

**COMMERCIAL VIABILITY OF BEEF CATTLE PRODUCTION: A CASE
OF TRADITIONAL FEEDLOTS IN LAKE ZONE, TANZANIA**

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**A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY OF THE OPEN
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2017

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by Senate of The Open University of Tanzania a Thesis titled: **“Commercial Viability of Beef Cattle Production: A Case of Traditional Feedlots in Lake Zone, Tanzania.”** in fulfilment of the requirements for the Degree of Doctor of Philosophy of The Open University of Tanzania.

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.....

Signature

.....

Date

DEDICATION

This thesis is dedicated to my husband Jacob Peter Semiono and my daughter Norah Jacob Semiono as well as my parents and to all smallholder traditional feedlots' operators in Tanzania.

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First of all, I would like to express my sincere thanks to the Almighty God who created me and made me the way I am today. He granted me this opportunity and enabled me to conduct this study up to its fruition. I would also like to express my heartfelt gratitude to Higher Education Students' Loans Board (HESLB) for granting me loan (Tuition fee) and Tanzania Commission for Science and Technology (COSTECH) for financially supporting my research. Thanks to the Open University of Tanzania (OUT) for granting me permission to study for PhD.

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ABSTRACT

Commercialization of traditional beef cattle production in Tanzania has been a great concern for improving beef cattle production in recent years. The assessment of profitability, value chain addition, possibilities of marketing transformation into contract farming and socioeconomic contribution of feedlots to feedlots operators was crucial. The study adopted across sectional study conducted in Mwanza and Kahama districts due to having large numbers of cattle, being drought prone and large numbers of feedlots operations. Data were collected quantitatively using 119 questionnaires and qualitatively using interview and twenty eight, (28) Focus Group Discussions (FGD) tools. The quantitative data were analysed descriptively and statistically with multiple linear regression model, and Data Envelopmental Analysis (DEA). It was revealed that all respondents were men aged from 16-66 years old with majority having completed primary education; owning cattle ranging from 1 to 140. Majority (85.7%) of feedlots operates at profit of CBR =1. Government support, infrastructures and skills & capacity influence profitability of TBCF negatively at ($r = -0.016$), ($r = -0.048$) and ($r = -0.058$) respectively while markets & marketing influences positively at ($r = 0.033$). Majority (95%) of operators sell live cattle in cash and receives market information through cell phone calls their colleagues and customers. The beef cattle are sold through four (4) channels and CF is not practised in marketing. It was concluded that there is a room for commercialization of TBCF with some attention of improving profitability, marketing and adopting CF innovations. The study recommends that the joint efforts from different stakeholders are crucial.

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LIST OF ABBREVIATIONS

ADG	Average Daily Gain
AMS	American Marketing Association
BMC	Botswana Meat Commission
CBA	Cost Benefit Analysis
CBPP	Contagious Bovine Pleuropneumonia
CBR	Cost Benefit Ratio
CF	Contract farming
COSTECH	Commission for Science and Technology
CTA	Technical Centre for Agricultural and Rural Cooperatives
DEA	Data for Envelopment Analysis
DMU	Decision Making Unit
EAZ	East African Zone
FC	Farmers' Cooperation
FGD	Focus Group Discussion
FMD	Foot Mouth Disease
FE	Feed Efficiency
HESLB	Higher Education Student's Loan Board
IBGE	Institute of Brazilian Geography and Statistics
ICA	International Cooperative Alliance
IDRP	Integrated Rural Development Programme
IDR	India Depository Receipt
IFAD	International Fund for Agriculture Development

LP	Linear Programming
LRPI	Livestock Research Production Institute
MALD	Ministry of Agriculture and Livestock Development
MC1	Marketing Channel One
MC2	Marketing Channel Two
MC3	Marketing Channel Three
MC4	Marketing Channel Four
MLD	Ministry of Livestock Development
NARCO	National Ranching Company
NCES	National Centre for Education Statistics
NSCA	National Sample Census for Agriculture
OUT	Open University of Tanzania
PSDP	Private Sector Development Programme
SACCOS	Savings and Credits Cooperatives Society
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SES	Socioeconomic Status
SFA	Stochastic Frontier Analysis
SME	Small and Medium Enterprises
SPSS	Statistical Package for Social Science
SWOT	Strength Weakness Opportunity and Threats
TBC	Traditional Beef Cattle
TBCF	Traditional Beef Cattle Feedlots
TR	Total Revenue
TSZ	Tanzania Shorthorn Zebu

TV	Television
TVC	Total Variable Cost
UNIDO	United Nations Industrial Development Organization
URT	United Republic of Tanzania
USA	United States of America
USDA	United States Department of Agriculture
VICOBA	Village Community Banking Association

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Commercial viability is the possibility of a business to exist, be profitable and grow (SME Toolkit, 2016), through a process of commercialization. Commercialization of traditional beef cattle production in Tanzania has been great concern of improving beef cattle production in recent year. However it has been hampered by many factors, one of which is the traditional practice which constituted largest proportion (98%) of the national cattle herd while the commercial ranching accounts for only about 2% of the total cattle herd, which is practiced mainly by National Ranching Company (NARCO). Beef cattle production was for subsistence until the mid of 16th Century where the production pattern changed to commercial following the various drives includes the effect of economy which creates various drives towards it (Rhoades, 2009). The transformation of traditional beef production through modernized traditional feedlots has been regarded by many as one of ways through which viability in commercializing the subsector can be realizable and scaled up.

In Tanzania for so long time livestock production including beef cattle production in has been taken as the cultural and to some extent economic practices. That is, this practice is done in some societies as prestige, rituals and fulfilling household welfare. Despite the fact that, there is an increase of cattle production from 12.5 million in 1991 to 18.8 million in 2007 (MLD 1991: 2007), the traditional system of production is a dominant sector. More than 90% of the national cattle herd is found in the traditional sector, in which over 95% of the cattle originate from the small East

African Zebu (EAZ) known as the Tanzania Shorthorn Zebu (TSZ) (Rushalaza *et al.*, 1992). According to Ngowi *et al.*, (2008,) about 95% of the indigenous breeds are kept under the agro-pastoral farming system, where the farming community is comprised of sedentary farmers who combine crop production with livestock keeping for sustenance of their livelihoods. The strains under TSZ include; Iringa Red, Maasai, Mkalama Dun, Singida White, Mbulu, Gogo, Chaga, Tarime and Pare (Mkonyi *et al.*, 2003).

Moreover the main focus of traditional cattle production systems were mainly on the subsistence and social cultural fulfilments as documented by Rege and Gibson, (2003) in Ngowi *et al.*, 2008) were production of milk and meat for subsistence, supply draught power and manure for cropping and provide fibre, skin and transport and sales of livestock provide farmers with cash to purchase household necessities and farm inputs. This was also documented by another study done in Tarime by Ngowi *et al.*, (2008) where the purposes for keeping cattle were to provide milk for home consumption (89.2%), draught power (72.5%), meat for home consumption (66.7%), dowry payment (50.8%), source of income (40%) and savings and security against future uncertainties (23.3%). Provision of draught power and dowry payment were ranked first and second purposes of keeping cattle in the highland zone of Tarime that include Muriba and Kemambo wards while in the lowland zone(Manga and Kisumwa wards) dowry payment was more important compared to draught power.

The underdevelopment of livestock production sector in Tanzania was due to the following challenges; poor animal nutrition, animal diseases, water shortage, low

genetic potential of the indigenous cattle (LPRI, 1986; 1991), and their entire dependence on seasonality in availability of grazing pasture and water (Niboye, 2010). More challenges that prevailed the traditional beef production system as documented by (MLD, 2009) were poor extension systems as well as lack of appropriate market information and limited access to markets leads to low productivity and economic value. These contributes to the production of low quantity and quality meat which is locally consumed at low price and make the farmers being excluded from regional and international market. A lot of efforts have been made in order to overcome the above mentioned constraints so as to improve cattle production in Tanzania nationally and locally. For example the research emphasis during the early years of the century was mainly to combat cattle disease, a threat to the livestock industry. Cattle diseases including Rinderpest, Foot and Mouth disease (FMD), Contagious Bovine Pleuropneumonia (CBPP) and Trypanosomiasis were killing thousands of cattle especially in the southern part of the country (LPRI. 1983). Despite of the mentioned efforts, the livestock production sector in Tanzania lagged behind and contributes less in national income compared to other sub-Saharan African countries like Sudan. Livestock sector has been gradually progressing in contribution to total agricultural exports from 5.46% in 1972 to 47% in 2009 (Policy brief, 2013), whereby great bulk of all livestock production possibly 90% of the total comes from small holders and migratory producers (Behnke, 2012).

In Tanzania emergence of TBCF as a coping strategy to drought season where many cattle died due to lack of pasture and water initially was another effort to improve beef cattle production regardless of seasonality (Mlote *et al.*, 2012). It later gained its

popularity due to increased demand for quality and quantity of meat. Opportunities are abundant resulting from the expansion of tourism and mining industries in the country and the general increase in income especially in urban areas calls upon the scaling up of beef cattle production (commercialization).

Commercialization of agriculture refers to a process of increasing the proportion of agricultural production that is sold by farmers. It can take many different forms by either occurring on the output side of production with increased marketed surplus or occur on the input side with increased use of purchased inputs (Pradhan *et al.*, 2010). Agricultural commercialization and investment are recognised as the key strategies for promoting accelerated modernization, sustainable growth and development and, hence, poverty reduction in the sector (Agwu *et al.*, 2012). Commercialization of agriculture goes further in taking profit motive as an integral part of it i.e. profit maximization (Hagos *et al.*, 2016). Thus is to say there are various dimensions of studying commercialization including; increased market sales, improved quality of the markets' goods, increased farmer's income and profit maximization and expansion of productivity (investment).

The study on commercialization of livestock sector in Tanzania is crucial as commercialization is described as a pillar of household livelihoods (Von Braun *et al.*, 1994); a cornerstone of rural development and poverty reduction (Pender and Alemu, 2007) and an indispensable pathway to economic growth (von Braun *et al.*, 1994). This implies that commercialization's ultimate purpose is poverty alleviation and economic development through income growth. The subsistence oriented smallholders have the greatest need to commercialize to satisfy growing demand and

partake in the resultant income-mediated benefits (Okello *et al.*, 2012). This process requires greater commitment, spread and speed to catch up with the rapidly changing environment (Hazell *et al.*, 2007).

In this study, possibilities of commercialization have been explored by investigating the extent to which the following dimensions of commercialization have been reached so as to be able to suggest for the future. These dimensions were; profitability or economic efficiency of operations, market access and market transformation and socioeconomic benefits of traditional beef cattle feedlots.

1.2 Statement of the Research Problem

Beef industry being one of the key components of the livestock sector in Tanzania, has a great potential for improving household income and livelihood of the people and the national economy in general (MLD, 2009). The transformation of traditional beef cattle production through modernized feedlots has been regarded by many as one of meeting the increasing demand for quality and quantity beef due to growing tourism industry and development in Tanzania. The expectations of traditional beef cattle production are to contribute effectively to the household food security and income as well as to national economy (MLD, 2006: 2012) as cited in Mlote *et al.*, (2012). It is also expected to lead to increased productivity and improved quality of produce, there by contributing to improved incomes. Hence, smallholder cattle farmers have the potential to lead to specialized, market-oriented farming systems (Rios *et al.*, 2009). However the development of traditional beef cattle feedlots operations in Tanzania has lived to their expectations. Since then there are no studies documenting the success of traditional beef cattle feedlots in Tanzania in terms of

increased income of the producers, increased quality and quantity of the produces. In the other hand few documented challenges contributing to under development of the sub sector were; price discrimination by middlemen, inadequate pasture and land tenure, unreliable supply and quality inputs, high cost of inputs, water unavailability and limited access to loan which in turns reduce the commercialization (Kadigi, 2014).

However, beef cattle feedlots operations have been doing better in developed countries like USA in Texas (Galyean, 2010), Brazil (Millen *et al.*, 2013), West Java (Setiadi *et al.*, 2011) and South Africa (Taljaard, 2009) and some developing countries such as Sudan (FAO, 2015), and Botswana (PSDP, 2014). The contributing factors to their development are the sector is operated in large scale (commercial), with good infrastructures and market development. Therefore exploration of the possibilities of commercialization of TBCF will provide the information on; what needs to be done to make the production more profitable and improve the livelihood of people as well as the nation at large, markets and marketing transformation necessary for commercialization as well as socioeconomic benefits out of commercialization of this sub sector.

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of this study was to evaluate the opportunities necessary for commercialization of traditional beef cattle production through traditional beef cattle feedlots in selected areas in the Lake Zone.

1.3.2 Specific Objectives

The specific objectives of the study are:

- (i) To determine the profitability of the traditional beef cattle feedlots as a precondition of commercialization.
- (ii) To identify market channels of traditional beef cattle in relation to commercialization.
- (iii) To evaluate the opportunities of marketing transformation of traditional beef cattle feedlots into contract farming as entity of commercialization.
- (iv) To determine the socioeconomic benefits of traditional beef cattle feedlots

1.4 Research Questions of the Study

The study was governed by four research questions;

- (i) Are the traditional beef cattle feedlots operations in Lake Zone profitable?
- (ii) How are traditional beef cattle supplied from the production site to consumer site?
- (iii) What are the opportunities of marketing transformation of traditional beef cattle feedlots into contract farming?
- (iv) Are there socioeconomic benefits of traditional beef cattle feedlots operations to feedlots operators and community at large?

1.5 Significance of the Study

The study on potential for commercialization of beef cattle production is of great concern for the government of Tanzania since commercialization of traditional beef cattle production has been considered as a way of improving beef cattle production

in recent years. The study added knowledge and skills on profitability of business particularly traditional beef cattle feedlots operations since very few studies have been done in Tanzania so far. This information is relevant in increasing commercially oriented production of quality beef to meet standards for the domestic and external markets, in an attempt to raise income of livestock farmers and consequently improving their living standards as called upon in Livestock policy (URT, 2006).

The study provided the understanding of the role of government in the beef cattle production, which is necessary in the improvement of profitability of the sub sector. More over the study used cost benefit ratio method in calculating the profitability of traditional beef cattle feedlots, which has been rarely used, thus providing new knowledge on calculation of profitability in a business.

1.6 Scope and Limitations of the Study

This study explored the possibilities of commercialization of traditional beef cattle feedlots operations and specifically concentrated on performance of the profitability as the commercialization aspect out of many aspects of commercialization. It also evaluated the markets and marketing of traditional beef cattle from the feedlots only which could have been different from the grazed beef cattle. More exploration was on the possibilities of transforming the existing market into more efficient market which is contract farming. The study was done quantitatively and qualitatively involving traditional beef cattle feedlots operators, district livestock officials, inputs suppliers and people living near feedlots. The study was done in the duration of four

years in Mwanza (Magu, Msungwi, Ilemela, Nyamagana, and Sengerema) and Kahama district.

The study was restricted in the two regions and to the studied small sample size due to financial and time constraints. The study used economic factors of production in calculating/determining the profitability of the traditional beef cattle feedlots in Lake Zone. These factors were cattle purchase and sale prices, feed prices, labour costs and interest rate. The management factors like weight gain in relation to genetics and nutritional background of the cattle and nutritional management (e.g. feed used, mixing and delivery method) were not considered in this study.

1.7 Organization of the Thesis

The thesis is organized into five chapters. Chapter one presents the background information, statement of the problem, and objectives of the study and research hypotheses. Significance of the study, scope of the study and limitations are also presented in the chapter. Chapter two presents the theoretical review of the literature related to commercialization viability of TBCF through presentation of profitability model. Chapter three describes the methodology of the study including the description of the study area, sampling procedures, data collection methods and analysis procedures. The findings of the study and discussions are presented in chapter four. Chapter five gives a summary of key findings, conclusions from the main findings and recommendations as well as policy implications of the findings of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Chapter Overview

This chapter reviews the theoretical literature relating to commercialization of traditional beef cattle feedlots productions and provides empirical literature review with reference to developing countries like Tanzania. The chapter further explains key concepts and approaches to the study of commercialization. The chapter also establishes the knowledge gap, which this study intended to bridge, and it describes the conceptual framework, which guided the study.

2.2 Conceptualization of Basic Concepts in the Study

2.2.1 Commercialization

Commercialization is defined in various ways depending on the environment and time. For instance it is defined as the outcome of a simultaneous decision-making behavior of farm households in production and marketing (Von Braun *et al.*, 1994). Jayne *et al.*, (2011), defined commercialization of smallholder by referring to a virtuous cycle in which farmers intensify their use of productivity-enhancing technologies on their farms, achieve greater output per unit of land and labour expended, produce greater farm surpluses (or transition from deficit to surplus producers), expand their participation in markets, and ultimately raise their incomes and living standards. Argwings-Kodhek *et al.*, (2011) went further defining commercialization as the degree of participation in the (output) market, with the focus very much on cash incomes.

Commercialization of agriculture is recognized as the key strategy for promoting accelerated modernization, sustainable growth and development and, hence, poverty reduction in the sector (Agwu *et al.*, 2012).

2.2.2 Traditional Beef Cattle Feedlots

Beef cattle fattening has been earmarked as one among several means to improve beef cattle production through value addition (Mlote *et al.*, 2012). A feedlot or feed yard is a type of animal feeding operation, which is used in intensive animal farming for finishing livestock prior to slaughter (Ibid). In Mwanza and Shinyanga regions the operations are called traditional because they partially adopted the features of modern feedlots operation. The local breed of cattle are bought from the farmers in Mara, Mwanza, Tabora, Shinyanga and Kagera regions normally during the dry season where there is scarcity of green pasture and water. These cattle are kept in yards, treated, grazed and supplied with concentrates containing cotton husks, cotton seed cakes, rice polishing and minerals for 3-4 months before they are sold (Mlote *et al.*, 2012).

2.2.3 Contract Farming (CF)

Contract farming has been defined differently by various scholars depending on the marketing-specification contracts, as well as resource-provision and production-management contracts (Prowse *et al.*, 2010). It is considered as an intermediate mode of coordination, in which conditions of exchange are specifically set among transaction partners by some form of legally enforceable, binding agreement (Da Silva, 2005). It is a contractual arrangement between farmers and other firms,

whether oral or written, specifying one or more conditions of production, and marketing, for an agricultural product, which is non-transferable (Rehber, 2007). The simple definition by Catelo and Costales (2008) that contract farming is a binding arrangement between a firm (contractor) and an individual producer (contractee) in the form of a ‘forward agreement’ with well-defined obligations and remuneration for tasks. FAO, (2012), define contract farming as an agricultural production system carried out according to an agreement between a buyer and farmers, which establishes conditions for the production and marketing of a farm product or produces. Recently Cieřlik, (2015) defined CF as a vertical coordination between growers of an agricultural product and buyers or processors of that product.

