ve	+ve
Distance to woreda market	Continuous (Km)	-ve/+ve	-ve/+ve	-ve
Herd size	Continuous (TLU)	+ve	-	+ve
Land holding size	Continuous (hector)	+/-ve		+/-ve
Access to extension service	Dummy (1= extension received, 0 = ve otherwise)		+/-ve	+/-ve
Access to credit	Dummy (1= credit received, 0= otherwise)	+ve	+ve	+ve
Farm income	Continuous (ETB)	+ve	+ve	+ve
Off-farm income	Dummy (1= if household heads involved in off-farm activities, 0 = otherwise)	+/-ve	+/-ve	
Market information	Dummy (1= accessed market information, 0= otherwise)	+ve	+ve	+ve
Average beef cattle price	Continuous (Birr)			+ve

4. RESULTS AND DISCUSSION

This chapter presents the results and discussion of the study based on the objectives of the study. First, Descriptive statistics results of socio-economic characteristics of major beef cattle value chain actors were discussed. Second, beef cattle value chain analysis results in Bora and Dugda woredas were discussed. It used information from major value chain actors operating in the beef cattle value chain. Third, analysis of beef cattle value chain constraints and opportunities were discussed. Fourth results of determinants of participation decision and quantity of beef cattle supply were discussed. Finally, the results of determinants of the beef cattle market outlet choices were discussed.

4.1. Socio-economic Characteristics of Beef Cattle Producers

Since producers are the primary unit of analysis, there is a need to understand the basic characteristics of the sample producer household heads in the value chain. These socio-economic characteristics (sex, age, education, etc.) of the sampled producers were discussed. Of the total sample respondents, 82% were male-headed households and only 18% were female-headed in Dugda Woreda and 90% were male-headed households and 10% were female-headed in Bora Woreda. Sex of the household head in the two woredas has significant difference at 10 percent significance level.

The survey results revealed that the education level of households shows there was variations between two woredas and significant difference at 1 percent significance level. About 97 percent of the respondents in Dugda woreda were attended formal education, whereas it was 85% in Bora woreda. Regarding marital status more respondents in Dugda and Bora woredas were married (94%).

Average household heads age was 42.5 and 41.2 years in Dugda and Bora Woredas, respectively. The average family size of the total sample respondents was found to be 7 and 6 persons in Dugda and Bora Woredas, respectively. Family size also showed variation at 5 percent significance level. With regards to farm experience, 13.97 and 15.19 average years of farming experience in beef cattle production/rearing both in Dugda and Bora woredas

respectively. T-test showed that there was significant difference between both woredas at 1 percent significance level. This implied that Bora woreda was more nearer to woreda markets than Dugda woreda. Table 4 and 5 summarize the demographic characteristics of sample respondents both in Dugda and Bora woredas.

Table 4: Socio-economic characteristics of samples (categorical variables)

Variables	Items	Dugda(N=67)		Bora(N=53)		Total(N=120)		χ^2 -test
		N	%	N	%	N	%	
Sex(HH)	Female	12	18	5	10	17	14.17	1.8*
	Male	55	82	48	90	103	85.83	
Religion(HH)	Orthodox	60	90	49	92	109	91	7.4**
	Muslim	3	4			3	2.5	
	Catholic	3	4			3	2.5	
	Protestant	1	1.5	4	7.55	5	4.17	
Education(HH)	(0= otherwise)	2	3	8	15	8.3		5.7***
	(1= formal)	65	97	45	85	91.7		
Marital Status(HH)	Married	63	94	50	94	113	94.17	2.1*
	Widowed	2	3	3	6	5	4.17	
	Divorced	2	3			2	1.66	

N is number of respondents, ***, **, * show level of significance at 5 and 10 percent

Source: Own computation from survey results (2016)

Table 5: Socioeconomic characteristics of samples (Continuous variables)

Variable	Dugda (N=67)		Bora (N=53)		Total (N=120)		t-test
	Mean	SD	Mean	SD	Mean	SD	
Age	42.58	9.93	41.22	12.28	41.98	11.00	-0.652
Family size	7	2.65	6	2.13	6	2.47	-1.95**
Farm experience	13.97	9.54	15.19	11.01	14.51	10.19	0.635
Distance to nearest woreda market	12.1	2.8	8.4	1.8	10.5	3.04	-8.82***

, * show level of significance at 5 percent and 1percent probability of significance level, SD=Standard Deviation

Source: Own computation from survey result (2016)

4.2. Socio-economic Characteristics of Beef cattle traders

About 100% and 94% of the traders were male-headed households both in Bora and Dugda woredas respectively. Only 4% were female-headed in Dugda Woreda. Chi2 statistics test shows that sex of the household head in the two woredas has no difference.

The survey results revealed that the education level status of the traders shows there was no variations between the two woredas. Only 8 percent of the total respondents were illiterate whereas 92% were literate. Regarding marital status 100% and 94% of respondents in Bora and Dugda woredas were married respectively. Only 6% of the traders were single in Dugda woreda.

Average household heads age was 40 and 41 years in Bora and Dugda Woredas, respectively. The average family size of the total sample respondents was found to be 6 and 5 persons in Dugda and Bora Woredas, respectively. With regards to market experience, 7 average years of marketing experience in beef cattle trading both in Dugda and Bora woredas. Table-6 summarizes the demographic characteristics of sampled traders in Dugda and Bora woredas.

Table 6: Socio-economic characteristics of traders (categorical and dummy variables)

Variables	Items	Woreda				Total		X ² - test/t- test
		Bora (N=15)		Dugda		(N=39)		
		%		%		%		
		N	%	N	%			
Sex	Female	-	-	1	4	1	3	0.59
	Male	15	100	23	96	38	97	
Education level	Illiterate	0	-	2	8	2	5	4.33
	Literate	15	100	22	92	37	95	
Marital status	Married	15	100	23	96	38	97	0.59
	Single	-	-	1	4	1	3	
Age	Mean	40		41		41		-0.13
Family Size	Mean	5		6		5		-0.90
Marketing Experience	Mean	7		7		7		0.24

Source: Own computation from survey data result, N= Number of respondents

4.3. Asset Ownership of Beef cattle Producers

4.3.1. Land holding size

The physical asset endowments, such as land, are critical for cattle production. That means there is a positive association between land and herd sizes. Landholding of the sample respondents ranges from 1.5 ha to 21ha with an average of 5.12ha per household in Dugda woreda and from 0.75ha to 15ha with an average of 3.78 ha per household in Bora Woreda. Out of the total land owned by beef producers farmers, only 5.2% and 8.92% was allocated for grazing land in Bora and Dugda woredas respectively (Table 7). The average rented in and rented out land for household was 2.04 and 1.5ha respectively in Bora woreda. 1.77 and 1.7ha average of land was also rented in and rented out in Dugda woreda respectively. About 5.2 percent of farmers were shared in and out land in both woredas and majority of

rented and shared in and out lands were allocated for crop production. There was a significant difference in area of owned, grazing land and share in land at 1% significant level. Land size is small in Bora Woreda compared to the land holding in Dugda woreda and hence the area owned and allocated to grazing land is small compared to Dugda woreda.

Table 7: Land holding size

Variable	Bora (N=53)		Dugda (N=67)		Total (N=120)		t-test
	Mean	SD	Mean	SD	Mean	SD	
Area of owned land	2.35	1.29	3.34	2.45	2.94	2.14	-2.77***
Area of rented in land	2.04	1.85	1.77	1.04	1.90	1.48	0.73
Area of rented out land	1.5	0.71	1.70	1.86	1.64	1.55	-0.21
Area of shared in land	1.25	0.44	0.69	0.44	0.89	0.51	2.85***
Area of shared out land	-	-	1.33	0.61	1.33	0.61	-
Area of grazing land	0.54	0.55	0.96	0.84	0.800	0.77	-2.15***

*** show level of significance at 1 percent, SD=Standard Deviation

Source: Own computation from survey result (2016)

4.3.2. Livestock Ownership

T-test statistics results revealed that there was a significant difference at 5 percent significance level among the two group mean comparisons of oxen, cows and sheep between the two woredas (Table 8). On average the household heads owned 2 and 3 TLU of oxen and 2 and 4 TLU of cows in Bora and Dugda woredas respectively (Appendix Table 1).

Table 8: Types of livestock and poultry owned by farmers household

Livestock owned	Bora woreda (N=53)		Dugda woreda (N=67)		Total (N=120)		t-test
	Mean	SD	Mean	SD	Mean	SD	
Ox	2.70	1.80	3.96	8.54	2.97	2.48	-1.05**
Cow	2.90	3.31	4.84	9.17	3.63	4.07	-1.60**
Bull	1.96	2.73	2.87	4.99	2.14	2.24	-0.50
Heifer	2.53	3.41	2.93	2.97	2.76	3.15	-0.5
Calf	2.32	3.49	2.53	2.37	2.44	2.89	-0.27
Sheep	7.61	6.85	5.53	3.71	6.52	5.49	1.50**
Goat	9.11	6.59	8.96	6.82	9.02	6.65	0.07
Poultry	8.67	5.63	8.77	7.98	8.73	7.09	-0.07
Donkey	1.58	0.89	2.21	1.09	1.95	1.05	-2.8***

***,** show level of significance difference at 1 and 5percent, SD=Standard Deviation

Source: Own computation from survey data results (2016)

4.4. Farmers' Access to Business Support Services

Access to business support services for all actors in the value chain is pivotal to make the chain actors and the market chain as a system competitive so that producers, intermediaries and end users of goods and services can make the best use out of it. In this section support services of extension, credit, input supply and accessed to marketing information were discussed.

4.4.1. Beef cattle extension services

About 96% and 91.04% of the respondents in Bora and Dugda woredas were received extension services for beef cattle production (Table 9). The training provided by different

institution shows that there was statically significant difference at 1 percent significance level between the two woredas. This might be due to most of the respondent trainees in Dugda woreda has been trained by woreda's experts or extension officers who closely follow up and provide advices to the farmers (85%) from the total respondent farmers who received training than Bora woreda (15%).

Table 9: Farmers access to extension services

Variables	Items	Woreda				Total	Chi2- test	
		Bora (N=53)		Dugda (N = 67)				
		N	%	N	%			%
Did you receive extension services?	No	2	4	6	9	8	7	1.27
	Yes	51	96	61	91	112	93	
How often did you contact the developmental agents?	Daily	0	-	4	6	4	6	3.32
	Once a week	13	24	14	21	27	23	
	Monthly	10	19	13	19	23	19	
	Rarely	28	53	36	54	64	53	
Did you get any training on beef production and marketing?	No	27	51	36	54	63	53	0.153
	Yes	26	49	30	45	56	47	
Who provided training?	BoA	3	6	18	27	21	18	14.46***
	NGOs	12	23	5	7	17	14	
	BoA& NGOs	11	21	7	11	18	15	
	Did you participate on any field demonstration or farmers day?	No	46	87	56	84	112	93
Yes		7	13	11	166	18	7	

*** show level of significance difference at 1percent

Source: Own computation from survey data results, 2016

4.4.2. Farmers access to credit services

About 96% and 89.5% of the sample respondents were accessed to credit services both in Bora and Dugda woredas respectively. About 32% and 50% of farmers were received credit from formal credit institutions for beef production. About 17 and 23 farmers received credit from Oromia Saving and Credit Association in Bora and Dugda woredas respectively, whereas only 1 and 5 farmers received from local money lenders in Bora and

Dugda woredas respectively. Pearson chi2 test shows that there was highly significant difference at ($p < 0.01$) significance level of farmers received credit during the 2015 production season between the two woredas. This might be due to most of the respondent farmers in Dugda woreda were received credit for purchasing of farm inputs (71.05%) from the total respondent farmers who were received credit than Bora woreda (55.56%). The t-test statistics test of the mean amount of credit received in 2015 also shows significance difference at 1 percent of significance level between the two woredas for the same reasons. (Appendix Table 2 and 3) described the purpose of receiving credit and problems related credit.