The CF can exist in either of the following models as developed by Eaton *et al.*, (2001); centralized, nucleus estate, multipartite, informal, and intermediary. The centralized model involves a centralized contractor and numerous small farmers. It is vertically coordinated with the control of quality and quantity. Nucleus estate goes far in which the agribusiness contractor not only purchases commodities from independent farmers but also invests in production activities through a plantation estate. Whereas in multipartite CF contract consists basically of a joint venture established between an agribusiness company and a local entity and may involve individual entrepreneurs or small firms with which more informal and verbal contracts are signed on a seasonal basis (Birthal, 2007).

Since there is direct relationship between contract farming and commercialization as documented by Glover *et al.*, (1990), in Eaton *et al.*, (2001), contract farming assist

farmers to gain access to good quality inputs and production services, credit, appropriate technology, and market opportunities that would not otherwise have been available to them.

2.2.4 Farmers' Cooperatives

According to statement on cooperative identity, a co-operative is an autonomous association of people who voluntarily cooperate for their mutual social, economic, and cultural benefit. It may include non-profit community organizations and businesses that are owned and managed by the people who use their services (a consumer cooperative) or by the people who work there a (worker cooperative) or by the people who live there (a housing cooperative), hybrids such as worker cooperatives that are also consumer cooperatives or credit unions, multi-stakeholder cooperatives such as those that bring together civil society and local actors to deliver community needs, and second and third tier cooperatives whose members are other cooperatives. It is a forum where farmers pool their resources in certain areas of activity. They are diverse all over the world depending on the structure and purposes of the association i.e. it can be the ones based on farmers service cooperatives, which provide various services to their individually farming members, and farmers' production cooperatives, where production resources (land, machinery) are pooled and members farm jointly (Cobia, 1996).

Farmers' cooperatives need to have membership and the potential to develop economically. This means that the member must be able to access sufficient land and affordable credit and develop knowledge and techniques and access market information and networks (Pinto, 2009).

2.2.5 Marketing Channels

Value chain is defined as a set of activities that a firm operating in a specific industry performs (design, produce, market, deliver and support its product) in order to deliver a valuable product for the market. Whereas value chain analysis is a process where a firm identifies its primary and support activities that add value to its final product and then analyses these activities to reduce costs or increase differentiation (Porter, 1985). According to IFAD, (2010), the livestock value chain is defined as full range of activities required to bring a product such as live animals, meat, milk, eggs, leather, fibre, and manure to final consumers passing through different phases of production, processing and delivery. Value chain is further explained as a potential favorable condition in which a business can capitalize on a changing trend or an increasing demand for a product by a demographic group that has yet to be recognized by its competitors. For a market opportunity to exist a company must be able to identify who its potential customers are, the specific needs that need to be met, the size of the market and its capacity to capture market share (Investors, 2017).

2.2.6 Socioeconomic Status

The word socioeconomic status is defined in many ways depending on the nature of the study, some of the definitions areas are as follows; Socioeconomic status (SES) is an economic and sociological combined total measure of a person's work experience and of an individual's or family's economic and social position in relation to others, based on income, education and occupation (NCES, 2008). The SES is the measure of the influence that the social environment has on individuals, families, communities, and schools (Brogan, 2009). The SES has also been defined as “the

relative standing in society based on income, power, background and prestige.” (Wool folk, 2007).

2.3 Theoretical Review of the Literature

2.3 1 Theory of Profitability

Commercialization (profitability) of beef cattle production has been studied by reviewing various related concepts and theory. The theory of profitability based on the assumption that profitability means the product choice and input use decisions are based on the principles of profit maximization (Argwings-Kodhek, 2011). Thus profitability is the ability of an organization to earn profits in other words and it is a composite concept relating the efficiency of an organization to earn profit. Gibson *et al.*, (1979), said that profitability is the “ability of the firm to generate earning”. The word Profitability does not merely mean profit making but it goes further to include “earning power or operating performance of the concerned investment (Verma, 1998). Profitability can be interpreted as a ratio, which expresses the rate of the profit amount benchmarked against some point of reference (%) (Orban, (2009).

Profitability of an investment or business can be assessed in various ways. Mlote *et al.*, (2012), studied profitability by calculating the gross margin of an enterprise i.e. the difference between the Total Revenue (TR) and Total Variable Costs (TVC). While Kakeya & Sugiyama (1987), studied commercialization by grading into absolute amount sold, either by volume or value, thereby producing a continuum of degrees of commercialization. Thus, for example, Integrated Rural Development Programme (IDRP) studies in Northern Province, Zambia defined commercialized farmers as those who sold more than 30 bags of maize per annum. Still more refined

is to consider the percentage of crop production marketed by a farm or household. Thus, Strasberg *et al.*, (1999) suggests the following crop commercialization index (CCI):

$$CCI = [\text{Gross value of all crop sales} / \text{Gross value of all crop production}] \times 100.$$

Whilst it may be more difficult to estimate produce value there is no reason why this should not be extended to include livestock as well. A value of zero for the CCI signifies total subsistence, whilst a CCI value approaching 100 indicates higher degrees of commercialization that is a greater percentage of crop production marketed.

Hazneci *et al.*, (2010), studied economic efficiency of cattle-fattening farms using Data Envelopment Analysis (DEA). DEA is one of the most popular methods for estimating the best-practice production frontier and provides an analytical tool for determining efficient and inefficient behavior. Since, DEA is less data demanding, works with small sample sizes and does not require knowledge of the proper functional form of the frontier, error and inefficiency structures, it has been preferred over Stochastic Frontier Analysis (SFA). Stochastic models such as SFA necessitate a large sample size to make reliable estimations (Coelli *et al.*, 2005).

Hazneci *et al.*, (2010), defined efficiency as the distance between observed input-output combinations and the best-practice frontier. The best practice frontier represents the maximum output attainable from each input level. The Farrell input-orientated measure of technical efficiency was used as a measure of productive efficiencies, as farms tend to have greater control over their inputs than over their

outputs. The construction of DEA model is based on the assumption that, each cattle-fattening farm produces a quantity of beef (y_1) using multiple inputs (x_1) and that each farm (i) is allowed to set its own set of weights for both inputs and output. The data for all farms are denoted by the $K \times N$ input matrix (X) and $M \times N$ output matrix (Y). Using piecewise technology, an input-oriented measure of Technical Efficiency (TE) can be calculated for the i^{th} farm as the solution to Linear Programming (LP):

(1)

Where, θ is the TE score having a value $0 < \theta < 1$. If the value equals 1, the farm is on the frontier; the vector λ is an $N \times 1$ vector of weights, which defines the linear combination of the peers of the i^{th} farm.

The input-based minimum cost for the i^{th} farm can be obtained by solving the following LP problem:

(2)

Cost benefit ratio analysis has been adapted in this study to measure profitability of running TBCF. The Data Envelopment Analysis (DEA) by Chen (2010) is the specific approach used. The DEA is a multi-factor productivity analysis model for measuring the relative efficiencies of a homogenous set of decision making units (DMU) in this study are feedlots (Chen, 2010). It also measures the magnitude of inefficiency of the inefficient units compared to the best practice units. The best practice units are relatively efficient and are identified by a DEA efficiency rating of $\Theta = 1$. The inefficient units are identified by an efficiency rating of less than 1 ($\Theta < 1$), the efficiency score in the presence of multiple input and output factors.

The efficiency score in the presence of multiple input and output factors is defined as:

Efficiency = $\frac{\text{weighted sum of outputs}}{\text{Weighted sum of inputs}}$

Weighted sum of inputs

The mathematical calculation of this is done using the linear programming as earlier proposed by Charnes *et al.*, (1978).

$$\sum_{k=1}^s v_k Y_{ki} - \sum_{j=1}^m u_j X_{ji} \leq 0$$

Where;

k = 1 to s,

j = 1 to m,

i = 1 to n,

y_{ki} = amount of output k produced by feedlot i,

x_{ji} = amount of input j utilized by feedlot i,

v_k = weight given to output k,

u_j = weight given to input

Cost benefit ratio is obtained through Cost–benefit analysis (CBA) which is a systematic approach to estimating the strengths and weaknesses of alternatives that satisfies transactions, activities or functional requirements for a business. It is a technique that is used to determine options that provide the best approach for the adoption and practice in terms of benefits in labor, time and cost savings (Ngulube *et al.*, 2013). It is one of the numerous ways used to quantify and measure the economic efficiency of a proposed investment (Gurau, 2012). Cost-benefit analysis is one of a set of formal tools of efficiency assessment (Hakkert *et al.*, 2005). According to Robert *et al.*, (2004), CBA is based on the disarmingly simple principle which states

that; an individual or a firm/society should take an action if and only if the extra benefits from taking the action are at least as great as the extra costs. Cost-benefit analysis is a formal analysis of the impacts of a measure or programme, designed to assess whether the advantages (benefits) of the measure or programme are greater than its disadvantages (costs).

The basic question in cost-benefit analysis is, "Do the economic benefits of providing this service outweigh the economic costs" and "Is it worth doing at all"? One important tool of cost-benefit analysis is the benefit-to-costs ratio, which is the total monetary cost of the benefits or outcomes divided by the total monetary costs of obtaining them. Another tool for comparison in cost-benefit analysis is the net rate of return, which is basically total cost minus the total value of benefits. The theory of profit has been used in this study since profitability is the basic and essential component of commercialization. Cost benefit analysis is essential in commercialization as it provides a consistent procedure for evaluating decisions in terms of their consequences (Sewell *et al.*, (1999).

2.4 Review of Empirical Literature on Commercialization

2.4.1 Commercialization of Beef Cattle Production through Feedlots Worldwide

Commercialization involves shifting of goals of production, can be from small scale production to large scale or can be from domestic food supply and raw materials subsistence farming to commercial farming for the industry (Rota *et al.*, 2013). The aim or essence of commercialization is different in developed countries and developing countries, as demonstrated in overview of commercialization of beef cattle production in some of developed and developing countries.

In Arizona and California the beef cattle feedlots started in 1960 as results of high production of Sorghum and wheat in Amarillo, which affect the supply and price of these products, made the famers to diversify the use to livestock. This opportunity created a large expansion from small scale production to large number of large scale (commercialization) and the development went further in 1970 where total cattle inventory was 112 million head and 132 million in 1971 (Rhoades, 2009). In Texas cattle have been fattened for hundreds of years, but the real feedlot industry, emerged in 1996s (Galyean, 2010). This development was as a results of; Corn feeding in the late 1800s in Iowa and other Midwestern states which led to the development of Chicago as a major marketing location for cattle; the growing rail system supporting movement of cattle from Western rangelands to the Midwest for finishing In the early 1900s; improved cattle genetics; introduction of silage as a major feed resource, and development of grain processing methods (grinding and cracking) (Ball and Cornett, 1996).

In Brazil the shift from the tradition system (low technology, low cost of production and inefficiency use of land) of beef cattle production to modern (commercial) started in 1994 when a plan called “Plano Real” was implemented to stabilize the economy and control inflation (Carvalho, 2007). The stabilized economy led to growing of the, purchasing power of the Brazilian population resulting in increased consumers’ demand of higher quality beef products. This new scenario in the late 1990s and early 2000s led to more intensive beef production systems in Brazil (Millen and Arrigoni, 2013). Up to 2011, commercial beef cattle production generated about 8.5 million related jobs and representing approximately 7% of the

gross domestic product (Pereira *et al.*, 2011). According to USDA (2012b), Brazil exported 1,394,000 tons of beef across the globe, which represented about 16.7% of the world's total beef exports.

However the Beef cattle industry still predominantly based on the production of grass-fed animals. In 2012, about 31,118,000 cattle were slaughtered in Brazil according to Brazilian Institute of Geography and Statistics (IBGE, 2013), however, only about 4.02 million animals were finished in feedlots BEEFPOINT 2012 which represented approximately 13% of annual slaughters cited in Millen *et al.*, (2013). The beef cattle feedlots operation in Brazil was done as a mechanism of finishing the grass fed cattle and reduce the slaughter age of these cattle so as to maintain the fat level of 4mm as market requirement (Millen *et al.*, 2009). Feedlots present the highest technological intensity of any production system in Brazil where by the animals are confined during the finishing phase for a period of 60 to 120 days, depending on the weight of the animals at entry and the level of technological intensification of the feedlot (Souza *et al.*, 2010).

Driving factors to transformation of Brazilian beef cattle production from traditional grass fed to finishing feedlots were; rising price for arable land with a growing presence of Brazilian beef on the international market (need to meet the international market demand for quality and standard beef) (Souza *et al.*, 2010). Another driving factor according to Cheryl, (2014) was strong consumer's demand for beef associated with the potential of Brazil's grain industry to provide increasing quantities of relatively cheap feed, which fuel the industry to produce not only more beef but also higher-quality products. The big concern of environmental degradation

raised transformation of traditional beef cattle production into feedlots which are environmental friendly production systems (Cheryl, 2014).

Feedlots in Brazil are expected to drive beef industry growth to double at 2.5 million tonnes per annum by 2023; this is due to the rapid intensification of feedlots production facilitated by expansion of production of Corn and Soybean as universal ingredients for animal ration. However, the main challenge facing the beef feedlot production in Brazil is the lack of infrastructure throughout the logistics chain from a deficiency of on-farm storage to hazardous roads and limited ports which imply higher costs for producers (Cheryl, 2014).

In Mexico shift from grass-fed beef to grain-fed beef had major implications for the overall levels of beef production necessary to meet both changing consumer preferences and increased total demand for meat (Peel *et al.*, 2011). In the past, a large percentage of beef in Mexico came from cattle finished on pastures in extensive production systems in which cattle required 2-3 grazing seasons to reach slaughter weight, and were 3-4 years of age at slaughter. This produced meat characterized by yellow fat and darker meat, and a coarser texture due to older age.

The evolution and development of beef cattle feedlots in West Java in Indonesia had been as alternative strategy to meet the supply of beef that was not fulfilled by the local beef cattle producers (commercial). The feedlots companies accommodate the feeder cattle from outside Java, adding them value and supply to the consumers (Setiadi *at al.*, 2011). In 2011 Java feedlots companies were able to absorb 1,024 workers and only 11 Companies feedlot already had investment and business

licenses with a total capacity of 89,930 heads (the carrying capacity of 70,330 heads), on 13 locations in 7 districts. Economically there was an increase in domestic investment, in the stable investment value of more than Indian Depository Receipt (IDR) of 375 billion rupiah (Setiadi *et al.*, 2011).

2.4.2 Commercialization of Beef Cattle Production in Africa and Sub-Saharan Africa

Commercialization of beef cattle production in Africa is crucial since there is reported increased demand for livestock products (double in the next 20 years) mainly because of rapidly growing population in urban centres coupled with economic growth, especially in developing countries (Delgado *et al.*, 1999; World Bank, 2005; Costales *et al.*, 2006). This could be taken as an opportunity for African countries for profitable increase in livestock production ever seen (Info resources, 2007). In Africa the rural poverty is an issue, the commercialization of livestock production could also be used as a tool for alleviation of rural poverty through improved livestock production with more efficient linkage to urban market (Rota *et al.*, 2013).

In most of the Sub Saharan Africa, the small scale subsistence livestock keeping system still dominates with small proportion being of large scale system such as ranching, large scale commercial farming, cooperatives and state farming (FAO, 2016). For instance Sudan had 30.1 Million cattle of which 90% were kept under the traditional pastoral and agro pastoral systems (FAO, 2015). The remaining small proportion of commercial systems carried out in the following manner; the commercial herds that utilize natural pasture in a year with supply of water through

water tanks and or available from privately developed watering facilities to meet dry season requirements. Another way is commercial herds left to utilize natural pastures in wet season grazing areas then return to irrigated land to utilize crop stubble and residue. Commercial practice also involves fattening operations near urban centers that utilize weaned calves and young bulls from traditional production areas. The feeds contents include a mix of either of the following; crop residues, urea and molasses; cottonseed cake, sorghum grains or wheat bran and salt and processed concentrates. The commercial herds (cattle and sheep) are also kept in irrigated land (Zaroug 2006).

According to PSDP (2014), in Botswana about 88% of 2.2 million cattle are raised by small communal farmers often with very small holdings, practicing traditional and less efficient methods of production. The remaining percentage is owned by 809 commercial farmers implementing modern husbandry and commercial practicing including feedlotting.

Republic of South Africa has made a big step in feedlots industry as it started a little bit earlier compared to other African countries. It has been reported to start back in 1960's by very few cattle farmers in the grain producing areas. Feedlots are operated in three ways; farmers feeders, seasonal feeders (grain farmers) and commercial feeders to a large scale > 100,000 standing capacity located in Gauteng market and grain areas. In the year 2009, 75% of all beef produced in Republic of South Africa comes from feedlots while 30% to 40% of beef cattle production is done in non-commercial sector the rest being commercial with the following production systems; extensive pastures, feedlotting and subsistence (Taljaard, 2009).

2.4.3 Commercialization of Beef Cattle Production in Tanzania

Cattle production in Tanzania has been regarded as more of a cultural than an economic practice that is, cattle are kept in some societies for social security (prestige, rituals) and for subsistence. Poor extension systems lack of appropriate market information and limited access to markets contributes to low animal productivity and ultimately affects the quality of the meat (MLDF, 2009). These contributed to the production of low quantity and low quality of meat, which is locally consumed at low price and make the farmers excluded from regional and international markets.

The main focus of traditional cattle production systems are production of milk and meat for subsistence, supply of draught power and manure for cropping and provide fibre and skin and sales of livestock (Rege and Gibson (2003) as cited in (Ngowi *et al.*, 2008). This was also documented by another study done in Tarime by Ngowi *et al.*, (2008) where the purposes for keeping cattle were to provide milk for home consumption (89.2%), draught power (72.5%), meat for home consumption (66.7%), dowry payment (50.8%), source of income (40%) and savings and security against future uncertainties (23.3%).

Provision of draught power and dowry payment were ranked first and second purposes of keeping cattle in the highland zone of Tarime that includes Muriba and Kemambo wards while in the lowland zone namely, (Manga and Kisumwa wards), dowry payment was more important compared to draught power. Thus livestock production is not considered as commercial production or rather social and cultural

concern as it involved sales of few live animal and sales of hides and skins to the local market and across the borders within the region and beyond (URT, 2011).