Table 10: Farmers' access to credit and source of credit

Variables	Item	Woreda				Total (N=120)		X ² /t-test
		Bora (N=53)		Dugda (N=67)				
		N	%	N	%	N	%	
Did you access to credit?	No	2	4	7	11	9	8	1.90
	Yes	51	96	60	89	111	93	
Did you received credit in 2014/15?	No	35	66	29	43	64	56	6.15***
	Yes	18	34	38	57	56	44	
Source of credit	Formal	17	32	33	49	50	42	7.36*
	Informal	1	2	5	8	6	5	
Amount Received	Mean	4,220.89		6,989.47		6,099.57		-3.78***

***, * show level of significance difference at 1 and 10 percent,

Source: Own computation from survey data results

4.4.3. Farmers' access to input supply

Inputs used by farmers of the study areas for beef production were veterinary drugs, veterinary services, Artificial Insemination (AI), improved breed bull services and feed. These inputs are supplied to farmers either by governments, private traders or own. The

result of this study shows that about 92.45% and 92.25% of the respondents farmers used or accessed to inputs both in Bora and Dugda woredas respectively (Table 11).

The survey result indicated that most of the animal healthy veterinary services and veterinary drugs (93% and 88%) are rendered by government both in Bora and Dugda woredas respectively.

Crop residues (teff and wheat straw) and grazing have become the main sources of feed for livestock both in Bora and Dugda woredas. About 84% and 81% of the sampled respondents farmers replied that they supply or prepare feed for their livestock by their own both in Bora and Dugda woredas respectively. Only 16% and 19% of the respondents were purchased by-product feed from the private traders with high price for fattening purposes both in Bora and Dugda woredas respectively.

According to the CSA (2012/13), the majority (98.95%) of the cattle population are local breeds. The remaining are hybrid and exotic breeds that accounted for about 0.94 percent and 0.11 percent, respectively. Accordingly, this survey result also revealed that about 85% and 90% of the cattle population are local breeds both in Bora and Dugda woredas respectively. The remaining is hybrid that accounted for about 15 percent and 10 percent, respectively in Bora and Dugda woredas particularly for milk purposes. With regards, to bull services the main source about 92% was local bull breed. The remaining was supplied by governments and NGOs that accounted for about 6 percent and 2 percent, respectively. The chi2 statistics test of all variables tested shows that there is insignificant differences between the two woredas farmers access to input supply (Table 11).

Table 11. Farmers access to input supply

Variables	Items	Woreda				Total (N=120)		Chi2- test
		Bora (N=53)		Dugda (N=67)				
		N	%	N	%	N	%	
Did you use any inputs for beef keeping 2015?	No	4	8	5	8	9	8	0.0003
	Yes	49	92	62	92	111	93	
Supplier of veterinary services	Government	49	93	63	94	112	93	0.78
	NGOs	-	-	-	-	-	-	
	Private traders	-	-	-	-	-	-	
	Own	-	-	-	-	-	-	
Supplier of veterinary drugs	Government	46	87	59	88	105	88	1.55
	NGOs	-	-	-	-	-	-	
	Private traders	3	6	4	6	7	6	
	Own	-	-	-	-	-	-	
Sources of feed	Crop residues	43	81	52	78	95	79	2.58
	By-product	8	15	12	18	20	17	
Types of breeds owned	Local	45	85	60	90	105	88	0.58
	Hybrid	8	15	7	10	15	12	
Means of getting inputs	Cash/purchase	46	87	60	90	106	88	2.69
	Credit	1	2	1	2	2	2	
	Gift	2	4	1	2	3	3	

N= Number of respondents

Source: Own computation from survey data results, 2016

4.4.4. Farmers' access to market information

About 78% of the total respondents were engaged in selling of beef cattle. The survey result also revealed that about 72% and 81% of the respondents knew the price offered by different actors or accessed to market information before selling beef cattle both in Bora and Dugda woredas respectively.

The respondents pointed out that they have been get market information from different sources. About 68.42% and 70.37% said that their first source of information is neighbor, 18.42% and 18.51% mentioned traders as the second source of information, and the remaining 13.16% and 11.11% said market place are their third major source of market information both in Bora and Dugda woredas respectively. From the total respondents accessed to market information, about 79% and 78% of the respondents searches price information, 18.4% and 16.7% searches buyers information and the remaining 5.3% and 3.7% searches information about market place information both in Bora and Dugda woredas respectively (Table 12).

Table 12: Farmers access to market information

Variables	Items	Woreda				Total		Chi-square d value
		Bora (N=53)		Dugda (N=67)		(N =120)		
		N	%	N	%	N	%	
Did you sold beef cattle in 2014/15?	No	12	23	14	21	26	22	0.053
	Yes	41	77	53	79	94	78	
Did you accessed market price information before sell?	No	15	28	13	19	28	23	1.31
	Yes	38	72	54	81	92	77	
Source of market information	Traders	7	13	10	15	17	14	1.03
	Neighbors	26	49	38	57	64	53	
	Market place	5	9	6	11	11	9	
Types of market information	Price information	30	57	42	63	72	60	7.22*
	Buyers information	7	13	9	13	16	13	
	Market place information	2	4	2	3	4	3	

* Show level of significance difference at 10 percent

Source: Own computation from survey data results, 2016

4.4.5. Farmers' market participation and quantity of beef cattle supply

According to the survey results, 78% of the respondents were participated in selling beef cattle in the study areas (Table13). On average 2 beef cattle (head) were supplied to the market by the respondents.

Table 13: Farmers' market participation and quantity of beef cattle supply

Variables	Items	Woreda				Total		X ² -test
		Bora (N =53)		Dugda (N = 67)		(N = 120)		
		N	%	N	%	N	%	
Market participation	No	12	23	14	21	26	22	0.053Ns
	Yes	41	77	53	79	94	78	
Quantity supply	Mean	2		3		2		- 0.95Ns

NS, Non-significant

Source: Own computation from survey data results, 2016

4.4.6. Farmers' market outlets choices

About 81%, 79%, 52%, 48% and 18% of the market participant respondents were choices butchers and hotels, beef cattle traders, small feedlot operators, individual farmers and consumers' market outlets respectively (Table 14). Additionally, the respondents were choice alternative market outlets depending on different criteria (Appendix Table 6).

Table 14: Proportion of market outlet choice of the producers

Market outlets	Items	Frequency	Percentage (%)
Beef cattle traders	No	20	21
	Yes	74	79
Butchers and Hotels	No	18	19
	Yes	76	81
Small feedlot operators	No	45	48
	Yes	49	52
Individual farmers	No	49	52
	Yes	45	48
Consumers	No	77	82
	Yes	17	18

Source: Own computation from survey data result, 2016

4.5. Beef Cattle Value Chain Analysis

4.5.1. The major value chain actors and their roles

To enhance opportunities for value chain actors, we need to understand the main value chain actors affecting the entire value chain. In the course of analysis, we looked at the basic components of value chain such as functions, information flows and actors. With these components, beef cattle pass through different channels before it reaches the end users. The major actors in beef cattle value chain were input suppliers, producers, processors, live cattle traders, small feedlot operators and consumers. Based on the functions, potential value chain actors and their relationships were mapped in figure (3) and their roles were discussed below.

Input Suppliers: Value chain function starts from inputs use to produce beef cattle and beef products (meat). Inputs such as veterinary drugs were supplied by woredas' livestock and fishery resource development offices and veterinary drug shops. Alema koudjis was the only supplier of different types of concentrate feeds for different purposes (fattening, milk and others). Most of the interviewed producers in the study areas were produce their own local breeds, but only few NGOs provided improved bull for few farmers organized in group.

Producers: In this value chain analysis, producers are the main suppliers of beef cattle to the different actors of the value chain in the study areas. Accordingly, smallholder beef cattle farmers are the major producers and suppliers (100%) in the study areas. There is no commercial or ranches in the study areas.

Traders: The majority of transactions are completed by brokers and traders in both woredas. In the study areas beef cattle traders were identified as small and large traders. Small traders were purchased beef cattle from the producers and sold to different actors (small-feedlot operators, large traders, butcheries and hotel owners, individual farmers for draught purposes). According to this study result small traders purchased on average 6 beef cattle/week at woredas markets. They have no specific standards that they look for apart from the body size of beef cattle. They are large in numbers relative to larger traders. They have limited working capital and even they borrowed from informal money lenders to run their business. The larger traders were purchased beef cattle mostly from small traders and producers then sold to the traders or consumers out of the areas and local butcheries. However, they are few in number compared to small traders.

Brokers: These market agents serve as mediators between buyers and sellers in the livestock market. They are usually expected to link buyers with sellers and facilitate the terms of exchange. They are not directly involved in buying and selling activities. But, they play a role in negotiating on the price the sellers (producers) want to sell and buyers (traders) want to buy in the study areas. They received a brokerage fee of 40 Birr per head of cattle from both sellers and buyers.

Trekkers: Animals can be transported either by trekking or trucking. Smallholder farmers usually trek their animals to the market. The distance varies according to their location from the market. In the case of the study areas about 53% and 83% of the market participant respondents replied that they use trekkers to transport their cattle to the woreda or secondary market both in Bora and Dugda woredas respectively. They paid them 15-20 birr/head depending on the distance from the market. The remaining about 47% and 7% of the respondents transport their animals to the woreda market by their own both in Bora and Dugda woredas respectively (Appendix Table 2).

Small feedlot operators: Small feed lot operators purchase on average two-three beef cattle mostly older oxen and, then fattened for three to four month targeting holiday markets. They purchased beef cattle either from the producers or small traders at woredas markets and sold to their customer (butcherries and hotel owners). In the study areas few emerging small feedlot operators are operating the fattening practices around peri-urban and urban areas, particularly in Dugda woreda. In Dugda woreda only two modern large feedlot operators are participating in fattening targeting to export market, they purchase Borena cattle due to fulfills export standards. In the study areas mostly beef cattle are consumed domestically.

Butcherries and Hotels: According to the woredas former Trade and Industry Offices, now Trade and Market Development Bureau there are 19 and 10 butcher's and hotels that are processing beef and beef by-products both in Dugda and Bora woredas, respectively. There is no butcherries which alone to act as meat supplier to hotels, cafeterias and restaurants in the study areas. That mean in the study areas the hotel owners have their own butcherries. They sell on a retail basis but also serve meat on their premises as raw meat (kurt) as well as roasted products. They buy from producers, small traders, feedlot operators and rarely from big traders at woredas markets.

Domestic abattoirs (Slaughter houses): Domestic slaughter houses that are administered by the local municipalities provide formal slaughter services to butchers and hotels and the general public. There is only two slaughter houses existed in both woredas town. Any animal slaughter outside these premises is illegal. However, except the butchers, the majority of the people use backyard slaughter especially for special occasions.

Individual farmers: In the study areas the individual farmers were identified as one of the beef cattle value chain actor and also served as one the farmers' beef cattle market outlets choices. They purchase heifer and young bulls for breeding and replacement purposes, and mainly oxen for draught purpose from either producers or small traders at farm gate or woreda market place. After finishing with draught purpose they are market for beef purpose at older age.

Consumers: These are the final actors in the beef cattle value chain. They are domestic consumers who buy either processed meat from butchers and hotels or who, as a group buy beef cattle to slaughter and then share the meat particularly during holidays and other social occasions. Here, the hotels which haven't their own butcheries, cafeterias and restaurants owners were also purchased meat from butcheries owners.

4.5.2. Value chain support actors or service providers

These value actors were identified as those who provide supportive services at meso-level actors rather than supplying physical inputs which are including veterinary services, financial services, training and extension services, Inspection services, and business licensing services were discussed below.

(a) Veterinary services: The only supplier of veterinary services was woredas Livestock and Fishery Resource Development Offices in the study areas. There are animal health clinics, approximately one for every 3 kebles, and animal health assistants are responsible for the diagnosis of the disease and treatments in the form of vaccination as-needed. These services were diagnosis, treatment and castrations. The most common diseases and conditions for treatment mentioned were internal parasites, external parasites, foot and mouth disease, lump skin disease, black leg disease, anthrax. Woredas Livestock and Fishery Resource Development Offices provide these above mentioned services. The vaccinations are given free of charge.

(b) Financial services: Oromia Saving and Credit Share Company, Busa Gonofa Micro finance and local money lenders were provided credit services for the producers and traders at various levels.

(c) Training and extension services: Woreda Livestock and Fishery Resource Development Offices were provided training and extension services to the producers regarding beef cattle health, management and on value adding or fattening topics with in collaboration NGOs and Projects. In both woredas NGOs and Projects providing a variety of trainings to the producers. For instance, SIDA and LIVES Project implement different activities for cattle farmers. SIDA have provided bull extension service, and LIVES have

provided different training in order to improve the capacity of the experts and the farmers in the study areas.

(d) Inspection services: Woredas municipality was provided meat inspection and slaughtering services for butchers and hotel owners as well as public in general. They follow sanitary facilities and inspected meat for consumption.

(e) Business licensing services: Woredas Market and Trade Development Offices were provided business licenses and commercial registrations for traders at various levels. They also control unlicensed traders to create competitive market among the traders.

4.5.3. Value chain Enabling environments (Influencers)

Ministry of Livestock and Fishery Resource Development set the policies and regulatory issues like animal health, informal cross border of beef cattle and facilitating basic infrastructure through woredas Livestock and Fishery Resource Development Offices at macro-level actors. Ministry of Trade and Industry set business rules and regulations policies at macro-level actors and implements through woredas Market and Trade Development Offices.

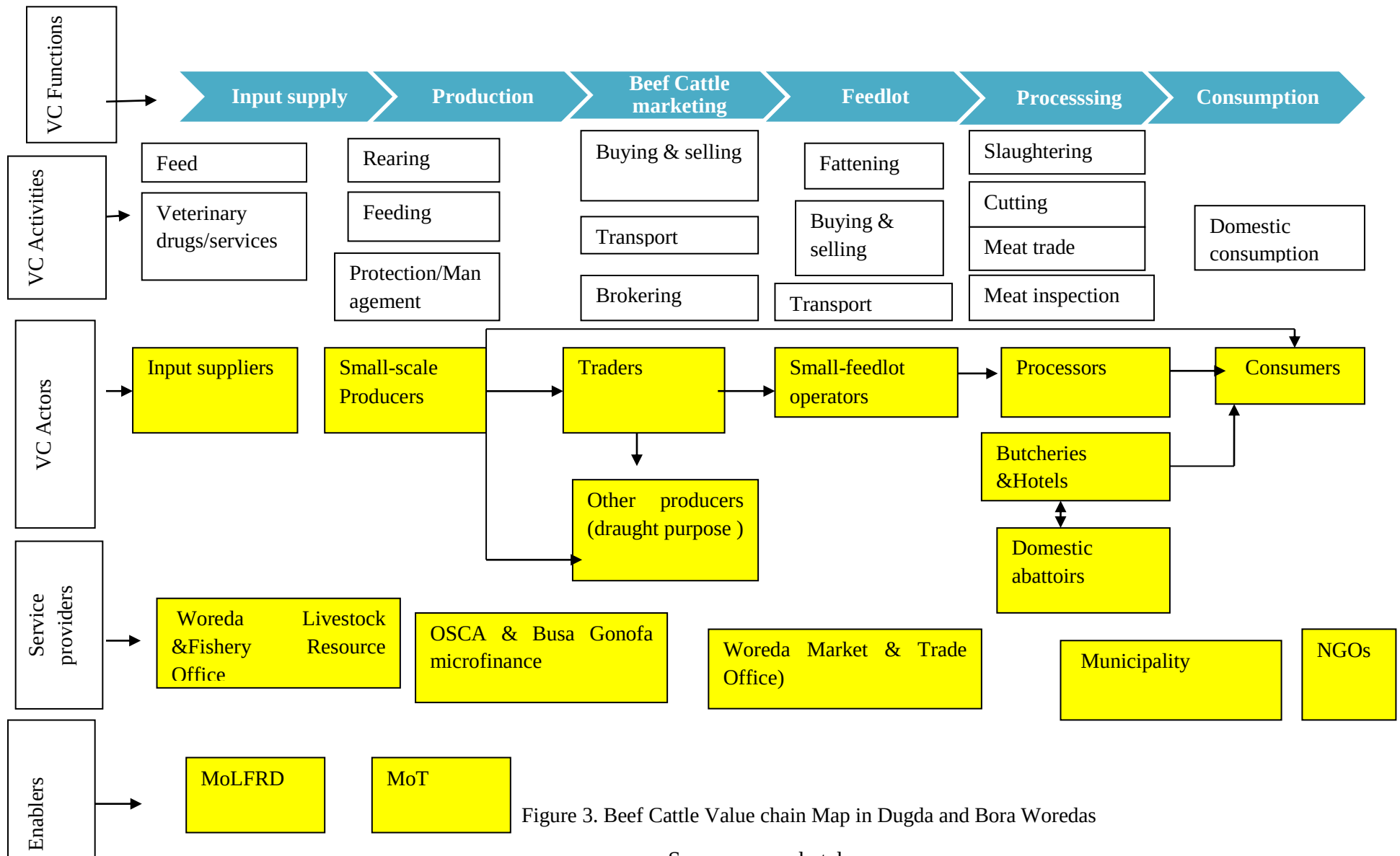


Figure 3. Beef Cattle Value chain Map in Dugda and Bora Woredas

Source: own sketch

4.5.4. Beef cattle marketing channels

Beef cattle market channels connect producers, traders (small and large traders), small-feedlot operators, butchers and hotels to consumers as shown in Figure 4. The starting point in the beef cattle market channels is the producers and the end user is consumers. It was estimated that about 230 heads of cattle was supplied to the market by the market participants for the year 2014/15. From the total beef cattle supplied to the market by the sample farmers, small traders have the largest share where about 37% followed by small feedlot operators and butcheries and hotels about share of 24% and 17% respectively. Small feedlot operators supply about 100% to the domestic abattoirs for domestic consumption. According to this survey results nine (9) beef cattle marketing channels were identified.

Channel 1: Producers → Small traders → Large traders → Consumers

Channel 2: Producers → Small traders → Small feedlot operators → Butchers & Hotels → Consumers

Channel 3: Producers → Small feedlot operators → Butchers & Hotels → Consumers

Channel 4: Producers → Small traders → Butchers & Hotels → Consumers

Channel 5: Producers → Large traders → Butchers & Hotels → Consumers

Channel 6: Producers → Butchers & Hotels → Consumers

Channel 7: Producers → Small traders → Individual farmers

Channel 8: Producers → Individual farmers

Channel 9: Producers → Consumers

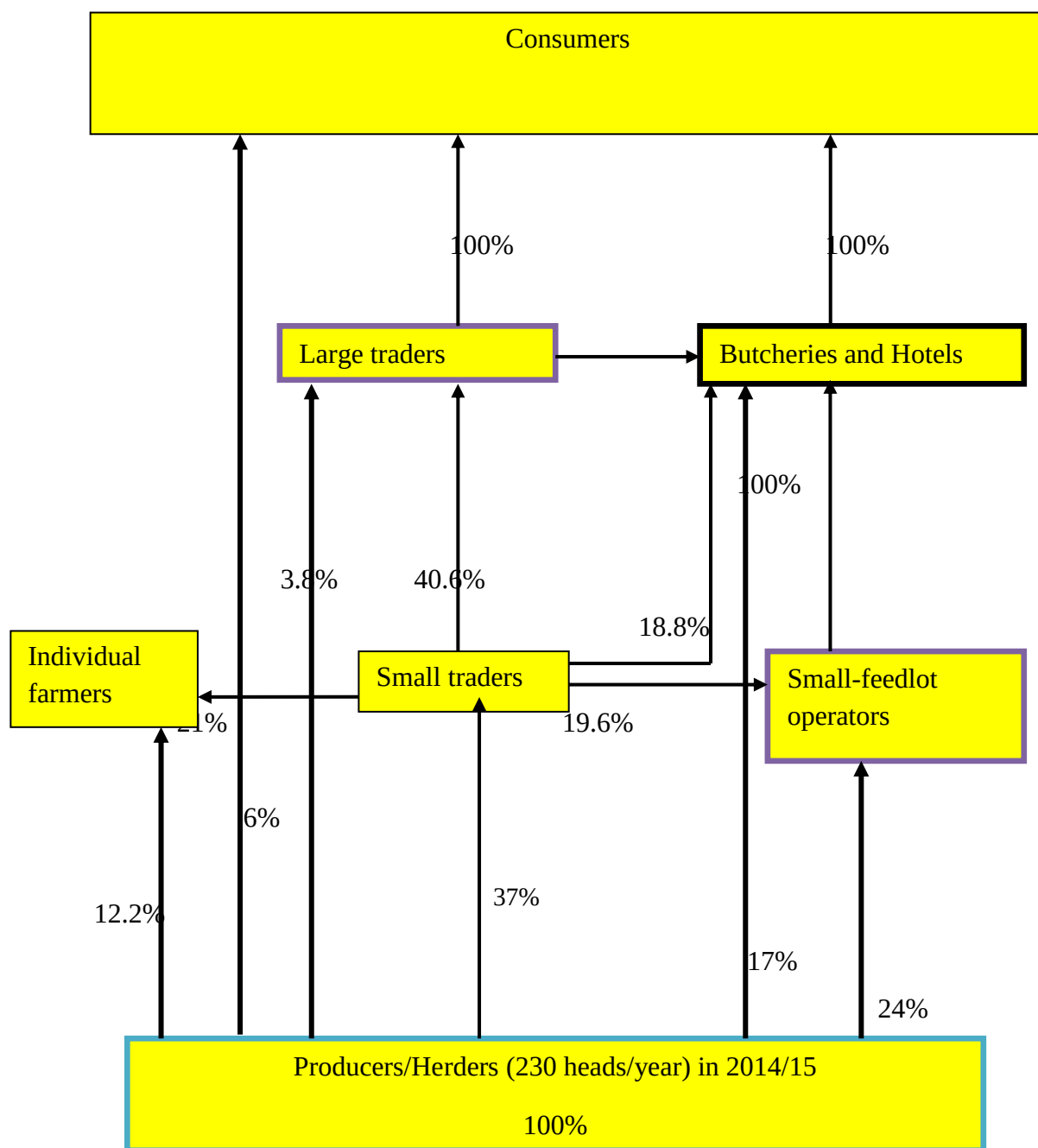


Figure 4. Beef cattle Market Map

Source: Own sketch

4.5. 5. Marketing cost and benefit share of the value chain actors

Each of the beef cattle value chain actors adds value to the product as the product passes from one actor to another during their performance. In a way, the actors change the form of the product through improving the produce by fattening or processing or create space and time utility by transporting. Table 15 indicates different types of marketing cost and margin related to the transaction of beef cattle by producers, butchers and hotel smaller traders, small feedlot operators and larger traders.