In recent past, there has been an increased motive towards commercialization driven by increased in demand for beef and red meat as the numbers of urban middle class citizens increases (Kadigi, 2014). A particularly interesting niche is that of quality meat which is generally in short supply and the price has been increasing (PASS, 2013). Fast growing meat market in Tanzania is in the food service industry. Tourism has been growing steadily and the number of hotels and specialized restaurants is increasing annually. Supermarkets are also increasingly coming in to capture a share of the growing market for quality meat. Likewise Institutional markets such as schools/universities, prisons and hospitals are growing in number as well (SAGCOT, 2011).

According to Mlote *et al.*, (2012), the emergence of traditional feedlots operations in the lake zone regions of Shinyanga and Mwanza was to meet this demand. The authors observed that, most of these feedlots were individually owned with animals ranging from 10 to 800 per feedlots. Initially they were started as coping strategy to dry season when pastures become scarce and limited to number of cattle raised in the areas. During this time most of cattle become emaciated as a results they don't meet slaughter market quality, therefore are sold at low market price to feedlots.

2.4.4 Profitability as an Integral Component of Commercialization

A business that is not profitable cannot survive. Conversely, a business that is highly profitable has the ability to reward its owners with a large return on their investment

(Orban, 2009). Profitability is estimated using economic(outside the feedlot) or management (within the feedlot) environments. Economic factors include purchase and sale prices, feed prices (usually a function of corn prices) and interest rate. Management factors are those that affect average daily gain (ADG) and feed efficiency (FE). These factors are largely dependent on genetics, nutritional background of the cattle, nutritional management (e.g. feeds used, mixing and delivery method), weather and health (Zehnder *et al.*, (1999), It has been documented by Zehnder *et al.*, (1999), that for producers to manage the back grounding operation, they need to spend time recording information on costs of production (close-out information) so that they can manage their operations more efficiently and with an eye on profitability.

2.4.4.1 Government and Government Policy in Commercialization of Beef

Cattle Feedlots

Government has a role to play in determining the profitability of TBCF production in enabling good environment of business through its policy statement; “Efforts will be undertaken to promote commercial production of high quality beef in intensive and extensive (ranching, pastoral and agro-pastoral) systems and strengthening NARCO” (URT, 2006). The ILRI research reported the necessity of appropriate interventions to progressive development when proper and suitable policies and institutions are in place to facilitate the process (Stall *et al.*, 2011). Notwithstanding there is a need to have appropriate quality and food safety standards for livestock products according to the national or regional context which will promote inclusion of the smallholder producers (GRAIN, 2011).

The government of Tanzania is aware of the under developed beef cattle production and the prevailing challenges towards development of beef cattle production in Tanzania. A number of challenges have being highlighted in (URT, 2006) including; Low genetic potential of Short horn Zebu (TSZ), inadequate infrastructure, inadequate marketing system, prevalence of animal diseases, inadequate feed resources, weak livestock farmers' organizations and inadequate technical support services. Control of disease through vaccination is also necessary as it contributes to improved productivity and profitability in beef production (Valdes *et al.*, 2004).

All in all government through government policies such as livestock policy, business and marketing policy and privatization policy is responsible in creating conducive environment for commercialization to take place. These policies need to integrate and support each other to enhance commercialization. As emphasized by Okello *et al.*, (2012), efforts concentration in commercializing traditionally subsistent farming systems will only be successful with policy coordination.

2.4.4.2 Supportive Infrastructures for Commercialization of Beef Cattle

Feedlots

Lack of access to sufficient agricultural support services and appropriate agricultural and developmental infrastructure has been documented as the challenges for commercialization (Okello *et al.*, 2012). Land is one of the livestock supportive infrastructures, over the past three decades the rangeland in Tanzania has been decreasing in size while the number of human and livestock population increase, therefore the demand for more land for settlements and cropping has increased. Conversion of traditional grazing lands into big state farms and mining operations in

Mwanza, Shinyanga and Mara, infrastructure development (Kilimanjaro international airport and others), expansion of cities and towns and conservation have reduced grazing land. Also, some of the grazing lands have been annexed into national parks and game/forest reserves (URT, 2011). The need of good land for both grazing and yard construction is necessary for proper production. Brazil has abundant grazing land for calf and grass-fed beef production in the Cerrados region, which encouraged the development of large beef processing operations (Valdes et al., 2004).

2.4.4. 3 Marketing and Marketing Transformation in Commercialization of

Beef Cattle Feedlots

Markets are essential element of commercialization since they can help provide insightful investment and development decision with commercial planning for products, portfolios and organization based on evidence based value (Parexel, 2017). The world Development Report of 2008, Identifies that enhancement of smallholder competitiveness, facilitating market entry’ and ‘Improve market access and establish efficient value chains” as milestones to support an agriculture-for-development agenda (World Bank, 2008). Efforts at improving access to market information and intelligence, relevant market infra-structure and agricultural financing are some of the strategies adopted to enhance the competitiveness and integration of farmers into markets (Martey et al., 2012). Efficiency marketing of products leads to commercialization. According to Rota et al., (2013), for Smallholders to participate and benefit from market oriented production it is a must that they are organised. As an individual’s volume is too small; the input is too small; transport too expensive;

services not discounted (or available), therefore collective action is necessary. Collective actions may be in farmers associations or farmer's cooperatives, which may be able to make strong contract farming possible.

Markets and Marketing of beef cattle is discussed in two categories named; markets channels and contract farming. Market channels for beef cattle from the feedlots involve the chain in which the products pass from the production to consumers and entail the value that is added. The proper market channels are the ones that will ensure market access/ availability, fair share of product/commodity value goes to farmers/producers, transparency in price and market and insurance of highest level of appropriate value addition (Rota et al., (2013).

Contract Farming (CF) is a partnership between agribusiness/marketing firms and farmers. Advantages of CF for agribusiness firms are; assurance on access to desired products or a quantitative and qualitative control over material supplies without actually engaging itself in farming. High return to investment of firms as if it were to produce its raw material requirements itself, using own or rented land and hired labor, the costs towards wages, social benefits, training and supervision could be very high. Through contract farming, the firm can shift and/or share some of these responsibilities with farmers, and secure supplies at a lower cost. Contract farming thus enables agribusiness firms to optimally utilize their installed capacity, infrastructure and manpower, and respond to food safety and quality concerns of the consumers. Nevertheless, agribusiness firms can encounter some negative externalities of contracting. One major externality is the risk of extra-contractual sales by the farmers, especially when negotiated price is fixed/pre-determined and

the market price, at the time of delivery, is higher than the negotiated price. Second, in smallholder agriculture while transaction costs (search, negotiation and enforcement) of contracting with a large number of small farmers are higher, contracting with a few large producers is riskier, particularly if the alternative supply sources are limited and non-dependable. Third, in resource sharing contracts, firms may also face risk of misuse/diversion of inputs and credit (Bithal, 2007).

The advantages of CF are that, it serves as an assured market for farmers produce at their doorsteps, reducing marketing and transaction costs and also price risk. It promotes the use of quality inputs; adopt improved technologies and scale up production systems. In circumstances when farmers face problems in accessing inputs, technology, information and services, firms provide these as a part of contract and hence reduce uncertainty in their availability, quality and prices for the farmers. Moreover CF enable farmers to cope up with risks, ex ante and ex post, firms provide them with inputs, technology and services; impart training in production management and share risks.

On the other side disadvantages of CF are: farmers may be vulnerable to negative externalities of contract farming. A farmer, being a weaker partner, is prone to exploitation by the firm(Bithal, 2007). Agribusiness firms can extract monopolistic rent in the output market, if alternative marketing options are limited and farmers have locked sizeable investment into assets specific to the contract commodity or the commodity is perishable and not amenable to transformation into less perishable products on the farm. Firms can also extract monopoly rent in the input markets. Agribusiness firms may introduce new crops and technologies that can increase

production and market risks. Bound by the contract to produce a specific commodity, farmers lose flexibility to adjust their production portfolio to emerging market opportunities. Further, there is also an apprehension that farmers' excessive dependence for credit on firms can lead them into perpetual indebtedness (Birthal, 2007).

The individuals in an ideal contract farming need to agree on certain conditions such as; quantities of a specific agricultural product to meet the capacity of the company. This should meet the quality standards of the buyer and be supplied at the time that the buyer determines. In turn, the buyer agrees to purchase the product at agreed pricing conditions and, in some cases, to support production through, for example, the supply of farm inputs, land preparation and the provision of technical advice (FAO, 2012).

2.4.4.4 Skills and Capacity Building in Commercialization of Beef Cattle

Feedlots

In commercialization a successful farmer must have a broad knowledge and skills in management, ICT, marketing and entrepreneurship (Mahaliyanaarachchi, 2006). That is to say skills are among the factors that influence the process of commercialization. Zhou *et al.*, (2013) documented that smallholders progress from subsistence towards market orientation, the success and failure of the process is influenced by several environmental (like socio-economic factors), farm level (like farm resources) and individual (like skills) determinants whose effects are also influenced by drivers. On the other hand, among the features of small holder farmers are poor technical skills and low management capacity, which isolates them from

accessing commercial markets and infrastructure, and finance and credit services (Okello *et al.*, 2012). The forerunners to success in market participation were individuals with entrepreneurial skills and the ability to respond to dynamic market conditions (Okello *et al.*, 2012).

Moreover commercialization for beef cattle production is highly associated with use of improved technology and innovations. Therefore building capacity in the smallholder farming community, in particular through development of formal training programmes for future generations of young commercial smallholder farmers is crucial (Rota *et al.*, 2013).

2.5 Potentials for Commercialization of Beef Cattle Production in Tanzania (SWOT)

Tanzania has many opportunities that favour commercialization of beef cattle production. These potentials are analyzed through the following tools of Opportunity and Threats/Constraints since these are external factors that can easily be worked on. An opportunity is an interesting trend that one or firm can take advantages of in improving the production and in this case livestock production development. Land availability is the foremost opportunity, according to (URT, 2010), Tanzania is endowed with 95.5 million ha of land of which 44 million ha are classified as suitable for agriculture and about 50 million ha of rangelands are suitable for livestock grazing of which only 24 million ha were being utilized and supporting 12.1 million ruminants. Regarding land use activities, by 2009, a total of 1,423,201.28 hectares of land spread over 266 villages in 33 districts and 15 regions had been allocated for livestock. More land needs to be allocated for the exclusive

use of livestock in areas where livestock have been newly introduced such as in Lindi, Coast regions and parts of Morogoro region where farmer-livestockkeepers' conflicts have been reported (URT, 2010).

The large number of cattle present in Tanzania is another potential for commercialization of beef cattle production. In 2008, the number of beef and dairy cattle producers in Tanzania mainland reached 1.66 million households equivalent to 29.1 percent of the total Tanzania population (NSCA 2007/2008) (Mlote *et al.*, 2012). Furthermore the collection of hides and skins is an opportunity for improving traditional beef cattle production as it has been reported that, there is an increased collection from about 1.3 million to 4.0 million pieces out of which 86 per cent were exported (URT, 2006). Lastly but not the least increase in the demand for quality and quantity of beef inside and outside Tanzania, for example Comoro is added opportunity.

Constraints or threats are anything which can adversely affect one's business. According to (URT, 2006) the foremost constraints are the lack of proper arrangement to allocate land and give ownership of grazing areas according to traditional or legal procedures, low genetic potential of the indigenous livestock coupled with limited supply of improved livestock, livestock diseases and inadequate infrastructure for processing and marketing of livestock and livestock products. There is also unfair competition of livestock products and highly subsidised livestock products from outside the country that discourage local investments. Others include inadequate livestock farmers' knowledge and skills and unavailability of investment and credit facilities to large, medium and small-scale livestock entrepreneurs. Similar

findings were reported in Uganda on factors affecting level of commercialization among cattle keepers (Kisamba-Mugerwa *et al.*, 2006; McIntire *et al.*, 1992; Jhanke, 1982).

2.6 Research Gap

Commercialization of smallholder farming systems through active participation in cattle markets has the potential to exploit developing regions' comparative advantages and transform rural economies (Mathenge *et al.*, 2010; Rios *et al.*, 2009; Boughton *et al.*, 2007). In developed countries commercialization of beef cattle production has been driven by a lot of factors such as: improved technology which allowed utilization of agricultural residues to livestock feeds, improved genetic potentials of beef cattle, increasing price of arable land for both agricultural and livestock production and increased in consumer's demand for quality and quantity meat.

This scenario presents, may be, the greatest opportunity for profitable increase in livestock production ever seen in Africa for the smallholders – who in many countries produce the lion's share of all food products including livestock products such as milk, meat and egg. Unfortunately in Africa commercialization of beef cattle production haven't been much developed despite of the emerging drives outside and inside Africa. Some of the reasons behind this as are; livestock keeping being taken as cultural and prestige in the small scale at household level and communal, poor technology and infrastructure facilities and limited access to market. Other factors that are ought to hinder productivity are; poor market infrastructure, price variability, limited marketing support services and market information and credit services to

traders and cattle keepers, absence of effective producer organizations at the grassroots and limited access to markets provide (Coetze *et al.*, 2005).

However beef cattle fattening is a new technology in Tanzania, many studies have been done to assess the profitability of cattle fattening farms elsewhere in the world (Yidirim, 2006; Even, 2006; Sahin *et al.*, (2008), and only one has been done in Tanzania. Mlote *et al.*, (2012), investigated the profitability of beef cattle fattening in Tanzania using profit margin method and concluded that, beef cattle fattening is new but has the potential to improve the livestock sector and the Tanzanian economy, if well harnessed. However, this will depend on the extent to which existing fattening enterprises attract new entrants to the subsector based on their profitability. In a competitive industry, high profit levels reflect high productivity and efficient use of resources.

In this study profitability of beef cattle fattening was studied using cost benefit ratios and investigated the determinants of profitability and their extent and try to relate with the possibility of scaling up the sub sector. It went further investigating the contributions of these determinants; government, markets and marketing, infrastructures and skills in existing beef cattle feedlots so as to identify challenges that needs to be addressed for commercialization to take off.

2.7 Conceptual Framework

The word commercialization as the dependent variable of this study is an effort that can be dominated by one agent or more entities It can be dominated by; government as a leading role (Rukuni *et al.*, (2006) ; Jayne *et al.*, (2011)); or private sector

taking the leading role with minimum state support and interference (Mulemba, 2009); (c) donor community and non-governmental organizations (World Bank, 2008); or collaborative (partnerships) strategy where there is joint effort between the state, private sector and donors (World Bank, 2008).

In Its multifaceted nature the success of commercialization is attributed by combination of several complementing factors (Zhou *et al.*, 2013). These includes; historical policy bias in favour of large producers, lack of supportive institutions; poor access to productive resources, markets, market information, public services, technology and skills; shrinking government investment and support; high transaction costs; poor agro-ecological conditions, prevalence of diseases; limited commercial mind-set and negative beliefs (Rukuni *et al.*, (2006); Hazell *et al.*, 2007; Louw *et al.*, (2006); Poulton *et al.*, (2005); Kirsten *et al.*, (2012)). These factors are considered as independent variables and are grouped into four groups; these are government support, markets and marketing, skills and capacity building and supportive infrastructures. Independent variables are those factors, activities and other phenomena that change or affect the value or level of a dependent variable (Babbie *et al.*, 2005).

Profitability or economic efficiency production as intervening variable in this study simply referred to ability of organization or business to earn profit. Profitability of business determine the possibility of commercialization, it is obvious that, commercialization cannot occur in inefficiency economic performance firm/business/organization. It is directly affected by number of factors, which are markets and marketing, government support, production infrastructure and skills and

capacity building among the beef feedlots operators, which eventually causes the commercialization to occur. Markets and Marketing access implies all the routes and activities where finished traditional beef cattle passes to consumers from the production sites, in this study, it is indicated by the following indexes; channel accessibility, contract farming, and access to market information, sales cash and transaction costs. Government support is the implications of rules and regulations from production to consumption, which are access to credits, vaccination, input subsidy, control of taxes and levies and livestock policy. On regards to infrastructures, the indicators were; enough land availability, availability of feeds inputs, availability of drinking water, and deep tank for ectoparasite control. Skills acquisition on management and business were assumed under the category of technical and business skills. The indexes under these variables were; production skills (livestock skills), entrepreneurship skills (Training), skills on livestock health (veterinary skills), research collaborations and extension related services.

Government support, markets and marketing, supportive infrastructure and Skills and capacity building affect commercialization either directly or via profitability. The conceptual framework lies under the following assumptions; Government support in terms of favourable livestock policy provide the enabling environment for commercialization to take place such as inputs subsidy, vaccination, taxes & levies and access to credits. On top of the mentioned variables government has got influences on other independent variables such markets and marketing, infrastructures, and skills. Von Braun *et al.*, (1994);Pingali *et al.*, (2005) emphasized the role of government in commercialization of agriculture that ought to help in increasing

enabling policy environments through investing in rural infrastructure and undertaking institutional reforms that could encourage the private sector to participate in the development of rural economy.

As far as markets and marketing are concerned the issue of market channels and information has directly relationship to the profitability and hence commercialization. Livestock commercialization can only be successful if farmers have access to information on market prices and agricultural inputs (Kadigi, 2014). The contact farming as entity of markets and marketing take care of both inputs and output markets which guarantee profitable production and hence commercialization. Most of the literature on smallholder commercialization deals only with the output side of commercialization. However, sustainable commercialization of smallholders also requires integration into the input markets (Pingali and Rosegrant, 1995).

Infrastructures influence commercialization directly, it was witnessed in Botswana, success in beef sector was enabled by investment incentives in form of long-term leases, infrastructure and input loans / subsidies, training and market linkage through the Botswana Meat Commission [BMC] (Timan *et al.*, 2004).

Skills and capacity building are essentials in business and influence profit maximization and growth of the business in many dimensions such as market skills and production skills. It was recommended by Dutta *et al.*, (2015), that enhancement of farmers' business skills, for instance by forming and producing in a group would provide them with economies of scale for better market search and bargain, as well as enable them to reduce operational cost.