Table 15: Average production, marketing costs and percentage of profit shared along the main value chain actors

Cost components	Producers	Small traders	Large traders	Small feedlot operators	Butcheries & Hotels
Production costs	-	-	-	-	-
Feed costs/head	77.0	-	33.3	220.0	-
Veterinary costs/head	26.8	-	-	190	-
Labor costs/day	80.0	-	140.0	100.0	-
Marketing costs					
Broker fee	55.5	162.0	267.2	50.0	34.4
Trekking/truck	272.7	100.0	267.7	133.3	-
Market search cost	-	150.0	-	100.0	-
Processing costs	-	-	-	-	544.4
¹ Total tax payment	-	30.0	30.0	30.0	20.0
Total marketing cost	328.2	442.0	804.9	313.3	598.8
(Birr/head)					
Total cost	512.0	442.0	737.7	823.3	598.8
Selling price	7600	8611.3	9451	12071.4	16000
Profit margin	7088	8169.3	8713.3	11248.1	15401.2
% Profit	14%	16.1%	17.2%	22.2%	30.4%

¹ A tax paid for exit (exit fee)

Source: own survey data computation (2016)

As indicated in table 15 above producers in beef cattle value chain got lower profit margin relative to other value chain actors. Compared to producers, other actors (butchers and

hotels, smaller and larger traders, and small feedlot operators) their profit margin is higher. Butchers and hotel owners, and small feedlot operators were received higher profit when compared to other value chain actors. So, this indicated that adding value to beef cattle is necessary in the study areas.

4.5. 6. Beef cattle value chain upgrading

There are a few beef cattle value chain upgrading that can occur at various levels of the beef cattle value chain in the study areas. These were discussed below.

Functional upgrading: Producers are participated in upgrading activities to move to another level of the beef cattle value chain in the study areas. They move to small feedlot operations and small traders functions by themselves. In the study areas very few larger traders are act as transporters by themselves.

Product upgrading: Small- scale fatteners were purchased beef cattle at lower price and sold at higher price by adding value (fattening). Butchers and hotel owners were mostly purchasing fattened beef cattle from small scale fattening operators existed in the local areas for slaughtering purposes. They processed and delivered different types of beef product or processed meat to the final consumers in different meal types.

Process upgrading: In order to increase farmers' knowledge of market oriented beef cattle production and other management techniques to improve the quality of beef cattle they supply to the market different training was provided by various organizations.

4.5.7. Beef cattle value chain governance (Power relationships)

In the study areas market rules and regulations of beef cattle market was administered by woredas municipalities. The beef cattle value chain in the study areas was dominated by traders and butchers who are exercising considerable power on the chain and share large volume of sales but the business operations among the actors are uncoordinated. In the

market places, brokers also wield a great deal of power, as the majority of transactions are conducted with their assistances. But, the producers do have a small amount of power in that they have some ability to control when and to whom they sell their beef cattle.

In the study areas there was a clear vertical linkage among beef cattle farmers, traders and beef cattle processors in terms of buying and selling activities. These links were only market interactions. However, when considering information and services follows among different value chain actors vertical linkages were weak. There is no horizontal linkages among the farmers. That means farmers were not organized as cooperatives or farmers groups particularly for beef cattle market in the study areas. However, there is a horizontal linkage among the beef cattle traders.

4.6. Beef cattle Value Chain Constraints and Opportunities

One of the merits of value chain analysis is that it helps to clearly identify the bottlenecks to the development of the chain right from the input supply to consumption. Accordingly, the numbers of constraints and opportunities were explained by different actors key informant interview and questionnaire.

4.6.1. Producers' major production and market constraints

From the study results, major production constraints which hindering the success of beef cattle value chain in the study areas were feed shortage, feed price increment, diseases outbreak, shortages of veterinary drugs, shortage of availability of water and poor management (Table 16). Price instability, low price offered for farmers, brokers and less accessed to market information were the major market constraints (Table 17). About 87% of sampled producers were faced feed shortage followed by feed price increment (Table 16).

Table 16: Producers' major production constraints

Major production constraints	Frequency	%	Rank
Feed shortage	113	94	1
Feed price increment	104	87	2
Disease problems	87	72	3
Shortage of veterinary drugs	53	44	5
Shortage of availability of water	44	40	6
Poor management	87	72	3

Table 17: Producers' major market constraints

Major market constraints	Frequency	%	Rank
Market price instability	89	80%	1
Low price offered for farmers	67	60%	2
Middlemen problem (Broker)	46	41%	4
Less/no market information	60	54%	3

Source: Own computation from survey result, 2016

4.6.2. Beef cattle traders major market constraints

The major beef cattle marketing constraints mentioned by traders were related with the financial problem, the problem of supply shortage, low product quality and lack of support from concerned bodies, and competition with unlicensed traders (Table18).

Table 18: Traders' major market constraints

Major constraints	Frequency	%	Rank
Financial problem	20.3	52%	3
Beef cattle supply shortage	11	28%	4
Beef cattle quality problem	25	64%	2
Lack of government support	33	84%	1
Competition with unlicensed traders	25	64%	2

Source: Own computation from survey result, 2016

4.6.3. Input Supplier major constraints

During the survey time the data was collected from private veterinary drug shops, Busa-Gonofa micro-finance, Oromia Saving and Credit Association and Alema koudijs feed private limited company using key informant interviews. Supply shortage of drug, high prices of drugs, lack of awareness on new drug, competition with illegal traders, lack of experts on selling (prescription) and low market control on drug (inspection) are the major private veterinary drug suppliers problems in the study areas. Lacks of farmers' awareness on the credit, unwillingness to take credit due to fearing of inability to repay and supply shortage are the major financial problems. Lack of farmers' awareness on concentrate feed is a problematic for improved feed supplier.

4.6.4. Beef cattle value chain opportunities

Availability of high population of livestock, excess of human labor, existence of crop residue as source of feed, existence of factory by-product concentrate feed, favorable condition for fattening, availability of veterinary services, accessibility are the major beef cattle production opportunities in the study areas.

One of the major economic objectives of the government of Ethiopia is pursuing a policy of maximizing revenue of live animal and meat exports. This is another opportunity

direction for producers. Furthermore, provision of infrastructure facilities like roads, veterinary clinic, telecommunication, financial institutions are the infrastructural advantages that facilitate the production and marketing of beef cattle in the study areas. Additionally, accessibility of extension training to capacitate farmers on various agricultural activities are also other policy dimensions which create opportunities for producers. There are also various Non-government organizations such as LIVES and SIDA that provide production inputs and technical services to the farmers.

High domestic demand for beef product (meat) consumption during festivals, social occasions and increasing population growth (urban consumers) may create market opportunities for beef cattle value chain actors in the study areas. Based on these production and marketing opportunities the sampled household heads and traders were asked whether they expand their business (Appendix Table 4 and 5).

4.7. Econometrics Model Results

4.7.1. Determinants of market participation and quantity of beef cattle supply

Results of first-stage probit model estimation of the determinants of the probabilities of the households to participate in beef cattle selling are given in Table 19. The Table also contains the values of marginal effects which are evaluated at the means of all other independent variables. The model chi-square tests applying appropriate degrees of freedom indicate that the overall goodness of fit of the probit model is statistically significant at a probability of less than 1%. This shows that jointly the independent variables included in the probit model regression explain the variations in the farmers' probability to participate in selling to beef cattle. The probit model explains 78% of the variations in the likelihood of beef cattle farmers to participate in selling of beef cattle. The probit model also predicts about 99% of the cases correctly. Five variables (age, sex, education, farm income and access to market information) were significantly found to influence the farmers' decision to participate in the beef cattle market in the study areas.

Age of Household Head (AGHH): As expected, age of household head is negatively associated with farmer's likelihood to sell beef cattle and statistically significant at 5% significance level. As household head's age increases by a year, the probability that household sell beef cattle decreases by 0.1 percent, holding all other factors constant. This implies that the younger people are more enthusiastic to participate in the beef cattle market than the older people. Barret *et al.*, (2007) stated that younger people participated more in the market because they are more receptive to new ideas and are less risk averse than the older people.

Sex of Household Head (SEXHH): Sex of the household head significantly and positively influenced market participation. Being male-headed household increases the probability of participating in the beef cattle market by 22.6%, all other factors held constant. This suggests that the male headed households are more market oriented than female, hence they participated more in the beef cattle market than female headed households. (Gezehagn, 2015; Sarma *et al.*, 2014) also found male-headed household had significantly and positively influenced market participation in beef cattle market.

Education level of Household Head (EDUHH): As expected, education of household head was positively associated with farmer's likelihood to sell beef cattle and statistically significant at less than 1% significance level. Marginal effect revealed that as household heads' education level increases the probability that household sell beef cattle increases by 2.9%. This implies that education enhances the skill and ability to better utilize market information, which may reduce marketing costs and make it more profitable to participate in the market (Ehui *et al.*, 2003).

Family size (FSIZE): Family size was positively associated with farmer's likelihood to sell beef cattle and statistically significant at less than 1% significance level. Marginal effect revealed that as the family size increases the probability that household sell beef cattle increases by 0.1%. The large household sizes could suggest that the required labor for cattle production and marketing is available in abundance (Musemwa *et al.*, 2007).

Table 19: Results of the Heckmans' first step estimation in the selection model (probit)

Variables	Coefficients	Robust SE	Marginal effects (df/dx)	P> Z
Constant	- 5.84***	1.87	-	0.002
Woreda	-1.089	0.0325	-0.0326	0.692
DMKT	0.021	0.086	0.002	0.807
SEXHH	0.0203***	0.739	0.226	0.01
AGHH	- 0.044**	0.023	- 0.001	0.052
EDUHH	0.466***	0.197	0.029	0.01
FSIZE	0.424***	0.161	0.001	0.008
LSIZE	0.263	0.235	0.018	0.269
HERD	- 0.058	0.043	- 0.0018	0.174
FINC	0.0005***	0.00001	3.66-e06	0.011
OFFINC	0.193	0.408	0.015	0.637
CREDIT	0.837	0.604	0.077	0.166
AEXT	- 1.175	0.766	- 0.047	0.125
MKTINF	3.145***	0.554	0.702	0.000

Number of observations = 120
 Wald $\chi^2(13) = 77.83 (0.0000)$ ***
 Log pseudo likelihood = - 22.504
 Pseudo $R^2 = 0.68$
 Observed probability = 0.78
 Predicted probability = 0.99

SE are robust standard errors. ***, ** and * indicate statistical significance level at 1%, 5% and 10% respectively.