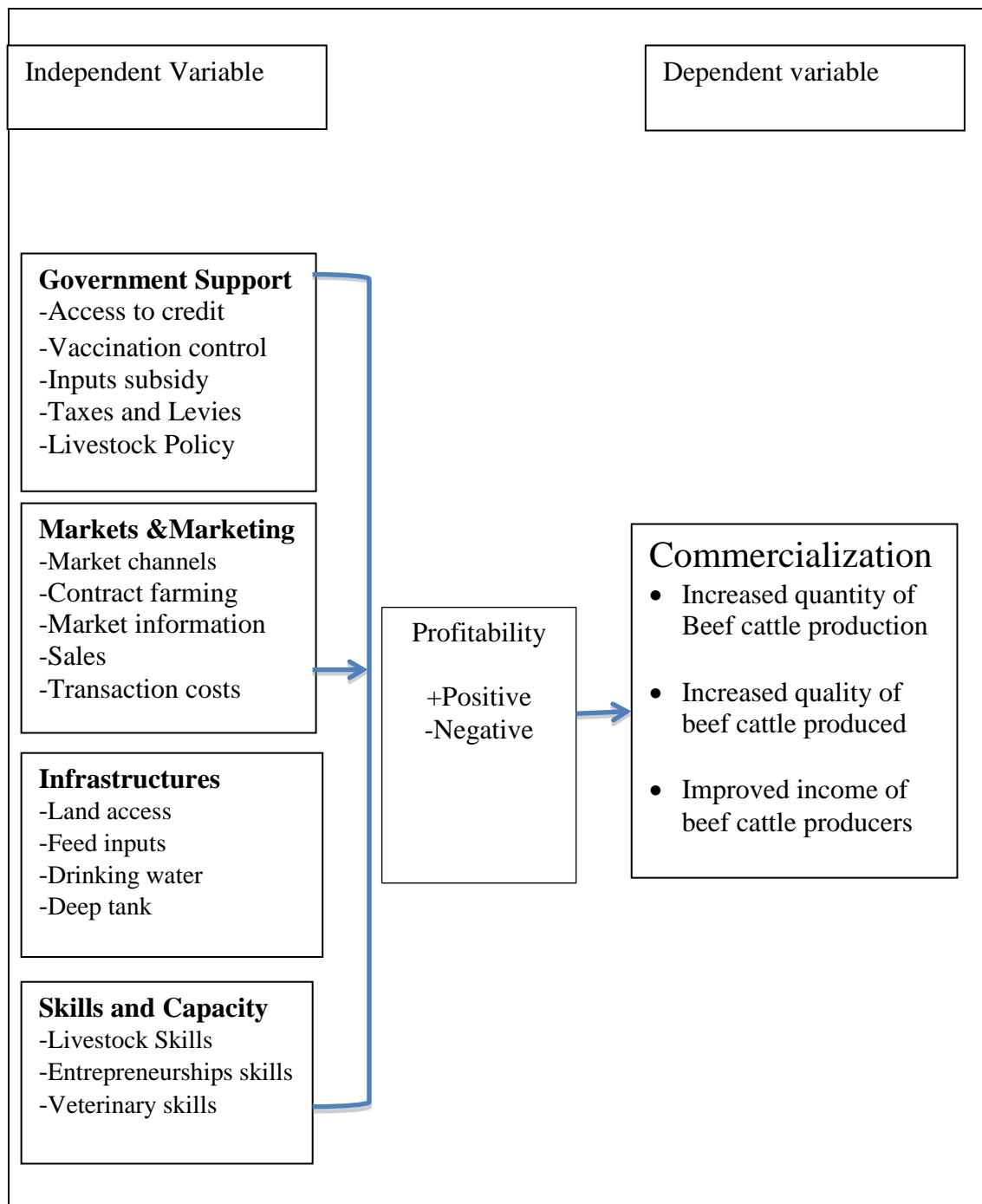


Figure. 2.1: Conceptual Framework of the Study

Source: Constructed basing on empirical literature review

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Chapter Overview

This chapter presents the methodology of the study on which this study is based and it starts with; research philosophy followed by research design and research methods. Then the chapter gives the profile of the study area including its location and major characteristics of the study area and the population of the study. Details on sampling procedures, data types and their sources, data collection techniques and the methods used for processing and analysing data are also explained. Lastly the chapter provides the justification of the variables used in the regression analysis for the study.

3.2 Research Philosophy

This study employed positivism research philosophy which is directly associated with the idea of objectivism (Saunders, 2003 and Cooper and Schindler, 2006) i.e. single objective reality that can be observed and measured without bias using standardized instruments. In this kind of philosophical approach, scientists give their viewpoint to evaluate social world with the help of objectivity in place of subjectivity (Cooper and Schindler, 2006). The traditional beef cattle feedlots (unit of analysis) are the objective in reality that were observed and measured in exploring the possibility of commercialization of traditional beef cattle feedlots sub sector.

3.3 Research Design

A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in

procedure. It is the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement and analysis of data (Kothari, 2004).

This study adopted a cross-sectional research design, which is the most common design that involves observation of a population, or a representative subset, at one specific point in time i.e. it takes place at a single point in time. In effect, we are taking a 'slice' or cross-section of whatever it is we're observing or measuring (Trochim, 2006). The choice of this research design was based on the advantages that; cross sectional studies are generally quick, easy, and cheap to perform. They are often based on a questionnaire survey. There will be no loss to follow-up because participants are interviewed only once (Sedgwick, 2014). The data was taken from the representative sample of all feedlots operators in Lake Zone.

3.4 Research Methods

"Research methods, are the particular strategies researchers used to collect the evidence necessary for building and testing theories" (Frey *et al.*, 1991). Methods of data collection and data analysis represent the core of research methods. In this study both quantitative and qualitative methods were used. The use of both methods was very important to allow all variables to be examined from different perspectives. Both qualitative and quantitative data collection methods were used in this study primarily to neutralise or eliminate the biases inherent in the use of a single method (Creswell, 1994, Glazier and Powel 1992). Quantitative research is a type of research that is 'explaining phenomena by collecting numerical data that are analysed using mathematically based methods (in particular statistics). Qualitative research is the

type of research that engages us with things that matter, in ways that matter and enables exploration of a wide array of dimensions of the social world. Its methodologies celebrate richness, depth, nuance, context, multi-dimensionality and complexity rather than being embarrassed or inconvenienced by them (Mason, 2002).

The quantitative method in this study was used to explain phenomena of commercial viability of traditional beef cattle feedlots by collecting numerical data through questionnaires and analyse the data using mathematical based methods. In calculation of profitability of traditional beef cattle feedlots operation and the determinants for profitability the quantitative method was used. Whereas qualitative method was used to obtain in depth feelings and experiences of traditional beef cattle producers and communities around them so as to broaden and/or deepen the understanding of how things came to be the way they are in and around the traditional beef cattle feedlots' social world. Use of research question that involves exploring how people experience something, or what their views are, exploring a new area where issues are not yet understood or properly identified (Windridge *et al.*, 2009). The value chain analysis of traditional beef cattle feedlots, market transformation into contract farming and socioeconomic benefits out of traditional beef cattle were assessed using qualitative method.

3.5 Description of the Study Area

The study was conducted in Mwanza and Shinyanga Regions. Mwanza region is located in the northern part of Tanzania just south of Lake Victoria. The Lake Victoria waters separate the region from the neighboring countries of Kenya and

Uganda. To the East and West are the sister lake dominated regions of Mara and Kagera. To the South there is Shinyanga Region. The lake zone region lies between latitudes $1^{\circ} 30'$ and $3^{\circ} 0'$ South of Equator and the longitudes $31^{\circ} 45'$ and $34^{\circ} 10'$ East of Greenwich. Temperatures and rainfall influenced by proximity to Lake Victoria and Equator. Average temperatures in the region range of 25°C to 28°C . Rainfall is unreliable, bimodal and ranges between 750 mm in dry areas and 1,200 mm in wet areas (URT, 2008).

Mwanza is a relatively small region occupying 2.3 percent of the total land area of Tanzania Mainland, It is formerly divided into six administrative districts which are as follows; Magu, Ukerewe, has been reorganized into seven districts as from July 1996. Misungwi is the newly established district of the region excised from Kwimba district. The districts are divided into 33 divisions; these in turn are further subdivided into 168 Wards (URT, 2008). According to the 2012 national census, the Mwanza Region had a population of 2,772,509, which was lower than the pre-census projection of 3,771,067 (URT, 2012).

Shinyanga Region is located south of Lake Victoria at 20 to 160 kms from the shorelines, forming part of what used to be known as the Sukuma land. The region lies between longitudes 31° and 35° Eastern and between 2 and 3 Southern latitude. In the Eastern part, the region bordered with Arusha Region, to the South there is Tabora Region and to the West Kigoma Region. To the northwest there is Kagera Region and in the North the region bordered with Mwanza Region. The region has a tropical type of climate with clearly distinguished rainy and dry seasons. According to meteorological statistics the average temperature for the region is about 28°C . The

region experiences rainfall of 600mm as minimum and 900 mm as maximum per year (URT, 2007).

The two regions (Mwanza and Shinyanga) were selected due to being among the leading regions in having large cattle population. According to the National Sample Census for Agriculture (NSCA) latest figures of 2008/2007, Mwanza and Shinyanga regions in the Lake Zone had the largest population of cattle in Tanzania. Shinyanga region had a total of 3.65 million cattle equivalent to 17 per cent of the total cattle population of Tanzania Mainland. Mwanza had 1.97 million cattle equivalent to 9 percent of the total cattle population. About 44.8 and 36.6 per cent of households in Shinyanga and Mwanza regions respectively are rearing cattle (NSCA 2007/2008). Also due to the reason that the regions are prone to drought, the feedlots production system is highly practised there as a coping strategy for saving cattle and as a commercial activity.



Figure 3.1: Map of Mwanza Region


Key:

 : Studied area



Figure 3.2: Map of Kahama District in Shinyanga Region

Key:

 studied areas

Economy of Mwanza region is dominated by smallholder agriculture who account for 85% of the region's population followed by the fisheries sector and mining. Mwanza is the leading producer of cotton, which is one of Tanzania's major export cash crops. For the past two decades, cotton production has declined basically due to low profitability and inefficient marketing arrangements. The major food crops in the region are maize, cassava, sorghum, millet, sweet potatoes, paddy, and legumes (URT, 2008). Fisheries activities have instead taken the lead, done on the fresh waters of Lake Victoria is one of the most important undertaking by the people of Mwanza especially those living along or close to the lakeshore and those living in the numerous islands of Lake Victoria.

According to March 2006 census, the region had a total of 56 321 fishermen with 16 911 fishing boats/canoes. There were 208 079 fishnets, 3 455 special finest for "dagaa" (*restrineobola argentius*) and 2.264 million fishhooks. The fish produced in the area include Nile perch (Sangara), 43 Plagic cyprinids (Dagaa), *Synodontis* (Furu), *Tilapia* (Sato), *Monmyrus* and catfish (Mumi). Mwanza region has a lot of

very interesting tourist sites, games reserved and national parks worth visiting. Some of these areas are Kayenze Ports, Uhuru parks, big stones, State House, Utemini (Lords Palace), Old Boma, Sanane Island and many sites that are more interesting (Kadigi, 2014).

Economy of Shinyanga is also dominated by Agriculture employing about 80 per cent of the total labour force of the region. The major cash crops are; cotton, sunflower, tobacco, and chickpea while the food crops are; maize, paddy, sweet potatoes, cassava, sorghum and bulrush millet (URT, 2013). There are large scale industries employing more than 50 workers; medium scale industries employing between 10 and 49 workers; and small scale industries employing 1 to 9 workers industries in Shinyanga (URT, 2013).

3.6 Population of the Study

Population is defined as an aggregate or totality of all the objects, subjects or members that conform to a set of specifications (Polit and Hungler 1999). The target population for a survey was the entire set of units for which the survey data were expected to be used to make inferences. This included individuals livestock farmers who keep livestock at household level in Mwanza and Shinyanga Regions; individuals feedlots operators i.e. owners and attendants from both regions and individuals inputs suppliers who were sellers of veterinary drugs and feeds provided information on the availability and prices of inputs. The said information was very crucial as it provided inputs in prediction and determination of profit in production system. Veterinary doctors and livestock officers and field officers were involved in this study, as sources of information on disease control and feeding management of

the livestock such as treatment cost, which contributes to inputs of production. Cooperatives officers in the district were also involved in the study as experts in cooperatives formation, which might be useful in commercialization of the sectors as it assures marketing of the product.

The other target populations were individuals' traders in primary and secondary markets, beef cattle traders; butcher men; middlemen. People from community surrounding the feedlots were also interviewed

3.7 Sampling Procedure and Sampling Frame

3.7.1 Sampling Procedures

Multistage sampling method was used to obtain respondents, involving combination of purposive sampling, simple random sampling and snowball sampling techniques at different stages. The two regions Mwanza and Shinyanga regions and their respective districts namely Nyamagana, Ilemela, Misungwi, Kwimba, Sengerema, Magu (Mwanza) and Kahama mji, Ushetu and Msalala in Kahama were selected purposively due to their potential in practicing the feedlots production. The livestock farmers involved in qualitative data collection through focused group discussions were randomly selected from the farmers present in the markets during data collection. The total number of farmers who attended the markets was identified from markets officials' records (Sample framework) and assigned number and each number had an equal chance of being picked and included in the total number of farmers included in FGD. The selection of the markets followed the following procedures. Firstly, three districts were selected from each region. In Mwanza, Nyamagana, Misungwi and Kwimba were randomly selected out of five districts. In

Kahama as the target district from Shinyanga region, all three districts were selected, Kahama mji, Ushetu and Msalala followed by selection of one primary market from each district depending on coincide of the date when the market operate. The markets selected where; Igoma market in Nyamagana district, Misasi market in Misungwi district, Bungulwa market in Kwimba ,Manzese market in Kahama mji, Masabi market in Msalala and Chona market in Ushetu.

The feedlots operators (owners and attendants) involved in quantitative data collection using copies of questionnaires were obtained through snow ball sampling technique and simple random sampling where by the initial group of them were identified and interviewed and then requested to help identify and contact the other feedlots operators who were subsequently interviewed (Greener, 2008). The first group in Mwanza was feedlots operators in Igoma who after being interviewed they lead to others by showing the direction and even provided the mobile phones numbers of their colleagues. The snow ball method was appropriate due to lack of comprehensive information on number and locations of feedlots farmers in the government offices. The main reason for this was the unofficial operation of these feedlots along the main roads of municipality.

The feedlots operators in qualitative data collection (focus Group discussions) were randomly picked using a sampling frame created by snowball sampling done during the quantitative data collection. Traders, butchers and middlemen as stakeholders in beef cattle marketing participated in focus group discussions. These were randomly sampled from the six selected primary markets in six districts from two regions. Key informants such as: livestock officers, livestock field officers, veterinary doctors,

district cooperative officers and extension officers were purposively selected from the six districts of the two regions. Inputs suppliers as well as people living near the fattened beef cattle feedlots were also purposively selected.

3.7.2 Sampling Frame and Sample Size

Unfortunately, there was no official record of traditional beef cattle feedlots operators, traders, middlemen and butchers in the district's office. The reason for this was revealed during the key informant interviews, that, most of these feedlots operators were not officially recognized by the government, since they are undertaking their operations in peri-urban area of the municipality where it is not allowed due to environmental pollution. Secondly, the feedlots operations were on and off due to seasonality. A sampling frame was created through snowball sampling technique, which provided a room for random selection of 119 traditional beef cattle feedlots operators that were included in the quantitative data collection both in regions.

The sample determination was done as usual using the sample determination formula

$$n = \frac{Z^2 pg}{d^2}$$

Whereby:

n= Sample desired when population is > 10,000

Z = standard deviation which is normally (1.96)

P = Proportion in the target population which is 50%

q= 1.0-p

d= Degree of accuracy which is 0.05

$$n = \frac{(1.96)^2 \cdot (0.5 \cdot 0.5)}{(0.05)^2}$$

$$n = 384$$

The desired sample was created by snowball techniques as explained, then the probability sample is simple random sampling was necessary to give an equal opportunity for every participant to be selected for the research. Therefore through simple random sampling 119 sample sizes for quantitative data collection was created. This sample size was meaningful for analysis as it was argued and confirmed that a minimum of 100 respondents is enough for each group when a comparative study is conducted (Sudman 1976). On top of that, the choice of this sample is reasonable due to limited time and funds but fulfils the requirements of the study for meaningful analysis (Bailey, 1994).

3.8 Data Sources and Collection Techniques

3.8.1 Primary Data

Primary data were collected from a representative sample of stakeholders who were directly or indirectly involved in the traditional beef cattle feedlots operations in Lake Zone regions particularly Mwanza and Kahama.

3.8.2 Secondary Data

Secondary data such as livestock census in Tanzania from Livestock Sector Development Strategy and Tanzania National Export Strategy was obtained from Ministry of Agriculture and Livestock development.

3.9 Data Collection Methods

The study employed both quantitative and qualitative data collection techniques, with more emphasis on quantitative.

3.9.1 Quantitative Data Collection Method

The quantitative data were collected using Questionnaire survey annexed as Appendix 1.

3.9.2 Qualitative Data Collection Method

The qualitative data were collected using interviews and Focus Group Discussions.

3.10 Data Collection Tools

3.10.1 Questionnaire Survey

In order to solicit background information and familiarize with the study area, a pilot survey was done in Mwanza. Pre-testing of questionnaires was conducted in circumstances that are as similar as possible to actual data collection and target population members as similar as possible to those that were sampled. Therefore, pre-testing of the questionnaires using 20 traditional beef cattle feedlots operators was carried out in order to test validity and reliability of questions. Following the pilot survey some amendments were made to the questionnaires and interview guidelines, whereby questions were added, some were deleted while others were reframed to make them clearer and easier to understand.

The structured questionnaires with open and closed questions regarding commercial viability of traditional beef cattle feedlots production were administered to 119

respondents, mainly traditional feedlots operators (owners and attendants) in Mwanza region and Kahama district. Information gathered were; list of inputs costs and outputs used to estimate cost benefit efficiency of running traditional beef cattle feedlots, market access for traditional beef feedlots cattle, and possibilities for transforming traditional beef cattle feedlots into contract farmers through farmers association.

3.10.2 Focus Group Discussions

Focus Group Discussions were used to identify cultural norms, attitude, perceptions and determinants of viable beef cattle production. This method involved in depth discussions with a small group of respondents drawn from similar backgrounds, which were believed to have general knowledge and well informed on traditional beef cattle feedlots operations. The advantage of this method is that it allows the interaction with a range of key informants and allows the researcher to focus on group norms and dynamics around the issue being investigated (May,1993). Moreover focus group discussions are useful in verifying and clarifying information and in filling in gaps of information caused by inadequate information gathered from the interviews and observations.