Source: own survey data results, 2016

Farm income (FINC): As expected, in this study the annual income earned from farm activities was positively and significantly influenced the farmers' likelihood to participated in beef cattle market at less than 1% significance level. As the annual income of the

farmers earned increases by addition of one birr, the probability of the farmers market participation in beef cattle selling increases by 14 percent. Farm income increases participation in live cattle markets (Ehui *et al.*, 2003).

Market information (MKTINF): Farmers' access to market information has positively and significantly influenced the probability of farmers' decision to sale beef cattle at less than 1% significance level. Marginal effect results show that if farmers get market information, the probability of market participation increases by 70.2 percent. Business decisions are based on dynamic information such as consumer needs and market trends (CIAT, 2004).

Heckman two-step estimation (OLS) for the quantity of beef cattle supply

Table 20 summarizes the results of the second-stage Heckman selection estimations for the volume of supply. The coefficient of Mills ratio (Lamda) in the Heckman two-stage estimation is significant at the probability of less than 10%. This indicates sample selection bias, existence of some unobservable farmer characteristics determining farmers' likelihood to participate selling of beef cattle and thereby affecting the quantity of beef cattle supply. The model chi-square tests applying appropriate degrees of freedom indicate that the overall goodness of fit for the Heckman selection model is statistically significant at a probability of less than 1%. This shows that jointly the independent variables included in the selection model regression explain the quantity of beef cattle supply. From twelve selected explanatory variables to determine the quantity of beef cattle supply, distance to woreda markets, education level of households head, land holding size, farm income, access to market information were affect significantly the quantity of beef cattle supply were presented and discussed below.

Distance to woreda market (DMKT): As expectation, distance to the woreda market is positively associated and statistically significant at less than 1% significance level with the quantity of beef cattle supply. This implies that holding other explanatory variables constant, a km nearest to the woreda markets results in 0.27TLU increases in the quantity of beef cattle supply.

Education level of household head (EDUHH): As expected, the education level of household head is positively affect and statistically significant at 1% significance level of quantity of beef cattle supply to the market. This indicates that formal education enhances the information acquisition and adjustment abilities of the farmers (Fakoya *et al.*, 2007). Holding other explanatory variables constant, a year increase of formal education increases the amount of beef cattle supplied to the market by 0.55TLU.

Land holding size (LSIZE): As expected, the size of land holding is positively associated and statistically significant at less than 1% significance level with the quantity of beef cattle supply. This implies that as the size of landholding by farmers' increases by one hector, the amount of beef cattle supplied to the market increased by 0.51TLU. This indicated that the more land owned by the farmers may available for feed production and as wells used for grazing purposes which in turn related to increase beef cattle production.

Farm income (FINC): It is a continuous variable and measured with the annual income earned (birr) by the households from farming activity within their land holding. Higher farm income was related positively and statistically significant at less than 1% significance level with the quantity of beef cattle supply to the market in the study areas. This implies that as the annual income of the farmer increases by one birr, the quantity of beef cattle supply to the market increases by 0.0001TLU. Producers who have adequate income to purchase inputs can easily participate in markets supply more beef cattle than those not having the money (Holloway and Ehui, 2002).

Table 20: OLS result of the Heckman two stage model for quantity of beef cattle supply

Variables	Coefficient	Std. Err.	P> z
Constant	-6.1660**	2.592	0.017
Woreda	-0.7604	1.6172	0.638
DMKT	0.2741***	0.0896	0.002
SEXHH	-0.9366	0.8111	0.248
AGHH	-0.0408	0.0307	0.185
EDUHH	0.5531***	0.2385	0.01
FSIZE	0.0871	0.1385	0.530
LSIZE	0.5051***	0.1440	0.000
FINC	0.0001***	0.00002	0.011
OFFINC	0.1071	0.5645	0.849
AEXT	-0.0346	1.159	0.976
MKTINF	3.550**	1.562	0.02
Mills Lambda	2.098*	3.280	0.062

Number of observation = 120

Uncensored observation = 94

Censored observation = 26

Wald chi2 (12) = 522.39

Prob > chi2 = 0.0000***

***, **, and * indicate statistical significance at 1%, 5%, and 10%, respectively.

Source: own survey data computation (2016)

Access to Market Information (MKTINF): It affected amount of beef cattle supply to the market positively and significantly at less than 5% significance level. This revealed that if the producer gets market information, the amount beef cattle supplied to the market increases by 3.5 TLU. Farmers do capitalize on the market information exchange networks when deciding the amount of cattle to be supplied on the market (Jorine *et al.*, 2013).

4.7.2. Determinants of beef cattle farmers' market outlets choices

Factors affecting beef market channel choice decision was analyzed using Multivariate Probit econometric Model (MVP). MVP is estimated using maximum likelihood estimator (ML). The model fits the data reasonably well that the Wald test ($\chi^2(48) = 259.61, p = 0.0000$) of hypothesis that all regression coefficients in each equation jointly significant at less than 1 percent significance level. This result implies that the subsets of coefficients are jointly significant and the explanatory power of the factors included in the model is satisfactory. In addition, the likelihood ratio test ($\chi^2(6) = 18.162, p = 0.0005$) of the null hypothesis that covariance of the error terms across equation not correlated are also rejected. This shows that there are significant joint correlation coefficients of error terms of market outlets choices equation (Table 22). The likelihood ratio test of the null hypothesis of independency between the market outlets choice decision ($\rho_{21} = \rho_{31} = \rho_{41} = \rho_{32} = \rho_{42} = \rho_{43} = 0$) is significant at 1%. Therefore, the null hypothesis that all the ρ (Rho) values are jointly equal to 0 is rejected, indicating the goodness fit of the model. Hence, there are differences in market outlet selection behavior among farmers, which are reflected in the likelihood ratio statistics.

Separately considered, the ρ value (ρ_{ij}) indicate the degree of correlation between each pair of dependent variables. The correlation between the choice for individual farmers (farmers traders) and small fatteners, (ρ_{42}) is negatively correlated and statistically significant at 1% significance level ($p = 0.0000$). This indicates that there is competitive relationship of individual farmer traders and small feedlot operators (Table 21). Even though there was negative correlations between the other market outlets, these correlations are not statistically significant. As illustrated in Table 21 below some of the variables used in the model were significant at more than one market outlets, while some others were significant in one market outlet but not in other outlet.

According to the result obtained from the multivariate probit model, the probability choosing the beef cattle traders' market outlet was influenced by family size, off-farm income, price and accessed to market information.

Family size was positively correlated with choosing of beef cattle traders outlet at less than 5% significance level. This due to the fact that households with larger family size have plenty of labor force to trek beef cattle to the final market.

Off-farm income was negatively correlated with choosing of beef cattle traders outlet at 5% significance level. This indicated that as the households' involved in off-farm income, the probability of the households choosing beef cattle traders outlet was decreased by 62.7% or less likely preferred.

Farmers' accessed to market information was positively correlated with farmers' choosing to beef cattle traders' outlet at less than 1% significance level. This implies that as farmers accessed to market information, the more the farmers likely to selling this outlet. (Mamo and Degnet, 2012) found that unavailability of market information reduces the probability of traders market outlets, and increases the probability of sell to other farmers market outlets. Price paid per head of beef cattle determined the choice of beef cattle traders outlet positively at less than 1% significance level. This implies that a unit increase in price offered for the producers by this outlet would raised the probability of selling this outlet.

The probability of choosing small feedlot operators' market outlet was determined by average selling price, accessed to market information and accessed to extension services. Average selling price determined the probability of choosing small feedlot operators market outlet positively at less than 1% significance level. Farmers' accessed to market information was positively correlated with farmers' choosing to small feedlot operators outlet at less than 1% significance level. Access to extension services also positively determined the probability of choosing small feedlot operators market outlet at less than 1% significance level. This implies that farmer's accessed to extension services was expected to increase the ability of farmers to acquire important market information as well as other related agricultural information which in turn increases farmer's ability to choose the best market outlets for their commodity. (Mamo and Degnet, 2012) found that

agricultural extension services tended to increase the probability of selling live cattle directly to consumers by 15.9 percent compared to the reference traders market outlet. It also positively and significantly determined the choice of other farmers market outlet compared to traders.

The probability of choosing butcheries and hotels market outlet was determined by age of household heads, herd size, accessed to extension services, average selling price and accessed to market information. Age of household head was negatively determined the probability of choosing butcheries and hotels market outlets at less than 10% significance level. This indicated that as the age of the household heads increases by a year, the probability of the households choosing the butcheries and hotels market outlet was lower. Herd size also determined the farmers' likelihood of choosing the butcheries and hotels market outlet negatively at less than 10% significance level. This implies that as the number herd size increases, the households selling to the butcheries and hotels were less likely preferred. Farmers who were sold beef cattle to both auctions and private sales had the highest average herd size than those who were sold to abattoirs (Musemwa *et al.*, 2007).

Average selling price determined the probability of choosing butcheries and hotels market outlet positively at less than 1% significance level. Farmers' accessed to market information was positively correlated with farmers' choosing to butcheries and hotels market outlet at less than 5% significance level. Access to extension services also positively determined the probability of choosing butcheries and hotels market outlet at less than 5% significance level.

The probability of choosing individual farmers market outlet was determined herd size and average selling price. Herd size determined the farmers' likelihood of choosing the individual farmers market outlet positively at less than 10% significance level. This implies that as the number of herd size increases, the households selling to the individual farmers for draught and replacement purposes was more likely preferred. Average selling price also determined the probability of choosing individual farmers market outlet positively at less than 10% significance level.

Table 21. Result of multivariate probit regression

Variables	Market outlets							
	Beef cattle traders		Small feedlot		Butcheries & hotels		Individual	
	(Y1, N=16)		operators (Y2, N= 4)		(Y3, N= 9)		farmers (Y4, N=10)	
	Coef.	P> z	Coef.	P> z	Coef.	P> z	Coef.	P> z
Constant	-0.127	0.910	-0.383	0.714	-0.958	0.494	3.334***	0.004
Woreda	-0.336	0.413	-0.314	0.412	0.0265	0.950	-0.0382	0.916
DMKT	-0.081	0.222	0.035	0.550	-0.0072	0.917	0.0421	0.479
SEXHH	0.373	0.422	0.882	0.72	0.5054	0.365	0.3527	0.395
AGHH	-0.012	0.400	-0.0195	0.174	-0.02072*	0.096	0.00268	0.850
EDUHH	-1.001	0.160	0.3775	0.508	-1.368	0.214	1.0371	0.114
FSIZE	0.196**	0.046	0.0478	0.548	0.0595	0.533	-0.1110	0.169
FINC	-0.00001	0.231	6.64e-06	0.527	3.10e-06	0.812	9.51e-06	0.368
OFFINC	-0.627**	0.052	-0.3364	0.236	0.0132	0.970	0.1892	0.508
TLSIZE	-0.041	0.615	0.0373	0.633	0.102	0.367	-0.0285	0.712
Herd SIZE	0.007	0.622	-0.0010	0.955	-0.0434*	0.086	0.0304*	0.079
CREDIT	-0.210	0.529	-0.212	0.482	-0.226	0.529	0.5420	0.72
AEXT	0.1893	0.537	0.9332***	0.001	0.663**	0.051	-0.0006	0.998
PRICE	0.00014***	0.008	0.4242***	0.005	0.0003***	0.000	0.00008*	0.084
MKTINFO	1.584***	0.002	0.00013***	0.001	0.683*	0.074	0.763	0.121
Number of draws (#)	5							
Observations	120							
log likelihood	-215.32027							
Wald chi2(48) =	259.61							
Prob > chi2 =	0.0000***							

***, ** and * indicates statistical significance level at 1, 5 and 10 percent respectively.

Table 22: Estimated correlation matrix

	ρ_1	ρ_2	ρ_3	ρ_4
ρ_1	1.00			
ρ_2	-0.1673 (0.1638)	1.00		
ρ_3	0.2427 (0.1725)	-0.0916 (0.1674)	1.00	
ρ_4	0.1224 (0.1755)	-0.5967 (0.1087)***	0.0323 (0.1735)	1.00

Likelihood ratio test Ho: $\rho_{21} = \rho_{31} = \rho_{41} = \rho_{32} = \rho_{42} = \rho_{43} = 0$

chi2(6) = 18.162 Prob > chi2 = 0.0005***

*** indicates statistically significant at 1 percent significance level

Source: own computation from survey result (2016)

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Summary and Conclusion

This study was aimed at analyzing beef cattle value chain in Bora and Dugda districts, Oromia Regional State, Ethiopia. Specific objectives of the study were to identifying the main value chain actors and their roles in beef cattle value chain, and map the beef cattle value chain, identifying the major constraints and opportunities in beef cattle value chain, analyzing determinants of market participation, and quantity of beef cattle supply to the market by the small holder farmers and determinants of farmers' beef cattle market outlets choices in the study areas.