In this study a total of twenty eight (28) focus group discussions were conducted with 12 discussants selected from six primary markets namely; Misasi, Bungulwa and Igoma in Mwanza and Manzese, Masabi and Chona in Kahama. Eighteen (18) focus group discussions were conducted among livestock farmers, feedlots operators and livestock (traders, butchers, and middlemen) in six districts i.e. one focus group discussion from each category of discussants in each district. The following

discussants; livestock officers, livestock field officers, veterinary doctors and extension officers (government officials) were grouped in a single group district wise. That is to say each district in Mwanza and Kahama had one focus group discussion for government officials. Two focus group discussions were conducted among the input suppliers of Mwanza and Kahama.

Moreover, people living around the feedlots participated in two focus group discussions, one in Mwanza and the other one in Kahama. The checklists see (appendices 3, 4, 5, 6, 7, and 8) were the basic tool for conducting focus group discussions. Discussants' responses were recorded in a notebook and voice records through mobile phone after getting their permission during the discussions.

3.11 Data Analysis

3.11.1 Data Processing

Data collected through the questionnaire were sorted, coded, and entered into the Statistical Package for Social Sciences (SPSS) for windows versions 16.0. Cleaning was done by consistency checks and treatment of missing responses. Quantitative data analysis was done using SPSS and Microsoft Excel 2010 and MaxDEA Pro 6.4 softwares. The SPSS computed descriptive analyses (frequencies, percentages, cross tab, multiple responses) and multiple linear regressions analysis. Whereas Microsoft Excels was used to compute and combine the production inputs and outputs costs before entered into MaxDEA Pro 6.4 software for Data Envelopment analysis of cost benefit efficiency. Qualitative data were transcribed and coded, divided into themes and reviewed before used in discussion.

3.11.2 Data Analysis

In addressing the objectives of the study, several statistical techniques and methodologies were employed. These methodologies were; Data Envelopmental analysis (DEA), multiple linear regression and descriptive data analysis and thematic analysis for qualitative data.

3.11.2.1 Data Envelopmental Analysis

Profitability in terms of cost benefit was calculated as cost benefit efficiency using Data Envelopment Analysis (DEA) model in Max DEA Pro 6.4 software and Microsoft excel 2010. The DEA involved computing sums of outputs over sums of inputs. The list of all inputs costs used in traditional feedlots production and outputs cost were obtained and computed using MS Excel 2010, which was then uploaded into the software. The inputs used in traditional feedlots operation were; purchasing cost per unit number of the cattle, feeds costs, operational costs and marketing costs. The outputs included the live selling of cattle, slaughtered cattle, selling of manure and selling of skin.

The purchasing cost of cattle to be fattened is defined as the price of cattle multiplied by the number of cattle to be fattened. The feed costs included the price of each feeds multiplied by quantity of the feeds purchased. These feeds include; cotton husks, cotton seed cakes, rice polishing, hominy meal, common salts and mineral salts. The operation costs in this study has included; labour power costs, interest attention cost, veterinary doctors and veterinary medicine costs, yardages maintenance costs, transportation costs, taxes and levies, grazing costs and government costs compensation on environmental degradation, water bill costs and feeders costs. The

marketing costs are the costs involved in marketing of cattle and by products such as transportation costs of the cattle to the market, meals and accommodation in the market, bus fare of the operators to and from the market, taxes and levies paid during marketing, labour costs at the markets, fine paid to police/ traffic on the road during transportation of the cattle (violating transportation rules and regulations) and Escort costs.

The efficiency was estimated using Max DEA Pro 6.4 software for Data Envelopment Analysis, which was developed by Gang *et al.*, (2014), it measures the magnitude of inefficiency of the inefficient units compared to the best practice units. The best practice units are relatively efficient and are identified by a DEA efficiency rating of $\Theta = 1$. The inefficient units are identified by an efficiency rating of less than 1 ($\Theta < 1$).

In this study it was difficult to weigh the inputs and outputs therefore the analysis was based on the assumption that all inputs have equal weight in production as well as the output. Since the interest was to determine the individual performance of feedlots operation, the cost benefit calculation used tangible inputs and outputs as proximal measure since it was difficult to trace the intangible inputs and outputs.

3.11.2.2 Multiple Linear Regression

The profitability (cost benefit) of traditional beef cattle feedlots operations in Lake Zone was hypothesized to be determined by a number of factors specifically, government support (access to credits, vaccination, inputs subsidy, taxes and levies, livestock policy), supportive infrastructure (land, feeds inputs, availability of

drinking water, and deep tank for ectoparasite control), Skills and capacity building (livestock skills, entrepreneurship skills and veterinary skills). Markets and marketing includes; markets channels, contract farming, marketing information, sales and transactions. The determination of individual factors to the profitability of the traditional beef cattle feedlots operated in the study area was assessed using multiple linear regressions analysis. The essence of using multiple linear regression analysis was to see how the variables can be predicted using liner function of a set of other variables (Alfred, 1998). In particular to see how profitability of traditional beef cattle production is related to markets and marketing access, government support, infrastructure and skills and capacity building in traditional beef cattle production.

The simple equation that was employed was specified as follows:

$$R_{z,xy} = \sqrt{\frac{r_{xz}^2 + r_{yz}^2 - 2r_{xz}r_{yz}r_{xy}}{1 - r_{xy}^2}}$$

In analysis:

Whereas;

R= Correlation coefficient

X , Y, Z= Variables

The profitability is the ratio of outputs costs and the inputs costs involved in the production as dependent variable, which was measured as a continuous variable that is at ratio level. Infrastructure facilities variable is defined as access to supportive infrastructure to traditional beef cattle feedlots operations with five (5) indices as described in the conceptual framework, scale ranging 1-5, one-two low, three neutral

and four-five being high. These are said to be important since weight gain of the animals during fattening might be hindered / interfered by diseases. Dip tank seems to be an economical way of treating external parasites as it treats lot of cattle in a limited volume of mixture of drugs and water for a specified time. It was one of the independent variables that were analyzed to predict the profitability of traditional beef cattle feedlots operation measured on as dummy variable 1= Yes and 0=No.

Market and marketing in the context of this study, refers to ways in which the fattened cattle and cattle products are routed from the production to consumers in direct cash sale, contract farming. Generally, they are all directed into readily available market i.e. operators being assured of disposal of their products when ready. This variable had was about five indices as described in conceptual framework ranging from 1-5 (1-2 being low, 3 neutral and 4-5 high). This was another independent variable with dummy level of measurement 1=Yes and 0=No computed in multiple regression model.

Skills and capacity were about technical support in TBCF operations in terms of training on knowledge and skills on management of beef cattle in feedlots and business techniques. Since the knowledge and skills are power to any situation operations done as documented by Kaeter and Cothran (1992), training influences the process that helps to improve quality and that quality begins and ends with training. The variable had three indices as described in the conceptual framework, ranging from 1-5, 1-2 being low, 3 neutral and 4-5 high. It was another independent variable being computed in multiple regression model with the dummy level of measurement I =Yes and 0=No.

Government support was among the four independent variables used in the multiple regression models during assessing the profitability prediction factors. This variable it had five indices as explained in the conceptual framework, ranging at the scale of 1-5, 1-2 being low, 3 neutral and 4-5 being high. The traditional fattening requires a lot of treatments since most of the cattle in feedlots are taken when sick, emaciated and malnourished. So a lot of money is used to buy drugs. Subsidies of these drugs would be very important and useful i.e. the government-controlled inputs (and outputs) marketing system, in which farmers are supplied with agricultural inputs at controlled and subsidized prices, and often on heavily subsidized credit (Kenneth *et al.*, 2012).

3.11.2.3 Descriptive and Thematic Data Analysis in Identification Market

Channels

This was about highlighting the route of traditional beef cattle commodity within the sub sector from the level of feedlots operations to the consumers i.e. value chain analysis. It involved identifying value of the commodity and key stakeholders involved at each level. Data collected through the questionnaire were analyzed descriptively while those collected through key informant interviews and focus group discussions were analyzed through thematic analysis. Thematic analysis is a categorizing strategy for qualitative data. It is a process of "encoding qualitative information" thus the researcher develops "codes," words or phrases that serve as labels for sections of data (Boyatzis, 1998). The analysis involved the transcription of recorded key informants interviews and focus Group discussions, followed by generation of codes and division into themes. The themes were reviewed, defined

and assigned names, which were then developed into a pattern used for report writing.

3.11.2.4 Descriptive Analysis and Thematic Analysis in Assessment of Marketing Transformation of TBCF

In this objective the focus was on the profitability of market transformation, which in turn supports commercialization. The assessment was descriptive i.e. frequencies and percentages. The variables under the assessment were; awareness of contract farming and readiness to enter contract farming.

3.11.2.5 Descriptive Analysis in Assessment of Socioeconomic Benefits Obtained from TBCF

The data for assessment of benefits derived out of traditional beef cattle feedlots operations were analyzed descriptively i.e. frequencies and percentages. The direct benefits of TBCF to feedlots operators were identified through responding to a question, which was asked as, “What development issues have you managed to do using the profit you made out of TBCF?” It was a multiple response questions that individual respondents were allowed to give more than one responses. A list of benefits was obtained and they were grouped into four categories namely; assets accumulation category, social benefits category, business benefits category and services benefits category. Assets accumulation simply is the piling of assets out of the interest obtained from the business while social benefits mean the social comforts that have been generated out of the business’s interests. The use of business interest in generation of other business was considered to business benefits. Service benefits

meant the amenities created by the presence of the existing business. Indirect socioeconomic benefits of traditional beef cattle feedlots focused on the benefits that people living in the community around the feedlots operations got.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Chapter Overview

This chapter presents study results and discussions, which are presented on basis of objectives of the study. The first item in this chapter is the overview of respondents' characteristics followed by cost benefits of feedlots operations in the study area. The next section is on markets and marketing of traditional fattened beef cattle, specifically on value chain analysis and markets channels.

The chapter also discusses the possibilities of transforming markets into contract farming and farmer's cooperatives. Lastly the contribution of traditional beef cattle feedlots on the socioeconomic status of feedlots operators and people living around the feedlots is presented and discussed.

4.2 An Overview of Characteristics of Respondents

4.2.1 Socio-Economic Characteristics of Traditional Beef Cattle Feedlots

Operators

The general demographic and socioeconomic characteristics of traditional beef cattle feedlots operators are presented in Table 4.1 Sex, age, district of residence, education level, experience in the feedlots operations, and number of cattle purchased for feedlots operations and economic activities of the respondents were the variables representing demographic and socioeconomic characteristics of the respondents.

Table 4.1: Demographic and Socioeconomic Characteristics of Respondents

Demographic & socio-economic characteristics	Frequency(n=119)	Percentage
Sex		
Male	119	100.0
District of residence		
Kahama	59	49.6
Sengerema	19	16.0
Nyamagana	18	15.0
Magu	10	8.4
Kwimba	10	8.4
Ilemela	3	2.5
Age		
16 to 25 years	23	22.8
26 to 35 years	26	25.7
36 to 45 years	34	33.7
46 to 55 years	13	12.9
56 to 65 years	4	4.0
Above 66 years	1	1.0
Number of cattle owned by respondents in groups		
1-36 cattle	70	58.8
37-73 cattle	41	34.5
74-110 cattle	5	4.5
> 111 cattle	3	2.5
Education level		
Never attend school	23	19.3
Primary	82	68.9
Secondary	9	7.6
College	4	3.4
Experience (years)		
0 to 5	99	83.2
6 to 10	16	13.4
11 to 15	2	1.7
16 to 20	2	1.7
Economic activities		
Livestock Keeper and business	59	57.8
Livestock keeper and crop farmer	37	36.1
Livestock keeper, crop farmer and business	4	3.9
livestock keeper, business, Salaried employed.	2	2.0

4.2.1.1 Sex of the TBCF Operators

It was revealed that all of the traditional beef cattle feedlots operators (owners/attendants) were men; this could be due to the reason that a cattle rearing is the work of men and young boys in most of the lake zone areas. One respondent, a feedlots operator in Kahama, said that: " *Women are not capable of this manual work, it is tough work*". Additionally, Shayo and Martine (2009) have reported that men assume that a woman's primary commitment is to care for a family at home, in the 'reproductive' sphere of life; and that each woman depends on a male provider for cash needs. In reality the women's role in livestock concentrates in certain livestock husbandry and not business. In transhumant systems, women typically have complete responsibility for animals that are kept close to the homestead, such as poultry, calves and other small livestock, and for sick animals. Women rarely have major herding and management responsibilities for large stock (Niamr-Fuller, 1994). Women's role is often reduced to that of laborers as they can't be able to compete with men or derive the same benefits (Waithanji, *et al.*, 2013).

4.2.1.2 Age of the TBCF operators

The ages of the respondents were grouped into six groups at the interval of 10 starting from 16 years; the mean age was found to be 35.7 years. The majority of them were 36 to 45 years, old as presented in Table 4.1. To see how age group was distributed among other socioeconomic characteristics, it was cross tabulated with experience of the feedlots operations, cost benefits of feedlots operations, occupation of the respondents and number of cattle in the feedlots as presented in Table 4.2. It was revealed that TBCF operators aged 36 to 45 years were the most numerous of

the respondents who has 0 to 5 years of experience with feedlots. This mainly imply and confirm that feedlots operations is a more recent economic activity taking advantage of the increasing demands though Mlote *et al.*, (2012), reported beef cattle fattening started much earlier in Shinyanga regions (around 1994), compared to Mwanza region where it started in 2007.

The age group of 36-45 years showed to have high CBR (profitability) that was greater than 1. The results demonstrate that feedlots operators in that age group produce at profit. The results are on contrary with Age Uk, (2014), said that there is little consistency in the relationship between ageing and work performance. On the other hand these results confirm previous research suggesting that farms whose operators were over 50 years old earned less than younger farmers (Weiss 1999: Mshenga *et al.*, 2008). With TBCF business operators with 36-45 years of age occupy big number of cattle i.e. 17.8% out of 58.4% cattle in the group of cattle (1-36), 12.9% out 35.7% cattle in the group of cattle(37-73) and 3% of 4% cattle in the group of (74-110).

As number of cattle is related to economies of scale obvious operators with large number of cattle are likely to produce at profit compared to farmers with small number of cattle. Another scenario associated with this result is 20.0% out of 61.7% of TBCF operators who practice both livestock keeping and business as their occupation are operator with 36-45 age group. This indicate and conform that, younger farmers, may also be more entrepreneurial and willing to tolerate the risk associated with innovation (Mshenga *et al.*, 2008), hence improves the profit of their production.

Majority of the respondents attained primary school education with few at college; this might affect one way or other efforts of commercialization. Okello, (2012) realized and confirmed that, socio-economic characteristics of smallholder producers affect their ability to become commercial producers. For example, poor education and low literacy levels result in poor networking, negotiation and management skills.

Table 4.2: Ages Distribution among other Socio Economic Variables

Variable	Age group of respondents (years)											
	16 to 25		26 to 35		36 to 45		46 to 55		56 to 65		Above 66	
	N	%	n	%	n	%	n	%	n	%	n	%
Experiences (Years)												
0 to 5	20	19.8	22	21.8	27	26.7	10	9.9	3	3.0	0	0.0
6 to 10	2	2.0	3	3.0	6	5.9	3	3.0	0	0.0	1	1.0
11 to 15	0	0.0	1	1.0	0	0.0	0	0.0	1	1.0	0	0.0
16 to 20	1	1.0	0	0.0	1	1.0	0	0.0	0	0.0	0	0.0
CBR												
Less than 1	3	3.0	1	1.0	3	3.0	2	2.0	0	0.0	0	0.0
Equal to 1	19	19.0	25	25.0	31	31.0	11	11.0	4	4.0	1	1.0
Occupation of the respondents												
Livestock keeper and business	14	16.3	12	14.0	18	20.9	8	9.3	1	1.2	0	0.0
Livestock keeper and crop farmers	6	7.0	8	9.3	10	11.6	3	3.5	2	2.3	0	0.0
Salaried employee	0	0.0	1	1.2	0	0.0	0	0.0	0	0.0	0	0.0
Livestock keeper, crop farmers and business	0	0.0	0	0.0	2	2.3	0	0.0	9	9.0	1	1.2
Number of cattle												
1-36	19	18.8	13	12.9	18	17.8	6	5.9	2	2.0	1	1.0
37-73	4	4.0	11	10.9	13	12.9	7	6.9	1	1.0	0	0.0
74-110	0	0.0	0	0.0	3	3.0	0	0.0	1	1.0	0	0.0
> 111	0	0.0	2	2.0	0	0.0	0	0.0	0	0.0	0	0.0

4.3 Profitability of TBCF as a Pre requisite of Commercialization of Beef

Cattle Production

Profitability of a business or investment attracts new entrants into a business is a pre-requisite for commercialization. It is documented that in a competitive industry, high profit levels reflect high productivity and efficient use of resources (Mlote et al., 2012). The profitability of TBCF in Lake Zonewas calculated using cost benefit ratio (CBR). It was found that, 85.7% of the traditional beef cattle feedlots operations in the study area, operated at profit, since the CBR was equal to 1. This indicates that TBFC are operated at profit. Since more than half of the feedlots operators operated at profit, it can be generalized that, the TBCF production in the study area is profitable hence there is a potential for investors to take advantages and hence promotes commercialization. However, there are other units (14.3%) that operate at loss. Appendix 9, Present the CBR results from DEA.

Table 4.3: Cost Benefit Ratio Categories (n=118)

Cost benefit efficiency (CBR) categories	Frequency	Percentage
CBR less than 1 (<1)	15	14.3
CBR Equal 1 (=1)	102	85.7
Total	118	100

Table 4.4 shows that, there was positive relationship between cost benefit ratio and the number of cattle kept. The results revealed that feedlots with herds' size ranging from 1-36 cattle had the highest cost benefit ratio compared to as presented in Table 4.4. This was in contrary to the theory of production, in particular

economies of scale. Economies of scale as equivalent to a falling long-run average cost function which can be considered either with respect to size offirms (Smith, 1955). This would imply that, feedlots with large number of cattle at fixed average cost of productions were expected to have high profit in terms of cost benefits. The reason of the results above could be associated with inaccurate information since most of the information was drawn from memory rather than written records. It was also speculated that some respondents could have concealed the true number of cattle owned and profit made for the fear of talking to strangers. However, the relationship between number of cattle and CBR was not statistically significant.

Table 4.4: Relationship between Cost Benefit and Number of Cattle (n=119)

Number of cattle	1-36		37-73		74-110		> 111	
	n	%	n	%	n	%	n	%
Cost benefit ratio								
CBR less than 1	16	13.4%	1	0.8%	0	.0%	0	.0%
CBR equal 1	67	56.3%	29	24.4%	3	2.5%	3	2.5%

4.3.1 Determinants for Profitability of Running TBCF in Commercialization

Since profitability is a pre requisite for commercialization, it was important for this study to find out the correlation between profitability and predicted factors. It was assumed that profitability dependon; government support, infrastructure support, technical and business skills and marketing access. The association was measured statistically using the multiple correlation analysis. The results are presented in Table 4.5.

Table 4.5: Correlation between Profitability and Government Support, Market and Marketing, Infrastructures and Skills and Capacity

	Correlation s	Governme nt support	Market& Marketin g	Infrastructur e	Skills&capacit y
CBR categor y					
	Pearson Correlations	-.016	.033	-.048	-.058
	Sig (2- tailed)	-.286	.724	.605	.532
	Covariance	-.002	.010	-.013	-.012
	N	119	119	119	118

The analysis considered the direction of the relationship as well as the strength of relationship or association i.e. positive or negative and the magnitude or correlation. The results indicate that profitability of traditional beef cattle feedlots operation was negative associated with Government support, infrastructure and skills and capacity and positive associated with market and marketing. The correlation of Government support with profitability can be both sides positive and negative. According to King, 2006) government support through its policies may be a help or hindrance to animal production. It can be on positive when it promotes the access & ownerships of land, subsidies that encourage production, with tariffs that discourage competition from imports, and through financial programs that make credit available to farmers.

On the negative side is when official policies encourage overgrazing, heavy reliance on plantation crops, exploit farmers to maintain low consumer prices and allow exportation of by-products that could be used in livestock rations (King 2006).

Therefore the positive or negative association on government support would depend on the role played by the government at that particular time. For commercialization the government has to play a positive role in promoting livestock production and hence profitability. In the other side the correlation (-0.06) between profitability could be explained by small sample size of the respondents and the possibility of respondents giving wrong responses. Another reason may be due to lack of knowledge on the role of government in supporting the livestock production and also the misunderstanding between government and feedlots producers. As it was mentioned earlier in the challenges of data collection is that these operations are done in unofficial premises closer to urban areas.

The similar pattern was observed between profitability and infrastructures ($r = -0.048$), as that means improvement or any innovation to support infrastructures development would results to a lower profitability. The negative impact of improved infrastructure to profitability is that the innovations are too expensive to be afford by individuals' feedlots operators for example constructions of deep tanks for ectoparasite control and treatment.

Moreover the results shows that, increase in skills and capacity had no impact on the increase of profitability of traditional beef cattle feedlots operations ($r = -0.058$). This could also be due to the fact that, these producers don't see the role of skills on their business even if some of them received few skills of which they have no implications on their business. This is on contrary with other studies, which emphasize skills and capacity can be management capacity is associated with profitability in running a

business. Management capacity is about having appropriate personal characteristics and skills to deal with right problems and opportunities in the right moment and in the right way (Makinen, 2013). This is to say skills and capacity are necessary for efficiency performance of production and to remain profitable, a farmer has to perform efficiently as possible (Grifele-Tatje and Lovell 1999). For commercialization skills and capacity are necessary and important since they tend to enhance efficiency performance, which strengthens productivity and profitability.

However Market and marketing access was found to have positive association with profitability although the association was weak ($r=0.033$). This indicates that the beef cattle feedlots operators are aware on the role of market in profitability of their production. The result is also supported by the feedlots operators' perception on the factors for profitability in Table 4.6; the availability of ready markets is the first determinant of profitability. The findings are supported by other studies such as, the one done by Sigalla, (2010) who reported that profitability increased due to the marketing strategies employed than the effect of price, quality, and place.

4.3.2 Beef Cattle Producers' Perceptions on Commercialization

To see whether the traditional feedlots operators' perceptions on commercialization match with the literature on factors influencing commercialization a set of factors were derived from the literature and were given to them. These were: large number of cattle purchased for fattening, ready available market, proper disease control, feed price, proper grazing, experience of feedlots operator, types of cattle purchased for fattening, education level of feedlots owner, the capital of feedlot owner and the

transportation cost to the market. The responses on perceptions is summarized in Table 4.6.

Table 4.6: Perception on Determinants of Profitability

Perception statement (n=119)	% Perception score		
	Agree	Disagree	Neutral
Is large number of cattle for fattening leads to profitability	86.6	9.8	3.6
Is presence of readily markets leads to profitability	95.6	0.9	3.5
Is proper disease control leads to profitability	87.5	3.6	0.9
Is good feeds price leads to profitability	87.2	10.1	2.8
Is proper grazing leads to profitability	95.5	4.5	0.8
Does experience to feedlots operation leads to profitability	89.0	8.3	2.8
Are types of cattle purchased leads to profitability	80.9	14.5	4.5
Is education level of producer leads to profitability	85.3	8.3	6.4
Is capital of producer leads to profitability	94.5	3.6	1.8
Is transportation costs leads to profitability	92.5	1.9	5.7

The results in Table 4.6 show that respondents highly agreed that readily available markets are important for profitability in a TBCF business. This result was also supported during FGD in Kahama by one feedlots operator.

“There is no guarantee in the existing cattle markets; I can bring cattle to the market only to find more sellers than buyers. This situation creates a competition which leads to reduction of sale price and lower revenue than expected”

The participant explained that, the unreliable markets for finished feedlots cattle lowers their revenue which affect profitability since sometimes supply surface the

demand at the market and thus lower the price of cattle without consideration of production cost. More revealed in the FGD that readily available market was reported to reduce the existing markets transaction costs such as transportation, welfares of the sellers (food and accommodation), security of the cattle and labour costs at the market place, which could lead to increase in profitability. The importance of impact of market and marketing of product on profitability was also reported in fish study done by Kimathet *et al.*, (2013) in Kenya.

Availability of feeds either through grazing and or supplementation was also a major determinant of profitability of beef cattle production through TBCF. The perception based on the fact that, fattened animal stay for a short in feedlots, hence the availability of feeds throughout the fattening period is critical.

Likewise to such an operation one requires injection of enough capital. According to Malthur *et al.*, (2010) working capital management determine firm's profitability, however there is still ambiguity regarding the appropriate variables that might serve as proxies for working capital management.

However feedlots operators did not perceive that, education level had impact on profitability of feedlot production. This is due to the fact that, they believe the experience they have been acquired in their home on traditional cattle rearing since their childhood is enough for them to operate feedlots business. This is on contrary with feedlot business if there is a need for commercialization, skills and capacity improvement is crucial. It is easy to impart skills and capacity to people with education than people without as explained by Marther and Adelzadeh, 1998 that.

people with high education level are likely to analyse and interpret information than those who have less education or no education at all .

Table 4.7: Frequency of Respondents' Perception on Determinants of Profitability

Profit Determinants	Frequency	Percent
Readily available markets	108	10.9
Proper grazing	107	10.8
Proper disease control	105	10.6
The capital of feedlots owner	104	10.5
Transportation costs to the market	98	9.9
Number of cattle purchased for fattening	97	9.8
Experience of feedlots operator	97	9.8
Feed price	95	9.6
Education level of feedlots owner	93	9.4
Types of cattle purchased for fattening	89	9.0

4.4 Market and Marketing of Traditional Fattened Beef Cattle

According to American Marketing association (AMS, 2013:Barrett,2008), marketing is the process of planning and executing conception, pricing, promotion and distribution of ideas, goods and services to create exchanges that satisfy individual customers and organizations. Marketing in the present study is defined as buying cattle for fattening and selling of fattened cattle and markets are places where there is accumulation of buyers and sellers.

4.4.1 Markets for Purchase of Traditional Beef Cattle for Feedlots

It was revealed that the majority of cattle (83.5%) to be fattened were purchased within Mwanza and Shinyanga (domestic markets) and very few were purchased outside these two regions (regional markets). Table 4.8 summarizes the findings on

the markets that respondents buy the cattle to be fattened. The cattle are purchased from the small holders/ livestock farmers at the household levels, which are used as raw materials for feedlots, i.e. is to say for traditional beef cattle feedlots to exist there should be purchase of traditional beef cattle from smallholders/ livestock farmers.

Table 4.8: Categories of Markets for Purchase of Traditional Beef Cattle for Feedlots (n-119)

Markets for buying cattle	Response	
	Number	Percent
Domestic Market	223	83.5
Region Market	44	16.5
Total	267	100.0

The respondent mentioned about twenty domestic markets, where they are purchasing these cattle. The most mentioned markets were Bukombe, Misasi, Bungulo, Sengerema and Bulige & Uyonga. These markets are located in rural areas where high numbers of cattle are kept, hence high availability and high supply of cattle making the markets the most popular sources of cattle. The same areas are also prone to drought, which forces farmers to cull cattle during drought season by selling many cattle. Understanding of the source of raw materials and its supply and demand for feedlots is important for commercialization as expansion of production should go hand in hand with availability of raw materials.

The high preference for buying at the domestic market is influenced by the following facts; the low fetch price they get from livestock farmers through individual negotiation. The buyers take advantage of livestock farmers since they are less informed about market price, the fact that at times they are obliged to sell their cattle due to various reasons.

The regional markets accounted for 16.5 % of all the markets that were sources of cattle to feedlots operators. This is due to the fact that, they incur more costs such as the tracking/transporting from markets to feedlots, when they buy cattle from another region. In addition, the feedlots operators incur transport, meals as well as accommodation costs during their trips to regional markets. These tend to increase the purchasing cost of the beef cattle to be fattened, which at the end affects profitability of production.

4.4.2 Market Channels and Value Addition of Traditional Beef Cattle from

Feedlots

Marketing channels are routes through which agricultural products move from producers to consumers (Acharya and Agarwal, 2008). The market channels were identified through mapping the value chain. If a value chain initiative intends to explore market opportunities, value chain maps can show up differently market channels through which products and services reach the final customer (Staricko, 2015).

In order for the consumers to get beef out of the traditional beef cattle there involves the following chain of activities which are; production, trading of live beef cattle,

processing/ slaughtering, wholesaling butchering and retails as presented in the value chain mapping in Figure 4.1.

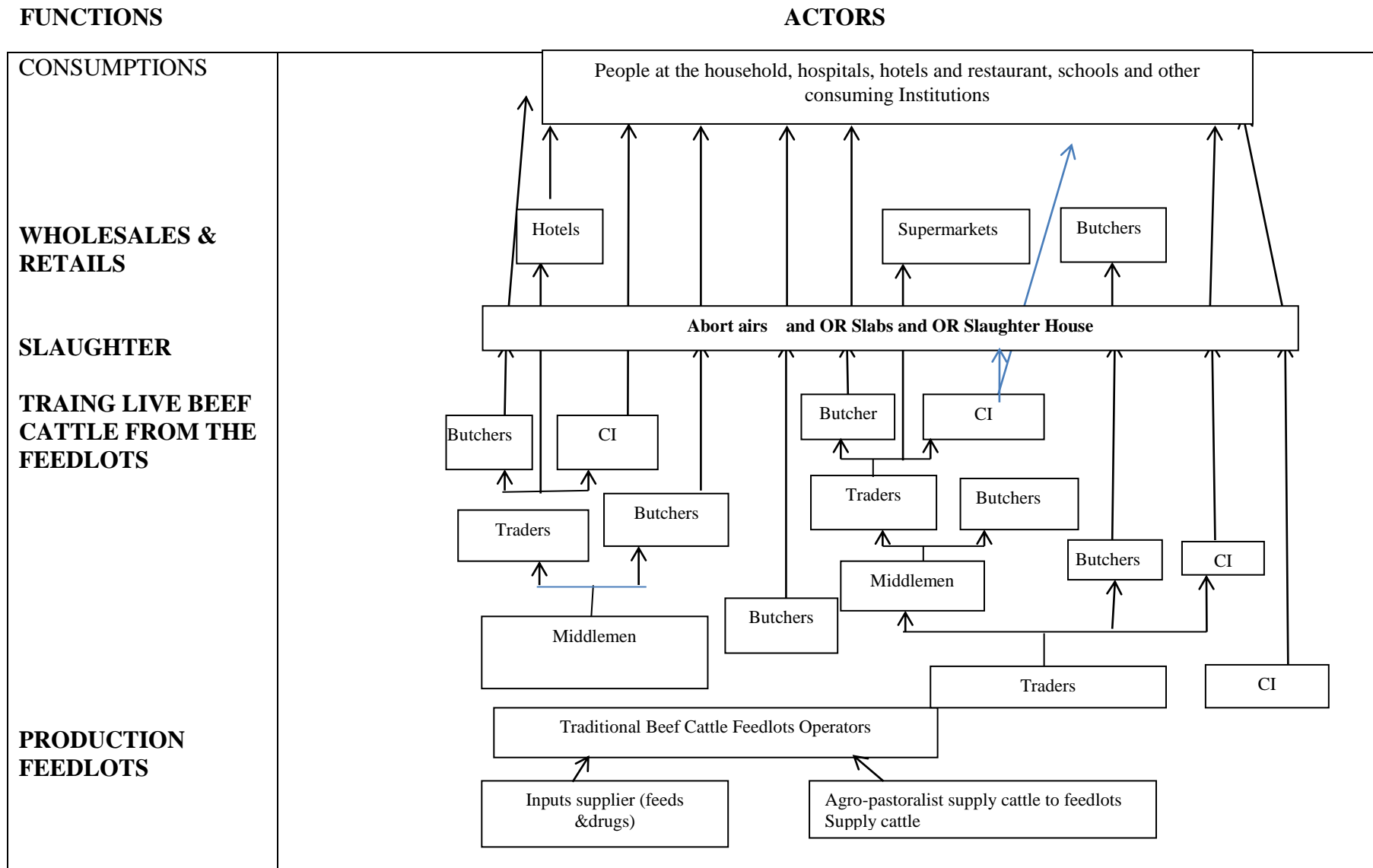


Figure 4.1: Value Chain Mapping of Traditional Beef Cattle

4.4.2.1 Actors in the Beef Cattle Value Chain in the Study Area

The major actors in the beef value chain in the study areas are agro pastoralist or livestock farmers, feedlots operators/owners, traders, middlemen, butchers, consuming institutions such as supermarkets, hotels and individual consumers

4.4.2.1.1 Agro Pastoralists/ Livestock Farmers

These are farmers from different parts of Mwanza and Kahama especially supply cattle thin and emaciated cattle as raw material in the major and preferable primary markets as identified in 4.4.1.

4.4.2.1.2 Feedlots Operators/Owners

These are feedlots practitioners who buy cattle as raw materials for their feedlots from agro pastoralist/ livestock farmers or middlemen. They add value to these thin and emaciated cattle through feeding the cattle with concentrates (cotton husks, cotton seedcake, rice polishing, minerals and water), which are nutritional feeds, together with grazing and treatment of disease. They sell the finished fatten cattle to traders, butchers and sometimes/ rarely directly to final consumers.

4.4.2.1.3 Beef Cattle Traders and Middlemen

Cattle from the feedlots are sold to traders in the primary or secondary markets in their proximity and they sell to different consumers including butchers and middlemen in different places. Middlemen are people who stay between producers or traders and consumers. They are very well informed about the business and most of the time dominates the market. In Lake Zone area ie Mwanza and Shinyanga these

people are nick named as “Wagalagaji” and are claimed to accumulate large market shares compared to producers.

4.4.2.1.4 Butchers

Owners and operators of butchers are actors who buys live beef cattle from feedlots operators or middlemen or traders in the primary or secondary markets for immediate slaughter.. They sell meat on a retail basis to restaurants, street vendors and individual consumers. These are noted to be important actors as they link producers, traders and final consumers.

4.4.2.1.5 Consuming Institutions

The consuming institutions are; supermarkets and hotels. Supermarkets mainly sell raw as well as processed beef and by-products directly to consumers for home consumption, which they buy from farmers or middlemen and traders. Hotels sell cooked meat to consumers depending on their preferences.

4.4.2.1.6 Individuals Consumers

These are the final actors in the value chain. These individual consumers buy meat from different sources like butcheries, supermarkets.

4.4.2.1.7 Service Providers and Inputs Suppliers

There are other stakeholders involved directly or indirectly in TBCF business by provision of services or goods (inputs). For services providers includes extension and veterinary specialists while, veterinary centers, stockiest and industries like gineries are the inputs suppliers of veterinary drugs, supplements and concentrates (feeds).

4.4.2.2 Market Channels of TBCF

The study identified the four main marketing channels (MC) of traditional fattened beef cattle in the lake zones as illustrated in Figure 4.2. The identification and classification of one to four market channels was based on the marketing preferences of traditional beef cattle operators during interview. The Each channel differs slightly in market behaviours and characteristics, which contribute to profitability to the producers and marketing price to consumers.

4.4.2.2.1 Market Channel One (MC1)

The market channel one is illustrated below:

MC1= Cattle from the feedlots ----- Middlemen -----Consumers

In this market channel, the cattle from the feedlots are sold or contracted to middlemen who sell them to traders and butcher men. The butcher men slaughter the cattle and sell the meat to the consumers directly in their butchers; the consumers may either cook the meat at household level or hotels and restaurants. The traders sell the cattle to either butcher men or consuming institutions like hotels and schools which then sell to the consumers. Therefore there are two sub channels in this main channel. The first sub- channel is the one from middlemen to butcher men or consuming institutions to consumers. The key actors in this channel are; feedlots operators who sell the cattle to the middlemen or give the cattle to the middlemen in certain institutional arrangements. The middlemen sell directly to butcherers /traders who slaughter and sell to consumers at butchers. The channel has effect to the operators since it passes in the hands of middlemen. The second sub-channel is the one from middlemen to traders who may sell to butcher men or consuming

institutions which lastly sell to consumers. The sub-channel have a bit long chains to butcher men which might increase the market transaction cost of beef and hence affect the price of beef to consumers. All in all the market channel number one is the most preferable market channel than others as involvement of middlemen who are the most influential agent easing the process of selling and somehow reduces the market transactions costs as feedlot operator doesn't stay long in the market. Middlemen dominated the market and reported to be the major means of market information (Staricko, 2015). The challenge with this channel the middlemen seem to gain higher market share those feedlots operators.

4.4.2.2 Market Channel Two (MC2)

The second market channel is the one that involved the passage of fattened cattle from feedlots to Butcher men to consumers and is illustrated below.

MC2 = Cattle from the feedlots -----Butcher men ----- Consumers.

The key actors in this market channels are feedlots operators, butcher men and beef consumers. This is the second channel to be preferred by feedlots operators since the butcher men are reliable buyers and they buy at good seasonal market price. In this route the transaction costs in terms of transport, taxes and levies, loading and off-loading costs are lowered due to short chain which leads to increasing market share of feedlots operators and reducing market price to the consumers.