Primary data were collected from 120 randomly selected households from Bora and Dugda woredas. 16 traders, 4 small feedlot operators, 9 butcherries and hotels, and 10 individual farmers were selected and interviewed using structured questionnaire from both woredas. Additionally, input suppliers and key informant interview was also conducted. Secondary data which assisted this study were collected from woreda agriculture office, woredas' Livestock and Fishery Resource Office, woredas' bureau of trade and market development, and from published and unpublished materials.

The collected data were analyzed using econometrics and descriptive statistics tools by employing SPSS version -16 and STATA version- 13 software packages. Heckman two-stage econometric model was used to analyze determinants of farmers' market participation decision and quantity of beef cattle supply to the market, and Multivariate probit model was applied to analyze determinants of farmers' beef cattle market outlets choices in the study areas.

The beef cattle value chain map in the study areas consisted main value chain actors were input/service suppliers, producers, beef cattle traders, small feedlot operators, processors (butchers and hotels) and consumers who performs different value chain activities. Service providers at meso-level those provides financial or non-financial support services were Oromia Saving and Credit Share Company and Busa Gonofa Micro finance Providing credit services, woredas' Office of Livestock and Fishery Resource Development deliver

veterinary services, LIVES project have provided different training in order to improve the capacity of the experts and the farmers. Ministry of Livestock and Fishery Resource Development set the policies and regulatory issues like animal health, and facilitating basic infrastructure through woredas' Office of Livestock and Fishery Resource Development and woredas Office of Trade and Industry set commercial registration and business licenses at macro-level or value chain enablers.

The major production constraints which hindering the success of beef cattle value chain in the study areas were feed shortage, feed price increment, diseases outbreak, shortages of veterinary drugs, shortage of availability of water and poor management. Price instability, low price offered for farmers, brokers and less accessed to market information were the major market constraints in the study areas.

Availability of high population of livestock, excess of human labor, existence of crop residue as source of feed, existence of factory by-product concentrate feed, favorable condition for fattening, availability of veterinary services, accessibility are the major beef cattle production opportunities in the study areas.

High domestic demand for beef product (meat) consumption during festivals, social occasions and increasing population growth (urban consumers) may create market opportunities for beef cattle value chain actors in the study areas.

In terms of market channels for producers, producers-to-beef cattle traders, producers- to-small feedlot operators, producers-to-butchers and hotels, and producers-to-individual farmers were the most important beef cattle market channels respectively in the study areas. Selling to consumers was the least important channel used by the producers.

The Heckman first step (probit) result showed that age of household heads, sex of household heads, education level of household heads, Family size, farm income and accessed to market information were the main determinants of market participation. The Heckman two stage (OLS) result showed that distance to woreda market, education level of household heads, land holding size, farm income and access to market information were significantly determined the quantity of beef cattle supply to the market in the study areas.

The result obtained from the multivariate probit model (MVP) revealed that about seven variables (age of household head, family size, off-farm income, average selling price, accessed to market information, accessed extension services and herd size) were found to be statistically significant at different significance level by determining the choice of beef cattle traders, small feedlot operators, butcheries and hotels, and individual farmers beef cattle market outlets. Farmers' choice of the beef cattle traders market outlet was determined by family size, off-farm income, average selling price, accessed to market information. Farmers' choice of small feedlot operators' market outlet was determined by average selling price, accessed to market information and accessed to extension services. The probability of farmers' choosing butcheries and hotels market outlet was determined by age of household heads, herd size, accessed to extension services, average selling price and accessed to market information. The probability of choosing individual farmers market outlet was determined herd size and average selling price.

5. 2. Recommendations

The findings of this study suggested the following recommendations for policy makers, researchers, and other stakeholders who are directly or indirectly involved in the beef cattle value chain. The recommendations or policy implications to be drawn from this study were based on the econometric model results that were significantly determined market participation and quantity of beef cattle supply, and market outlets choices. The study recommended the following suggestions:-

Age was negatively significant meaning that more of the older household heads were participated in beef cattle marketing. Therefore, the government should have support the youths to be participated in beef cattle marketing is crucial. This may create job opportunities for jobless people through earning income from beef cattle trading at different levels. Improving the educated households suggests that providing farmers with basic education might enhance market participation and quantity of supply.

Distance to woreda market was positively related with the quantity of beef cattle supply to the market. So, improving rural road infrastructure could be an important policy

intervention. The income obtained from farm activities was determined both market participation and quantity of beef cattle supply. Therefore, building the capacity of the producers to boosting agricultural productivity to improve market participation, and to produce surplus production is critical. Land holding size has also significance influence on the quantity of beef cattle supplied to the market. Therefore, allocating appropriate land for forage production and crop production is critical since crop residue is the main feed for beef cattle production.

Dissemination of adequate and timely market information to the smallholder beef cattle farmers is very essential to increase the probability that farmers can participate in the beef cattle market as well as the quantity of beef cattle supplied to the market. As policy intervention building the capacity of the farmers on how to use market information (eg. price information and price determination, market requirements and seasonality of beef cattle supply to the market) is necessary.

Accessed to market information and average selling price were the key determinants of farmers' market outlets choices. Therefore, these variables should be promoted and get particular attention. In order to obtain appropriate price improving beef cattle productivity is important. As policy intervention setting uniform beef cattle market pricing is essential. Additionally, setting measurements standards is also important because there is no settled measurement standards like weight based transaction. Mostly, the beef cattle transaction are marketed based on eye boll (body condition, color, age, etc.,). The provision of market information will strengthen farmers' negotiating ability during transactions with traders and consequently prevent the possible exploitation of farmers by better-informed buyers.

Access to extension services is important in increasing the ability of farmers to acquire relevant price information and related production information which, in turn, increases production and farmer's ability to choose the profitable market channel. Therefore, the government should have strengthen the farmers' access to extension services like improving productivity of beef cattle through providing of improved breeds, feeds, water, healthy management, and building the capacity of the farmers on the value addition or upgrading of beef cattle value chain and beef cattle market requirements.

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7. APPENDICES

7.1. Appendix 1: Tables

Appendix Table 1: Conversion factor used to compute tropical livestock unit (TLU)

No.	Livestock Type	TLU (Tropical Livestock Unit)
1	Calf	0.25
2	Weaned calf	0.34
3	Heifer/Bull	0.75
4	Cow/Ox	1.00
5	Horse/Mule	1.1
6	Donkey (adult)	0.7
7	Sheep/Goat (adult)	0.13
8	Camel	1.25
9	Chicken	0.013

Strock *et al.*, 1991

Appendix Table 2: Purpose of receiving credit

Variables	Bora woreda (N=53)		Dugda woreda (N=67)	
	N	%	N	%
Farm input purchase	10	18.86	27	40.29
Livestock purchase	4	7.54	9	13.43
Household Consumption	1	1.88	1	1.49
Land rent	2	3.77		
others	1	1.88	1	1.49

Appendix Table 3: Nature of Credit problem

Variables	Bora woreda (N=53)		Dugda woreda (N=67)	
	N	%	N	%
Few supply	11	20.75	9	13.43
High interest rate	6	11.32	5	7.46
Restrictive procedure	1	1.88	6	8.95
Lack of awareness	1	1.88		

Appendix Table 4: Expanding Producers beef production and business

Variables	Bora woreda (N=53)		Dugda woreda (N=67)	
	N	%	N	%
Yes	34	64.15	49	73.13
No	11	20.75	17	25.37

Appendix Table 5: Expanding beef business (Traders)

Variables	Bora woreda (N=9)		Dugda woreda (N=16)	
	N	%	N	%
Yes	9	100	15	93.75
No			1	6.25

Appendix Table 6: The reasons for farmers to select a given actors

Variables	Freq	%
Price difference	75	84
Closeness in distance	14	16

7.2. Appendix 2: Interview Schedule

Checklist for Beef Value Chain Analysis in *Bora* and *Dugda* Districts

Instructions for Enumerators:

- ❖ Make brief introduction before starting any question, introduce yourself to the farmers, greet them in local ways and make clear the objective of the study.
- ❖ Please fill the interview schedule according to the farmers reply (do not put your own feeling).
- ❖ Please ask each question clearly and patiently until the farmer gets your points.
- ❖ Please do not use technical terms and do not forget local units.
- ❖ During the process write answers on the space provided.
- ❖ Prove that all the questions are asked and the interview schedule format is properly completed.