4.4.2.3 Market Channel Three (MC3)

This market channel is when the cattle from the feedlots are sold in whole sale to traders, who sell to middlemen or butcher men or consuming institutions. The

channel consists of many sub channels. The sub-channel one is the one by which cattle from traders are sold to middlemen who may sell to traders again and to butcher men. It forms another route from this sub-channel from traders who sell to butcher men or consuming institutions, which lastly sell to consumers.

The butcher men from the main sub-channel one sell the beef to consumers. The second sub-channel is the one that cattle from the traders are sold direct to middlemen who sell to consumers and the third sub-channel involves selling of the cattle to consuming institutions, which consume. Generally, these three sub-channels are very long as cattle pass through many channels before reaching the consumers. Such hands are; traders twice and through middlemen, butcher men or institutions and consumers. The transaction cost in this market is very high which leads to high price of beef to the consumers.

The fourth sub channel is when the cattle from the traders is sold to butcher men and consuming institutions (hotels and restaurants, schools etc.) from the localities and even far places and last hand consumers who buy the beef. This sub channel is short. Traditional beef cattle operators prefer to sell their cattle to traders, due to the facts that, they sell at maximum price of the season since most of the traders transports to the next market places and even outside the country. Traders, on another side of the coin prefer to buy direct from the feedlots operators receiving good quality cattle at good price. Quality of the beef cattle which trickles to the quality of beef to the consumer is highly reserved in this route especially when the traders sell the cattle to butchers within the localities. Reliability of cattle supply from individual farmers is limited since it entirely depends on the cattle that are in finishing stages (in stocking

or out stocking). The supply also depends on the season, during the rainy seasons most of the feedlot operators are not operating. Therefore, the direct of supply from individual operators becomes, limited. Consumers receive beef or meat at a little bit lower price due to reduced marketing transaction costs

4.4.2.2.4 Market Channel Four (MC4)

The channels in which feedlots operators sell their cattle direct to the consuming institutions is called market channel four. The key actors in this market channel are feedlots operators and consuming institutions like hotels, schools and other companies. Feedlots operators, prefer this channel since the institutions are reliable buyers and they buy at good season market price. In this route the transaction costs in terms of transport, taxes and levies, loading and off-loading costs are lowered due to short chain which leads to increasing market share of feedlots operators and reducing market price to the consumers.

4.4.2.3 Markets Where the Cattle from the Feedlots are Sold

The traditional fattened beef cattle were sold in three markets categorized into domestic markets, regional markets and international markets. The proportion of market sales in these three markets is presented in Table 4.9. The most (57.6%) traditional fattened cattle from the feedlots were sold in domestic markets followed by regional market places (39.4%) and lastly in the international market places (2.9%). Selling in domestic markets had three options i.e. selling at farm gate, selling to the butchers and selling at local markets. The most (37.1% out of 57.9%) preferred option to the feedlots operators was selling at farm gate. Selling at farm gate was preferred as it entails no transactions cost to the feedlot operators but on contrary it

results in high price to consumers and low return to the farmers since the cattle are bought at low price. The issue of farm gate purchase and transactions cost is also well elaborated by Kadigi, (2014), “the farmer’s decision to sell at the farm gate rather than a more distant market may be influenced by the desire to avoid transaction costs involved in the latter option”.

Table 4.9: Categories of Market for Selling of Beef Cattle from the Feedlots (n=119)

Markets for buying cattle	Response	
	Number	Percent
Domestic Market	98	57.6
Region Market	67	39.4
International Markets	5	2.94
Total	170	100.0

Selling at local or primary markets was the second options in domestic markets. The primary market prefers more traditional cattle from farmers than fattened cattle, so few fattened beef cattle are sold in primary markets. Sometimes they cross the regions i.e. they sell cattle outside the production region such Dar-es-salaam at Pugu and even Zanzibar. This kind of market is categorized as regional market. The feedlots operators admitted to sell their cattle outside the country, which is referred to as international markets.

The most fattened beef cattle were exported to Kenya and Comoro. Unfortunately this international market is not officially recognized by the central government of Tanzania. The buyers from those countries come to our country with reference

people within the country and they visit the feedlots operators to explore their choices and buy. If they don't find their choices at that time, they make order and pay some amount in advance, then they come back later for their products.

The exploration of markets where TBCF operators sell their finished cattle is crucial since markets location determines the price of goods and profitability in the business. This is supported by different studies done inside and outside the country such as done by Staricko, (2015), proper market arrangements influence chain actors to work towards improvements of beef cattle profitability. Improvement of access to market and the establishment of an efficient value chain are therefore essential in order to enhance livestock farmers to excel (Word Bank, 2008; UNIDO, 2012).

Table 4.10 shows live beef cattle and other by-products out of feedlots and majority of the traditional beef cattle operators preferred to sell live beef cattle from the feedlots rather than beef. One of the reasons for this preference was reported by one of the respondents from Misasi as follow:

“I don't have enough slaughter houses for us to engage in selling beef”

Selling of live cattle is easy and fast for them as they don't have to stay long with the cattle after fattening. Unfortunately, the selling of live cattle is not perfect enough to provide profit to the feedlots operators as they need to diversify their sale through value addition so as to add more earnings. Every slight value addition has got impact on price of the product, which tends to increase profitability.

Manure as a byproduct from feedlots is the second product of sale by traditional beef cattle feedlots operators. Unfortunately, the sale of this product is in the form of

exchange, i.e. exchange of manure with land rent, since the majority of these operators hire a piece of land from the landlords who prefer to be provided with manure in return. That is why most of the respondents did not count the sale of manure.

Hide is the last option of selling, this is true due to low beef selling, which leads to limited slaughtering and hence skin production. One of the operators in Igoma Mwanza explained the following during a FGD.

“I don’t prefer selling skin, even if it happens that I slaughter an animal, simply because I don’t have knowledge and skills to produce quality skin.”

However, if the operators could have taken part in the hide and skin value addition chain could have been receive good returns to the investment. Value addition could be done in Cattle feedlots through production of beef, hides, horns and hooves. Knowing the products and by products generated from feedlots operations will add value in development of strategies for commercialization of the sub sector as every product will add and contributes to profitability.

Table 4.10: Selling of Traditional Fattened Beef Cattle and its Products (n=119)

If selling the named products	Selling trends %	
	Yes	No
Live beef cattle	95.0	5.0
Beef	1.7	98.3
Manure	4.2	95.8
Skin	0.8	99.2

4.4.2.4 Sales Transactions in Traditional Fattened Beef Cattle and its Products

The feedlots operators admitted to sell their cattle in either cash, or credit and even both depending on the marketing environment. The results in Table 4.11 presents

these sales transactions and most preferable sales transactions is cash as reported by (78.5%) of the respondents. This is due to the reason that, there is limited trust with their customers since the customers are not a permanent basis.

However there are driving factors which lead them to sell on credits, this is when there is higher supply of cattle in the market than the customers. The results concur with Tracy, (2006), who reported three types of sales transactions, which are cash sales, credit sales and advance payment sales. Cash sale is a sale in which cash is collected when the business makes the sale in exchange of the product, while Credit sale, cash isn't collected until sometime after the sale is made; the customer is given a period of time before it has to pay the business and advance payment sales is when the customer pays the business before the sale is consummated, that is, before the business delivers the product and/or service to the customer.

Knowing common sales transactions is crucial in the process of commercialization as it provide feedback from the market, because the effectiveness of this activity depends on the dynamics of demand for products, customer preferences structure and consistency of its output (Olefrenko,2017). Thus it is the necessary stage of innovations commercialization.

Table 4.11: Sales Transaction (n=119)

Sales transactions	Response	
	Frequency	Percent
In cash	84	78.5
In both cash and credit	19	17.8
In credit	4	3.7
Total	107	100.0

4.4.2.5 Markets and Marketing Information

Marketing information is a very essential element in marketing of any product or services. It may involve the information about demand and supply of products, price, quality of produce and concentration of traders and buyers in general. The study identified different ways traditional beef cattle feedlots operators used to communicate in order to obtain marketing information as presented in Table 4.12.

Table 4.12: Marketing Information (n=119)

Marketing information	Response	
	Number	Percent
Mobile phone communication		
Colleagues	55	43.7
Customers	22	17.5
Middlemen	6	4.8
Extension officers	3	2.4
Market survey	18	14.3
Mass media	17	13.5
Observation of events of the year (X-mas, Idd el fitri)	5	4.0
Total	126	100.0

Mobile phone communication was highly reported way of gathering information by feedlots operators. They call to different stakeholders involved in marketing process, highly prefer to call colleagues in feedlots operations, followed by customers who happened to exchange mobile numbers and rarely call extension officers who serve the markets. The use of mobile phone to get marketing information is good marketing innovations for commercialization as it is a cheap way since it doesn't involve use of a lot of money like market survey, which needs travelling and visiting different market places. It is good since sometimes the customers who are in need of cattle do call the farmers if they can supply to them with the cattle. Kadigi, (2014)

documented that use of mobile phones was the crucial way due to they are highly available and used in rural areas, and might be effectively used to upgrade the value chain for beef cattle. Taking advantages of their availability to strategies markets and marketing of beef cattle which will then have influence in profitability and hence commercialization process.

Surprisingly the middlemen ranked the third to be relied on provision of market information to the feedlots operators compared to colleagues and customers. This indicate the loss of trust to this people as they tends to dominate the marketing accumulate large market share. This is supported by Kadigi, (2014) who found out that, middlemen use the advantage of limited access to market information to discriminate producers by offering low prices to cattle and sell at profit to traders.

Therefore beef cattle feedlots operators avoid them in marketing of their beef cattle. Market survey was the second way to be mentioned by the respondents used to get marketing information. This way involved operators to travel to different market places domestically and regionally for the sake of getting market information. It is a difficult strategy of market seeking since it is probable that one is not sure of what is going on at the market places. This is applicable when one is not sure whether the colleagues, middlemen, extension officers and consumers are telling the truth.

However, it is a good way since the feedlots are sure about the market information and act upon accordingly. Use of mass media was the third way of gathering marketing information to feedlots operators. As far as the respondents are concerned use of media means listening to radio and watching TV on business news.

Observation of the events of the year such as religious ceremonies and other events was the last way of gathering marketing information (4.0%). The most observed religious ceremonies as mentioned by respondent were Christmas, Ester, Idd-el-fitris and Idd-El-Hajji. This way is not a much reliable way since some of the religious ceremonies are not on fixed dates.

Market information is very essential marketing strategy as it has an impact of price of goods in the market. It was also reported by Kadigi, (2014) from, CTA (2006) and Jenson *et al.* (2004), that In Mozambique the successful stories have shown that farmers with access to market information obtain higher farm prices. In order for the commercialization to occur the issue of market information should not be ignored the innovations basing on the existing ways can be taken as advantages to improve the situation and strengthening marketing.

4.5 Marketing Transformation into Contract Farming as Entity of Commercialization

The study identified underperformance of Contract farming in traditional fattened beef cattle in lake zone because only one (1) respondent was reported to have entered into a producer – buyer contract arrangement. However this reported CF was not real or rather it involved and informal arrangements that could reflect informal contract farming model, of which the respondent were not aware of it. This was reflected in focus Group Discussion with operators in Igoma, Mwanza who reported on his buyers from Comoro as follows:

“These buyers came to my feedlots looking for the beef cattle of their choice i.e., Nyankole but they couldn’t find them. So they requested me to fatten fifty five (55) cattle for them by making advance payment so the

could come back for them after three months, I did and they came back for them.”

Through Focus Group discussions with feedlots operators, middlemen, butcher men, traders and institutions consumer (hotels and restaurants, schools), justify the possibility of marketing transformation of traditional fattened beef cattle into contract farming. The discussion was based on the knowledge of contract farming, conditions for CF, role of each party involved, merits and demerits of CF and the way forward for getting into CF when it is initiated Table 4.13 summarizes these responses.

Conduct of contract farming was found to be well understood by the feedlots operators and consumer institutions than middlemen, traders and butcher men as they were able to explain it well that it involves the agreements between buyers and farmers. Not only that but also, the two groups on with positive knowledge were able to explain the conditions of CF in a positive way i.e. agreed quality, quantity and price, timely of producing on the side of feedlots operators and production assistant on the side of consumption institutions.

The main reason of this results is purely based on the conflicts of interests, the middlemen doesn't not support the idea of contract farming in fear of losing their job in the market. Likewise the roles of each party in CF were clearly stated by traditional feedlots operators and consuming institutions. The traditional beef cattle feedlots operators were more confident with quantity and timely supply than with good quality cattle, of which they thought they would not be able to meet.

Table 4.13: Summary of FGD Responses on Marketing Transformation on TFBC into CF

Attributes of Contact farming	Feedlots operator (FGD1)	Middlemen (FGD2)	Butchered & Traders (FGD3)	Institution Consumer (FGD 4)
Conduct of CF	<ul style="list-style-type: none"> This involves signing an agreement between sellers and buyers. 	<ul style="list-style-type: none"> Contract buying 	<ul style="list-style-type: none"> Contract buying 	<ul style="list-style-type: none"> Agreement between buyers and sellers in certain terms
Conditions for CF	<ul style="list-style-type: none"> Provision of agreed amount of cattle Agreed price Agreed quality Agreed time 	<ul style="list-style-type: none"> Restriction to buy from single producers 	<ul style="list-style-type: none"> Holding the feedlots producers 	<ul style="list-style-type: none"> Assisting the feedlots operator in production
Role of each part in a contract farming	<ul style="list-style-type: none"> Timely supply of beef cattle Worrying is on Production of Quality beef We can supply timely but seasonal. Agro vet service is available but expensive 			<ul style="list-style-type: none"> Timely receiving of quality and quantity cattle Timely payment Advance payment in terms of cash or inputs
Merits and Demerits of CF	<ul style="list-style-type: none"> Reliable Markets for or cattle. We will get profit since we sell fast our cattle. Advance payment will help us to produce large quantities. Cheating may likely to occur if not handled carefully. Lack of freedom in selling with price fluctuation. 	<ul style="list-style-type: none"> It will affect availability of cattle in the markets Our work will be affected since we need to wait for single operators for 3 month to provide 	<ul style="list-style-type: none"> Inconsistency supply of quantity and quality beef cattle Price restriction may affect us 	<ul style="list-style-type: none"> Guaranteed of beef cattle since at moment there is competition
Ways of meeting the conditions for CF	<ul style="list-style-type: none"> Education about CF Accessing enough capital Keeping large amount of cattle Training of quality of good cattle 		<ul style="list-style-type: none"> Enough capital Enough knowledge 	<ul style="list-style-type: none"> Enough capital for holding the feedlots operators. Trust worth

In spite of their higher expectation of reliable markets of their cattle and profit making through CF and expansion of their production through advance payment they were still worried on the cheating that might have occurred during the contract making. This arouse due to the fact that, they didn't have enough and detailed

knowledge on contract farming and believe that, those contracts owners are clever enough to jeopardize the contract. The traders showed the predicted concern on the inconsistency supply of quality and quantity beef cattle from the producer and price fluctuation that would affect their business.

Furthermore, the ways forward on the preparation for contact farming entrance was positively responded to traditional beef cattle feedlots operators and consuming institutions than middlemen, butcher men and traders. Being able to think forward on what they need for preparations of CF such detailed knowledge on CF, production of quality cattle and access to capital is evidence enough to argue that these people knew what they want. They were ready to enter into contract with the above conditions. This is related to the results from quantitative data, which showed that; majority of the respondents (71.4%) indicated that, they were ready to enter into contract if it was to be introduced or when such opportunity arouse although they had some observation.

Since marketing transformation of traditional beef cattle feedlots operation is a key elements in the commercialization of traditional beef cattle feedlots, it was relevant to ask the respondents about their opinion on what could be the possible challenges which backing them up on contract farming and commercialization of traditional beef cattle feedlots at large. Table 4.14 illustrates the feedlots operators' perception on the challenges.

Table 4.14: Respondents' Opinions on the Challenges for Traditional Beef Cattle Feedlots (n=119)

Challenges	Frequency (n=299)	Percent (%)
Unreliable Markets for fattened beef cattle	68	22.7
Lack of grazing land	53	17.7
Lack of clean water for cattle drinking	46	15.4
Unreliable feed supply and high price	43	14.3
Lack of capital	38	12.7
Lack of education and skills	12	4.0
Inadequate of veterinary services	8	2.7
Lack of association	8	2.7
Uncontrolled taxes and levies	7	2.3
Disease eruptions	7	2.3
High price of cattle for fattening	6	2.0
Uncontrolled theft	2	0.7
Absence of dip Tank	1	0.3
Total	299	99.8

Lack of reliable market was a critical challenge since markets is the among the main determinants of profit making in any business. This is also supported with the results on the determinants of profit making in terms of cost benefit in Table 4.7. Markets channel, among the determinants of profit making score, had the highest standardized beta coefficient of 0.9, which indicates the high influence on cost benefit. On the other hand, absence of dip tank for Ecto parasite control and treatment would be expected to be a leading challenge on CF, but it was found to be the least challenge. This could be the reason that most of the traditional beef cattle operators prefer spraying as a more important means of controlling ectoparasites than dip tank, due to that they operate at temporary premises. Fortunately, the feedlots operators were able to provide suggestions for the improvement of the mentioned challenges as presented in Table 4.15.

**Table 4.15: Suggestions for Improvement of the Traditional Beef Cattle
Feedlots Operations (n=119)**

Ways for improvement	Frequency	Percent (%)
Provision of enough and suitable land	70	22.6
Provision of soft loan	59	19.0
Reliable markets	47	15.2
Improvement of livestock infrastructure	40	12.9
Availability of clean water for livestock drinking	32	10.3
Formation of farmers cooperatives	27	8.7
Provision of Training	21	6.8
Establishment of feeds factory	8	2.6
Removal of non-official taxes and levies	3	1.0
Improvement of extension services	3	1.0
Total	310	100.1

The traditional feedlots operators suggested ways for improvement of their productivity and probably will lead them to the direction of marketing transformation of tradition beef cattle into contract farming and commercialization. The provision of enough and suitable land was perceived to be the best way of improving production and hence increasing productivity.

4.5.1 Farmers' Association as a Way to Contract Farming

Farmer's association has been defined in various ways, it is simply "an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise" (ICA, 2005). It is usually expected people who share common characteristics come together for the purpose of fulfilling the shared goals.

An informal type of association among traditional beef cattle feedlots operators was identified. Few respondents (14.3%) admitted to have an informal association among

themselves. It was emphasized during the interview with one feedlot operator at Igoma market in Mwanza,

“Yes we have an association which is unregistered, but we have received training on how to create a good association.”