Checklist for Farmers (Producers interview schedule)

Name of District _____

Name of Peasant Association _____

Name of household head (respondents name) _____

Enumerator name _____

Signature _____

Date of Interview _____

Distance of respondent residence from the nearest market place _____ km

I. Respondents' general household information

1. Sex of house hold head	1= Male 0= Female
2. Age of household head in years	
3. Religion of respondent	1. Muslim 2. Orthodox 3. Catholic 4. Protestant 5. Other (specify) _____
4. Educational level of the household head Grade _____	1= Formal, 0= otherwise
Marital status	1= Married 2= Single 3= Widowed 4= Divorced

Family size_____

Sex category	<15 years	15 to 65 years	>65 years
Male			
Female			
Total			

II. Resource ownership

Land holding and Farming characteristics

1. What is the area of your total land _____ ha
2. What is total area of rented in land_____ ha , rented out land _____ha
3. What is the area of shared in land _____ ha , Shared out land _____ha
4. Have you grazing land? 1=Yes 0= otherwise
5. If No. 4 is 'yes' what is the size of grazing land? _____ha
6. For how years are you keeping/producing beef cattle? _____year
7. For how many years you are participating in beef cattle sell? _____year
8. How far is your residence place from market place where you sale beef cattle? _____km
9. Do you have livestock? 1= Yes 2=No
10. If Q9 is "Yes" proceed to the next table

Types Livestock	Number
Oxen	
Cow	
Bull	
Heifer	
Calf	
Sheep	
Goat	
Horse	
Mule	

Hen	
Donkey	

III. Farm income

- What is your major means of income generation? (Rank in order of importance) 1= vegetable production 2= Cereal production 3= pulses production 4= livestock production 5= livestock trading, 6= vegetable trading 7= grain trading 8=Off-farm income 9=Others (specify) _____
- Estimate of annual cash income from
 - Sale of crops ____Birr/year
 - Sale of livestock ____Birr/year
 - Sale of livestock products (milk, butter, egg,...)_____Birr/year
- Do you have other income sources other than agricultural outputs? 1=yes, 0=No (if "yes" proceed to the following table)

Income source	Estimated annual income	Who are responsible (*)
Daily labour		
Petty trade		
Hand craft		
Fire wood sale		
House rent		
Employment		
Remittance		
Others (specify)_____		

*1=husband 2=wife 3= son 4=daughter

1. Production

- How is the trend of volume of beef cattle production during the past 5 years? 1= Increasing 2= Decreasing 3= Same

1.2. If the production increases, what are the reasons? _____

1.3. If the production decreases, what are the reasons? _____

1.4. what types of breeds you use? 1= Local 2= Improved 3= Both

1.5. what problems are you have ever encountered with the use of improved breeds? _____

—

1.6. What are the major beef cattle production constraints?

No.	Constraints	1= Yes 2= No	Rank (according to importance) 1=low 3=high
1	Shortage of grazing land		
2	Feed shortage		
3	Shortage of veterinary (drugs, vaccine..etc)		
4	Disease problem		
5	Shortage of availability of water		
6	Shortage of other inputs		
7	Poor management (shelter, breeding)		
8	High price of inputs		
9	Others _____		

2. Inputs/services

2.1 Have you ever used agricultural inputs (improved breeds, veterinary medicine, vaccine, improved forage seeds, chemicals etc)? 1= Yes 2= No

2.2 If your answer for **Q 2.1** is "No" what was the main reason behind? _____

2.3 If your answer for **Q 2.1** is "Yes" Who is the main supplier of the following inputs/services: own, government, coop, traders?

	Supplier (source) 1= own, 2=government, 3= coop, 4= traders	Proportion of farmers getting from this source
AI		
Bull service		
Feed		
Veterinary drugs		
Veterinary services		
Credit		

2.4 . How did you get the input from the mentioned sources? 1= Through purchase 2= on credit bases 3= As gift 4= Others (specify)_____

2.5 . Do you always get inputs/services at the right time? 1=Yes 2=No

2.6 . If your answer for **Q2.6** is "No", what are the reasons? 1= Unavailability 2= Far distance 3= others(specify)

2.7 . Do you always get inputs/services in the quantities that you need? 1=Yes 2=No

2.8 . If your answer for **Q2.7** is "No", what are the reasons? 1= Not available on time 2= I am not sure of the benefit 3= Too expensive 4= Cash shortage 5= others (specify)

2.9 For each of the following inputs/services are you incurred the costs? Yes=1 No=0

Cost components	Yes=1 No=0	Amount of costs (ETB)
AI		
labor		
Transport cost		
Bull service		
Trekking cost		
Feed cost		
Vet drugs		
Vet services		
Others (specify)		

III. Credit services

1. Do you have access to credit? Yes=1, 0= No
2. If yes, have you received credit in cash last year? Yes=1, 0= No
3. If Q2 is yes, how much it was?_____ Birr
4. If Q2 is yes, for what purpose you used? 1= Farm inputs purchase, 2=Livestock purchase, 3= HH consumption, 4= Land rent, 5= Others Specify_____

5. From where did you get the credit service? 1= Cooperative, 2=Micro finance, 3= NGOs, 4=Local money Lender, 5= Saving and credit Association, 6= Others (specify)_____
6. If answer for Q2 is no, why? 1= High interest rate, 2= No need, 3= Lack of Collateral, 4=Fear of inability to repay, 5=No service, 6=Others (specify)_____
7. What was the precondition to get credit? 1. Membership 2. Personal guarantee 3. Land holding 4. Collateral 5. Partial payment 6. Others (specify)_____
8. Do you have any problems in getting credit? Yes =1 No =0
9. If yes, what is the nature of your credit problem(s)? 1. Few supply 2. Inadequacy of credit 3. No diversification 4. Absence of informal sources 5. Unfavorable repayment time 6. High interest rates 7. Restrictive procedures 8. Others (specify)_____

IV. Extension and Information Services

1. Did you have an extension contact? Yes =1 No =0
2. If yes how frequently do you meet extension agent? 1. Daily 2.Weekly 3. Monthly 4. Rarely
3. Have you ever received any training on beef production and marketing? Yes=1 No=0
4. If yes, what types of training topic in the following table?

No.	Type of training	1. Yes 2. No	By whom(*)	How many times
1	Fattening practices			
2	use of inputs			
3	Use of cooperative			
4	Use of credit			
5	livestock management			
6	Forage Seed production			
7	Marketing of live animals/livestock products			
8	Field days/demonstration			

*1. Research Centre 2. Bureau of agriculture 3.University 4. NGOs 5.Others (specify)_____

3 Marketing

1. Did you sell beef last year (2007/8)? 1=Yes 0=No
2. If Q1.is yes, how much and to whom did you sell? (More than one answer is possible)

Cattle type	Amount of herd owned (No.)	Amount sold (No.)	*To whom (use code)
Oxen			
Cow			
Bull			
Heifer			
Calf			

*1=collectors 2=Small traders 3=Wholesaler 4=Cooperatives/Unions 5=brokers
6=live animal exporters 7= processors/butcheries 9= Big traders 9=final consumers (hotels and restaurants) 10= Others (specify)

3. To whom do you usually want to sell? _____ (choose from above)
4. Reason for selling to the selected actor? 1. Price difference from others 2. Closeness in distance 3. Transport availability 4. Others (specify)_____
5. Where do you sale/market place? 1. on farm 2. woreda market 3. Zonal market
6. Type of beef cattle usually sold? 1= male 2= female 3= Both
7. What breeds are used? 1= Local 2= Improved 3= Both
8. Is there a difference in price due to differences in place of sale and the type of buyer?

1/Yes 2/No

9. If yes, indicate the price when the commodity is sold to different actors and in different places (the following table)

Place of sale	Price when the commodity is sold to:								
	Collectors	Small traders	Big traders	Wholesalers	Cooperative/union	Processors/butcheries	Exporters	Brokers	Hotel and restaurants
On the farm/farm gate									
Woreda market									
Zonal Market									

10. Do you consider quality requirement of your customers in your beef production processes? 1=Yes 2= No

11. If your answer for **Q.10** is Yes, what quality requirement do you consider? _____

12. With whom commercial value chain actors you are more linked? (Multiple response is possible) 1= Coop/union 2= Whole sellers 3= Consumers 4=Brokers 5= Collectors 6= Live animal exporters 7=Others(specify)_____

13. Do you want to expand the beef cattle production and business? 1=Yes 2= No

14. If **Q13** is "Yes", why? _____

15. If **Q13** is "No", why? _____

16. Marketing constraints

No.	Constraints	1. Yes 2. No	Rank according to Severity of problem (1= low 3=high)
1	Low price		
2	Less/no market information		
3	High cost of inputs		
4	Price instability		
5	Market infrastructure		
6	Lack of market transport		
7	Illegal traders		
8	Distance to market center		
9	Others (specify)		

14. Average return of beef cattle (2015/2016)

Beef type	Selling price	Total cost (Birr/head)				
		Transport	Broker	Dead animal	Tax	Other cost
oxen						
cow						
Bull						
Heifer						
Calf						

V. Transportation

1. How do you transport the animals (mode of transportation)? 1= Truck 2= Man power (Trekking) 3= others (specify)_____

2. How far do you travel to reach market to sell your beef cattle? (_____km)

VI. Market Information

- Do you get market information? Yes=1 No=0
- If yes, who is the major source of market information? 1=Traders 2= Friends/neighbors 3= Development Agent 4= Others (specify) -----

- What type of information did you get? 1= Price information 2= Market place information 3= Buyers information 4= others (specify)_____
- At what time interval do you get the information? 1= Daily 2= Weekly 3= Monthly 4= other(specify)
- Was the information you get is valuable? 1= Yes 2= No
- Did you know the nearby beef market price before you sold? 1= Yes 2= No
- Did you face difficulty in finding buyers when you wanted to sell beef? 1=Yes 2=No
- If your answer for Q.7 is Yes, due to: 1= Inaccessibility of market 2= Lack of market information 3= Low price offered 4= Others(specify)

VII. Membership in Cooperatives;

- Are you a member of farmers cooperative? 1. Yes 2. No
- If yes, what is the name of cooperative? _____

3. Why you joined the cooperative?
1. The cooperative provide better price
 2. The cooperative try to hold the cost down
 3. Provide guaranteed outlet (market)
 4. Give service or technical assistance
 5. Others (specify)_____

VIII. Gender

1. During selling beef cattle, who will decide? 1. Only husband 2. Only wife 3. Both husband and wife through discussion 4. Others (specify) _____
2. Who will manage the finance after selling? 1. Husband 2. Wife
3. Who is responsible for taking feed for the beef cattle from your family? 1. Husband 2. Wife 3. Both 4. Others (specify) _____

IX. Price of the commodity

1. What is the trend of beef cattle price for the past five years? 1. Increasing 2. Decreasing 3. Stable
2. If increasing, why?_____
3. If decreasing, why?_____
4. Would you like to expand beef selling? 1=Yes 2= No
5. If your answer for **Q.4** is Yes, why? _____
6. If your answer for **Q.4** is No, why_____
7. Who decides on price during selling? 1. Traders 2. Producers 3. Brokers 3. Negotiation of farmers with traders 4. Others (specify) _____
8. If broker/middlemen negotiates on price, who will pay for him? 1. Farmer 2. Trader 3=Both

Checklist for Traders

1. Name of the Trader _____ Tel: _____
 2. District _____ Kebele _____
 3. Age _____ Sex _____ 1. Male 2. Female
 4. Marital status 1. Married 2. Single 3. Divorced 4. Widowed
 5. Family size _____: Male _____ Female _____
 6. Type of business: 1) Wholesaler 2) Big Traders 3) Small traders 4) live animal Exporter 5) collectors 6) Feedlot operator 7) Brokers 8) Cooperatives 9) Butcheries 10) Domestic consumers (hotels and restaurants) 11) others (specify) _____
 7. Level of education of respondent _____
 8. Position of respondent on the business: 1. Owner 2. Spouse of owner 3. Employed manager 4. Relative of business owner 5. Others (Specify) _____
 9. How long have you been operating the business? _____ years
 10. Did you trade alone or in partnership? 1= Alone 2= Partnership 3= other (specify) _____
 11. If partnership, how many are you in joint venture? _____ persons
 12. Total number of peoples employed in your business:
- | | Male | Female | Total |
|-------------------|------|--------|-------|
| Family member | | | |
| Non family member | | | |
| Total | | | |
13. Do you participate in beef trading year round? 1= Yes 2=No
 14. If your answer to **Q.13** is No, at what period of the year do you participate?
1=When purchase price becomes low 2= During high supply 3=Other(specify)
 15. Do you practice trading other than beef? 1= Yes 2= No
 16. If your answer to **Q.15** is Yes, what? _____
 17. Number of market days in a week? _____

18. What was the amount of your initial working capital when you start this business?
_____birr.

19. What is the amount of your current working capital? _____ birr.

20. What is your source of working capital? 1=Own 2= Loan 3= Gift 4= Share 5= Others (specify)

21. If it was loan, from whom did you borrow? 1= Relative/family 2=Private money lenders. 3= NGO (specify) 4= Friend 5= Other traders 6=Micro finance institution 7=Bank 8=Others

22. How much was the rate of interest? _____ birr for formal, birr for informal_____

23. What was the reason behind the loan?_____

24. How was the repayment schedule? 1=Monthly 2=Quarterly 3=Semi-annually 4=When you get money 5= Others (specify)

25. Is there change in accessing finance these days? 1= Improved 2= Deteriorated 3=No change

26. Do you carry out any physical treatment to maintain product quality? 1= Yes 2=No

27.If your answer to **Q.27** is Yes, mention;_____

28. Are there entry barriers in beef trading? 1=Yes 2=No

29. If your answer to **Q.28** is yes, what are the reasons? 1=Capital 2= Information collusion 3= Administrative problems 4= Stiff competition with unlicensed traders 5= High monopoly with prior control of farmers 6= Other (specify)

30. Linkage with commercial value chain actors: (Multiple response is possible) 1= Farmers 2= Retailers 3= Whole sellers 4= Consumers 5= Local collectors 6=Brokers 7=Others(specify)_____

2. Purchasing Practices (Buying)

1. Who are the major suppliers of beef cattle for you? 1. Farmers 2. collectors 3. Brokers 4. wholesalers 5. Small traders 6. Cooperatives/Unions 7. Big traders 8)other (specify)_____

2. If farmers are the major suppliers, where does the transaction take place? 1. Farm gate 2.Woreda Market place 3) Zonal market 4) other (specify)

3. From which market do you prefer to buy most of the time? 1. Farm gate 2.Woreda Market place 3) Zonal market 4) other (specify)

4. Why do you prefer this market? 1= Better quality 2=High supply 3=Shortest distance 4=Others (specify)

5. Are all your purchasing centers accessible to vehicles? 1= Yes 2=No.

6. If your answer to **Q.5** is No, what proportions are accessible? _____ %
7. In which months does the demand/supply for beef increases/decreases?

	January	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec
High demand												
Low demand												
High supply												
Low Supply												

8. Who sets the purchase price? 1=own self 2= Set by demand and supply 3=Sellers
4=Other (specify)_____

9. Who purchase for you? 1= Myself 2=Broker 3= Commission agent 4= Family members
5= Friends 6=Others
(specify)_____

10. Quantity purchased and Average buying prices for different types of beef cattle 2015/16?

Cattle type	Quantity purchased(No.)	Average buying price (Birr/head)
Oxen		
Cow		
Bull		
Heifer		

11. Do you consider quality requirement in purchasing activities? 1= Yes 2= No

12. If **Q11** is "Yes" what quality parameters to be considered when buying beef cattle?
1=Body condition 2= Color 3= other (specify)_____

13. Do you transfer information on quality considerations to your suppliers? Yes=1 No=2
If "yes" what types of quality you considered?
specify_____

—

14. Is your purchasing price higher than your competitors? 1= Yes 2=No

15. If your answer to **Q.14** is Yes, what was the reason? (Multiple answer is possible);
1=To attract suppliers 2= To buy more quantity 3= To get better quality 4= Others
(specify)_____
16. Do you have long standing customer with your suppliers? 1 =Yes 2=No
17. If **Q19** is "Yes", How many regular suppliers do you have? 1=Producers _____,
2=Collectors _____, 3=Brokers _____, 4=Wholesalers _____, 5=Small traders
_____, 6=Big traders, 7= others (specify)_____
18. Do you provide premium prices for their permanent suppliers? Yes=1 No=2
19. If yes, how much (what percent of the price)?_____Birr
20. How many on an average you buy weekly beef in the low supply season? _____How
high supply season? _____
21. Have you ever stopped purchasing due to lack of fund? 1=Yes 2=No
22. If your answer to **Q.21** is Yes, for how long _____years
23. Is obtaining sufficient amount is a problem? 1=Yes 2=No
24. Have you ever stopped purchasing due to lack of supply?1=Yes 2=No
25. If your answer to **Q.24** is Yes, for how long_____

3. Selling

1. To whom do you sell the commodity (beef)? 1= Export Abattoirs 2= Wholesalers
3= Live animal Exporters 4=Hotels and Restaurants 5= Big traders 6= Feedlot
operators 7=other (specify)_____
2. Where do you sell beef? 1= woreda market 2= Zonal market 3= other
(specify)_____

3. Quantity sold and Average selling prices for different types of beef cattle 2015/16?

Cattle type	Quantity sold(No.)	Average selling price (Birr/head)
Oxen		
Cow		
Bull		
Heifer		

4. Do you have longstanding customers for selling beef? Yes =1 No=2
5. If **Q4** is "Yes", How many regular buyers do you have? 1= Export Abattoirs 2=
Wholesalers

3= Exporters 4=Hotels and Restaurants 5= Big traders 6= other
(specify)_____

6. When did you sell? 1= Fattening and when price rises 2= As soon as the purchased
3=other (specify)_____

7. Do you sell on credit? 1/Yes 2/No

8. If **Q7** is "Yes" For how long do you wait the payment?_____

9. What relations you have with buyers? 1= No relations 2= Acquaintance 3= Friend 4= Relative

10. Do the buyers have set specific criteria for your commodity (beef)? Yes=1 No=2

11. If **Q10** is "Yes", What are the requirements of buyers in terms of quality? 1= Body condition 2= Color 3= other (specify)_____

11. Do you know the market prices in different markets (on farm, woreda market, zonal market and other areas) before you sold your commodity (beef)? 1=Yes 2= No

12. What is your source of information? _____

13. Who sets selling price? (1= Myself 2= Set by demand and supply 3= Buyers 4=Other (specify) _____

14. How do you consider the trend in availability of beef/volume of marketed in the market you operated? 1/increased 2/decreased 3/same

15. Reason for such a trend?_____

16. Do you want to expand your trading or business? 1= Yes 2=No

17. If your answer to **Q.16** is Yes, why?_____

—

18. If your answer to **Q.17** is No, why?_____

—

19. Are there problems in beef marketing? 1= Yes 2= No

20. If **Q19** "Yes", what are the problems

Problems	1= Yes	2= No
Credit		
Price setting		
Supply shortage		
Information flow		
Lack of demand		
Quality problem		
Government policy		
Lack of government support		
Illegal trade		
Other (specify)		

4. Transportation

1. How do you transport beef cattle?_1= Isuzu truck 2= Man power(Trekking) 3= other (specify)

2. If you are transporting cattle using Isuzu trucks, how many cattle can you transport in one load?_____

3. What is the maximum distance that you trek cattle? _____km

5.Costs

Indicate all costs you incur for marketing the commodity (beef) including taxes, transportation, labor, feeding, veterinary costs;

Cost of marketing	Unit	Cost per unit	Remarks
Feed cost			
Vetnary cost			
Labor cost			
Market search cost			
Transport cost to port			
Trekking cost			
Trucking cost (Isuzu)			
Loading/unloading cost			
Total tax payment			
Payment to buying agent			
Payment to selling agent			
Payment to guard/feeder			
Telephone cost			
Other cost (specify)			

6. Marketing services

1. Is beef cattle trading in your locality needs a trading license? 1=Yes 2= No
2. If your answer to **Q.1** is Yes, how do you see the procedure to get the license? 1= Complicated 2= Easy
3. Did you have trade license? 1=Yes 2= No
4. How much did you pay for beef trade license for the beginning? _____birr
5. How much is the yearly renewal payment? _____birr
6. Are you restricted by Woreda or administrative boundary to operate? 1= Yes 2= No
7. Are there restrictions imposed on unlicensed beef traders? 1=Yes 2=No
8. Did you fatten before you sold? 1= Yes 2=No
9. If your answer to **Q.8** is Yes, for how long did you fatten beef? _____week/Month
10. Are you organized in any of the following organization? (Multiple response is possible)

Organization	1= Yes 2= No	If yes, what is the name of the organization?	Benefits (write codes)*	Option for benefit
Social association (iqub, idir etc)				1. Accesses to credit 2. Encourage to save
Market cooperative/farmers cooperative				3. Facilitate joint marketing 4. Got market information
Trade association				5. Coordinate purchase and sale

Checklist for Consumers

1. Name of the Consumer _____ Tel: _____
2. District _____ Kebele _____
3. Age _____ Sex _____ 1. Male 2. Female
4. Marital status 1. Married 2. Single 3. Divorced 4. Widowed
5. Family size _____: Male _____ Female _____
6. Education level of the respondent : 1) No formal education 2) 6th grade or less 3) 7th to 12th grade 4) Certificate 5) Diploma 6) Degree and above
7. What is your major means of income generation? 1=Farming 2=Trade 3= Employment 4=Others (specify) _____
8. Please estimate your income _____ birr/week/Month
9. Is meat consumed in your family? 1=Yes 2= No
10. Experience in meat consumption? _____ years
11. what is the proportion of your income used for purchase of beef product?
12. If no consumption of beef product, why? _____
13. Do you consider any quality requirements to purchase meat? 1= Yes 2= No
14. If yes, what quality requirement do you consider? _____
15. What are the constraints hindering consumption of beef product or meat? 1= supply shortage 2=Income shortage 3= High price 4= Lack of Market information 5= others (specify) _____

III. Checklist for Key Informants Interview

1. Name of the organization: _____
2. Role of the interviewee in the organization _____
3. Woreda _____ telephone _____
4. Type of the organization: public/private/NGO _____
5. Organizational mission, vision and objectives? _____
6. What is your role in beef production and marketing? _____

7. Describe beef production and marketing system in your area? _____

8. What are the major challenges and opportunities in beef production? _____

9. Who are the major actors in beef markets in the area? _____

10. The characteristics of each of these actors? _____

11. Linkage /interaction between actors? 1. weak 2. good 3. very good 4. no relation
12. What are the major challenges and opportunities in the marketing of beef? _____

13. How can these problems be resolved? _____

IV. Checklist for Key input suppliers Interview

1. Name of business: _____
2. location: _____
3. What beef related products/services do you stock?
 - a. Feed items
 - b. Animal insemination and veterinary services
 - c. Other physical inputs
 - d. Financial services
 - e. Other specify _____
4. what major operational challenges do you encounter in running the business?

1. _____	4. _____
2. _____	5. _____
3. _____	6. _____
5. What marketing challenges do you encounter in selling the input materials/services to the beef related farming?

1. _____	4. _____
2. _____	5. _____
3. _____	6. _____
6. What is the average gross margin for these products/services?
 - a. Total revenue earned _____ birr
 - b. Total costs incurred _____ birr
7. What are your source of finance? _____
8. What financial challenges you encounter? _____
9. What assistance (financial, operational and marketing) would you need to increase/expand your business? _____
- _____
- _____
- _____

V. Checklist for Key cooperative/union Interview

1. What roles do you play in the supply of inputs for beef production the area?
2. Challenges in beef input supply?
3. Do you have member primary cooperatives that are involved in production of beef production/fattening? 1. yes 0. no
4. If yes? What supports do you provide to these cooperatives?
5. Does your cooperative union involved in beef marketing? 1. yes 0. no
6. If yes, how do you see competition in this market?
7. If yes, what challenges have you faced so far and how did you overcome it?
8. What can the cooperatives/Unions contribute in the effort to resolve these problems?
9. What supports do you need to be strong actor in beef marketing?

THANK YOU FOR YOUR PATIENCE AND TIME ALLOCATION
TO RESPOND!