They further reported other benefits that they receive from the association which were then grouped into three categories of social benefit, production benefits and marketing benefits as presented in Table 4.16. The social benefits comprise of funeral support, social security and training or education. Production benefits include; purchasing of cattle, capital rotation, small loans, dipping of cattle and sharing of feeds purchase. The last category of marketing support contains selling of cattle and security of cattle during marketing.

Table 4.16: Support from Association (n=119)

Support from Association	Response	
	Frequency	Percent
Social Support	10	52.6
Production Support	7	36.8
Marketing Support	2	10.5
Total	19	100.0

Since the essence of all identified informal association or cooperative is to join power in production, marketing and social issues, the strengthening of the existence association could provide a way through contract farming and hence commercialization by improving capital, increasing quantity and quality, and timely supply of the traditional fattened beef cattle. The marketing transformation of traditional beef cattle into contract farming could get its ways since the feedlots producers would be able to meet the conditions of contract farming.

4.6 Socio-Economic Benefits out of Running TBCF Feedlots

The socio-economic benefits promote commercialization, as any business or investment that would results in improvement of people's welfare attract many investors hence scaling up. Socioeconomic benefits out of the traditional beef cattle feedlots operations have been analysed into two ways; the direct benefits to feedlots operators and indirect benefits to people in community surrounding the feedlots operations. The direct benefits of feedlotsoperators were derived from the questionnaires and are presented in Table 4.17 in the categories of asset accumulation, social benefits, business benefits and services benefits. At the category of assets accumulation, the construction of a house was the leading benefit; it is obvious since, in Tanzania house is the commoner and more valued asset than others. Nearly half of the feedlots operators in this category had managed to construct urban houses(sheet roofed) out of the feedlot operation indicating that. This indicates that TBCF business is of profitable.

However, buying a field and cultivating it was the last mentioned asset accumulation. That item being the last mentioned one is obvious since those people don't prefer cultivation; they do it just for survival only. In the social benefits, the majority admitted that, this business helped them to send their children to schools (English medium school).Improvement of capital from the business benefit category was the leading benefit as it was also proved during discussion with one of the young (25 years old) feedlot operator, who said that the following words,

"I use more than 90% of the interest from this business to buy more cattle for fattening"

The increase of capital will increase inputs per fixed costs of production i.e. economies of scale and hence maximize the profit. The profit out of the business has been also used for investment in other businesses. Moreover, the feedlots operators were able to appreciate that business had been a source of employment to them as well as to attendants from different parts of the lake zone regions.

Table 4.17: Socioeconomic Benefits of Running Traditional Beef Cattle Feedlots Operations (n=119)

	Frequency	Percentage
Socioeconomic benefits	(n = 253)	%
Assets accumulation (n=105)		
Construction of a house	56	22.1
Purchasing plots	38	15.0
Purchasing a motorcycle	6	2.4
Purchasing a car	2	0.8
Crop cultivating	3	1.2
Social benefits (n=72)		
Sending children to school	36	14.2
Fulfilling family needs	22	8.7
Purchasing ordinary cattle to keep	12	4.7
Paying dowry	2	0.8
Business benefits (n=75)		
Improvement of capital	65	25.7
Building lodge for business	1	.4
Opening new business	3	1.2
Developing other business	6	2.4
Service benefits (n=1)		
Source of employment	1	0.4

On the other hand of socioeconomic benefits i.e. indirect benefits, some of the people living around the feedlots operations were included in focus group discussion. Table 4.18 presents the views of these people which were based on their knowledge and skills and material benefits. The table shows that, the people were benefiting directly out of traditional beef cattle feedlots operations. However, during discussion, they expressed the existence of discomforts such as spreading of cow dungs and dust in the streets and pollution of water sources.

Table 4.18: Summary of Socioeconomic Benefits of TBCF to the People Living Round the Feedlots

Benefits	Focus Group Discussion with people living around TBCF in Mwanza and Kahama
Knowledge and skills	<ul style="list-style-type: none"> • Have seen these cattle brought very thin and emaciated but after sometimes they become fat. • Have learned how to feed these cattle by going several time observing when feeding. • I have learned how to mix the feeds (cotton husks, cotton seed cakes, rice polishing and mineral water.
Material benefits	<ul style="list-style-type: none"> • We get meat at low price when it happen they slaughter • I get milk frequently • Availability of manure for our field • Sometime if you have a celebration, you can talk to the feedlots operator, they sell to us cattle at reduced price.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Chapter Overview

This chapter presents a summary of the key conclusions and recommendations in three sections. Section one is where the summary of the findings in relation to the objectives of the study are presented. Section two presents conclusions on the study findings while section three gives the recommendations.

5.2 Summary of the Major Findings of the Study

The study was all about assessing the possibility of commercialization of traditional beef cattle feedlots production in selected lake zone regions in Mwanza and Shinyanga (Kahama). It specifically assessed the profitability of traditional beef cattle feedlots as a precondition of commercialization. It also evaluated the markets and marketing of traditional beef cattle feedlots including mapping the value added chain and contract farming possibilities in relation to commercialization. The study went further on assessing the possibilities of marketing transforming of traditional beef cattle feedlots into contract farmers as an entity of commercialization. The socioeconomic benefits out of traditional feedlots that will lead to commercialization were also assessed. The following were revealed in this study.

The majority of the traditional feedlots operators operated the business at profit. Government support, infrastructure availability and skills & capacity influence negatively profitability while market and marketing of beef cattle had positive influence

The respondents were able to demonstrate their perceptions on the determinants of profitable feedlots operations and readily available markets to sell their beef cattle ranked first while types of cattle purchased for fattening last.

It was revealed that majority of the feedlots operators preferred to sell the live cattle and in cash than slaughtered cattle since it is easy for them. Market information was effected through mobile phones communication with colleagues who are already at the markets, paying survey to different markets, use of mass media as such as listening to radio and watching TV and observation or timing of the season of the year especially on religious ceremonies. The value addition of traditional beef cattle from production to consumption identified five functions with four main market channels.

Unfortunately contract faming is not common practice among the feedlots operators. Surprisingly, the majority of feedlots operators were aware of the advantages and disadvantages of contract farming and were ready to enter the contract whenever. On contrary middlemen and traders were negatively about the idea. Moreover, the study identified few informal farmers' associations, which supported each other in terms of social support such funeral support.

Feedlots operators expressed their perceptions on what they thought were barriers to development of this business; about fourteen challenges were reported unreliable markets leads. However suggestions for improvement on the identified challenges were provided by the respondents, provision of enough and suitable land for feedlots operations ranked first.

Capital improvements was reported to be the first benefits that feedlots operators gain out of the feedlots operations while fulfill the family basic need rank the last benefits.

5.3 Conclusion

There is a room for commercialization of tradition beef cattle feedlots since the following possibilities have been concluded basing on findings.

5.3.1 Profitability of Running TBCF

Since more than eighty fiveper cent of the traditional beef cattle feedlots operates at profit. It is worth undertaking these operations at a large scale with some improvements.The profitability in this sub sector is not influenced from government support, infrastructure facilitiesand skills and capacity. The determinants for profitability are reasonably known by the feedlots operators and also from the literature. This indicates that the feedlots operators are the key players in the improvement of quantity, quality of the cattle produce and hence commercialization. Professionally profitability is not a matter to be addressed by a single player; it is rathera function of many factors.

5.3.2 Markets and Marketing of Traditional Beef Cattle from the Feedlots

The marketing of fattened beef cattle is reported to be the main challenge in the sub sector with uncontrolled market channels and inefficiency value addition. The middlemen dominates beef cattle market tends to discriminate producers/operators and make them not enjoying their fully fruits. There is also a problem with market information since it is not reliable i.e. calls from colleagues and buyers. There is little

and informal exports of cattle outside Tanzania and thus limit profitability and hence commercialization

5.3.3 Possibilities for Market Transformation into Contract Farming

Contract farming and cooperatives as market strategies that could be used to improve marketing of TBCF, unfortunately are not common practice in marketing of livestock especially the feedlots beef cattle. However its awareness and readiness to feedlots operators and other consuming institution is encouraging and good start for the move. The little resistance from the middlemen and some traders can be controlled since middlemen have no ability of preventing the production activity.

5.3.4 Socioeconomic Benefits of TBCF

Apart from the profit as direct and economic benefit of running traditional beef cattle feedlots, the feedlots operators receive other benefits. These benefits are socio-economic benefits that directgo to feedlots operators and indirectly to people living around the feedlots operations. The benefits were categorised as asset accumulation, social benefits, business benefits and service benefits.

5.3.5 ChallengesFace the TBFC Operators in Mwanza and Kahama

It can be concluded that there is limited government support in this sector like that's why there are a lot of challenges; if the government could put its hands, they wouldn't be there. Of these challenges were; lack of enough and suitable land for feedlots operations, lack of enough water for cattle to drink, uncontrolled taxes and levies, especially during transportation of the animals to the market places, limited and inadequate knowledge and skills on feedlots operations.

5.4 Recommendations

The commercialization of traditional beef cattle feedlots and be achieved through joint efforts from different stakeholders since it is multidimensional. The government, through the Ministry of Agriculture, Livestock and Fisheries development and municipal councils, feedlots operators, customers/ consumers, and higher learning institutions are among the few stakeholders in the business. Every stakeholder should play a role in the commercialization of the beef cattle feedlots operations following attention will be taken care.

5.4.1 Recommendation to Feedlots Operators

5.4.1.1 Improving Beef Cattle Production for Profitability

Beef cattle feedlots operators take the production seriously by producing quality and enough beef cattle to compete for the markets inside and outside more. Thus beef cattle feedlots operation to be done professionally (seek more knowledge and skills) and not locally and experience based. The increase of the outside market (exports), the higher chance of making profit and hence being able to expand production, thus commercialization.

5.4.1.2 Enhancing Contract Farming

Traditional beef cattle operators should be pro-active and get into contract farming for expansion of their business, sustainable and profitable production. They should take initiatives to understand in and out of contract farming so that won't be a problem whenever they get opportunity. Contract farming is important entity in commercialization of any production but a precaution should be taken care when enter into so that all part benefits from each other.

5.4.1.3 Challenges in Tradition Beef cattle Feedlots Operations

The beef cattle feedlots operators should take challenges in a positive way and convert them as strategies towards success. They have a part to play in each challenge instead of blaming the government and waiting for the government to solve their challenges. This will leads to success commercialization of sub sector since commercialization needs joints efforts.

5.4.2 Recommendations to the Government and Non-Government

Organization

The government has to play a role in this sector so as to be able to move from the existing scale level to a more advances and improved scale level.

5.4.2.1 Support Profitable Beef Cattle Feedlots Production

Government supports are very crucial in making the production more profitable and being able to move in the pace of commercialization. It has to play part in the following areas for efficiency production;

Allocation of enough and suitable land to traditional beef cattle feedlots operators so as to allow expansion in production, because right now they are operating in unauthorized places (in urban areas along the main roads) which make them not being officially recognized by the government this limits the expansion of their production. With this limitation on expansion of beef cattle feedlots production, commercialization will be difficult to exhibit.

Creation of good production environment such as provision of necessary supportive facilities for smooth running of the operations such as dip tank facility and clean

water supply for the animals and inputs subsidies so as to support the production. Strengthen the veterinary and livestock extension services so as to provide guidance and counseling services on disease control and treatment, feeds preparations and feeding regimes. Train the beef cattle feedlots operators on management and business skills, to the feedlots operators without neglecting their indigenous knowledge and experiences. These will improve production and leads to quality beef cattle which when sold will fetch good market price and hence profitability.

Enabled the beef cattle feedlots operators being able to access and accumulate capital for the expansion of the production. This can be done through trainings on capital accumulation and access, village community banking association (VICOBA), Savings and Credits Cooperatives Society (SACCOS), and linking to micro financial institutions is essential.

5.4.2.2 Strengthen Markets and Marketing of Beef Cattle from Traditional

Feedlots

The Government and Non-government organization should work together in promoting contract farming to the beef cattle feedlots operators for sustainable and profitable production as CF will assures their inputs and fate of their outputs. This can be achieved through provision of more knowledge on the contract faming and that will attract them into farming contract for their betterment.

On top of that the government should work on increasing external markets for beef cattle produced from feedlots so as to help improving the profit gain out of the production.

5.4.3 Recommendations for Further Studies

The study explored the possibilities of commercialization of traditional beef cattle feedlots operations basing on existing operations and concluded that there is a room of commercialization in Mwanza and Kahama. Further study is proposed to be conducted on how to commercialize the existing traditional beef cattle feedlots operations in the study areas and come up with real strategies.

The study also recommend the same study to be done in other areas where the traditional beef cattle feedlots operation is taking place in Tanzania and to make a sort of comparative findings for enrichment scientific phenomen.

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APPENDICES

Appendix 1: Questionnaire for Data Collection

ASSESSMENT OF THE POTENTIAL FOR COMMERCIALIZATION OF TRADITIONAL FEEDLOTS

QUESTIONNAIRE FOR SOCIO-ECONOMIC INFORMATION CONCERNING TRADITIONAL BEEF CATTLE FEEDLOTS

Interviewer's name _____

Date of interview _____/_____/2012

Duration of time _____

Start time (hh:mm) _____

End time (hh:mm) _____

Instructions:

1. Please remember to introduce yourself to an interviewee and explain objectives of this study (Sample of introductory remarks provided below (No. 4))
2. Use pencils to record your answers
3. Remember to thank the respondent after the interview

4. INTRODUCTORY PHRASE

Good morning/afternoon/evening, my name is _____. I am working for a Project at the Open University of Tanzania, which is about to be implemented in this place. The main purpose of this project is to assess and identify animal health, production and socio-economic constraints facing traditional feedlot operators so that we can collaborate to address these challenges with the ultimate goal of enhancing productivity and economic gains accrued from this enterprise. You have been selected to participate in this study in order to provide information on your knowledge and practices with respect to animal health constraints in the traditional beeflots sector in Tanzania. I would like to assure you that the information provided will be used for the intended purpose only and your identity will never be disclosed when such information is presented. Please feel free to answer the questions that will be asked.

1. FEEDLOTS OPERATOR

Name Phone No
Location Date

	Cost and margin					
1	What is the average purchasing price per purchased weight per cattle?				Purchased weight(kg)	Purchased price (Tsh)
2	Feeding costs during the entire period of fattening	feeds	Quantity (tone/kg)	Buying Costs	No. of cattle fed	No. days
		Cotton seed husks				
		Cotton seed cake				
		Rice polishing				
		Hominy meal				
		Common salt				
		Mineral lick				
		Any other feed; Specify.....				
					
3	Other running cost	activity	costs	No. cattle	No. of days	
		Trekking				
		Labour power				
		Interest/attention costs				
		Veterinary services				
		Veterinary medicine				
		a) Vaccination				
		b) De-worming				

		c) Ector-parasite control d) Treatment				
		Yardage costs				
		Transportation of the animal feeds				
		Taxes and Levies				
		Grazing land				
		Death loss				
		Water				
		Any other costs; Specify.....				
4	To what extent do you agree to the following statements about factors contributing to the profitable feedlots operations	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
a	Number of cattle purchased for fattening					
b	Readily available Market					
c	Proper disease control					
d	Low Feeds price					
e	Proper grazing					
f	Experience of feedlots operators/owner					
g	Type of cattle purchased for fattening					
h	Education levels of feedlots operators/owner					
i	The wealth of feedlots owner					
j	The low transportation costs to the market					
5	Can you list challenges which prevent you from making profit out of this business			List of challenges		
				1)		
				2)		
				3)		
				4)		
				5)		
	Contribution of beef feedlots to the household welfare					
6	What development issues have you managed to do using the profit you made			List of things done		

				1.)
				2.)
				3.)
				4.)
	Possibilities for commercialization			
7.	What produce do you normally sell?			Selling price
	Cattle (whole) average selling weight			
	Beef			
	Manure			
	Skin			
	Other specify.....			
8.	Where do you sell your cattle			1)
				2.)
				3.)
				4.)
9	Costs during marketing	costs	No. cattle	No. of days
	a) Transportation and on transit cost			
	b) Accommodation costs			
	c) Meal costs			
	d) Fare to and from the market			
	e) Taxes and levies/permits			
	f) Loading and off loading			
	g) others specify.....			
10	How do you sell your cattle?			1) Cash 2) Credit
11	Are you organized into association?			1) Yes 2) No
12	If yes what types of support do you get from the association			Types of support
				1)
				2)
				3)
13	What business service providers are you working with?			Tick appropriate
	a) NGOs			
	b) Input suppliers			

	c) Researchers			
	d) others specify,.....			
14	How do you cooperate with traders			
15	Have you entered any legal producer-buyer contract with traders/buyers?			1) Yes 2) No
16	If no to immediate question above, can you enter legal contract with traders to buy your animals?			1) Yes 2) No
	Reason to any answer above			
17	Where do you get information on price, quantity and quality of product from traders?			
18	Do you think that, you can do this business more than what you are doing now?			1.) Yes 2.) No
	If yes , what is your comments on the following;			1.) Yes 2) No
a	Do you have enough energy to work?			
b	Do you have enough capital to purchase cattle for fattening			
C	Do you have enough land for fattening			
D	Is there enough veterinary services to control animal diseases			
E	Is there available veterinary medicine for treatments			
F	Are there enough market to sell the products			

G	Quality meat to compete for the market			
H	Enough skills to produce quality and quantity meat.			
I	Enough facilities to simplify the production			
19	What support do you get from the government?			1.)
				2.)
				3.)
				4.)
20	In general what do you think need to be done so as to expand /improve this business			

Appendix 2: Interview/ FGDs Checklist for District Cooperative Officers

1. If you have any as cooperatives district cooperative officer?
2. Have you ever heard about Feedlots operators present in this district?
If yes explain your relationship with them.
3. Is there any cooperative of feedlots operators in your district?
If Yes explain its effectiveness
4. If there is , what are your efforts in promotion the establishment of Cooperatives.
5. What are the challenges in establishment of cooperatives in your district?
6. What are the strategies needed to overcome the above challenges
7. One of the complains from the feedlots operators is lack of reliable markets.
What do you think they can do?
8. Are there big investors in this sector of feedlots?
If yes who are they, explain...
If no why do you think are not there?
9. What are your general opinion on this business

Thank you

Appendix 3: FGDs Checklist for Farmers

1. How do you feel being a livestock farmer?
2. How did you learn to keep livestock
3. Why do you keep livestock?
4. Why do you sell your livestock?
5. Who are your buyers? And at what selling price
 - Feedlots operators Price
 - Butcherers Pricei
 - Middlemen..... Price
 - Whom of your customers you like most?
 - Explain reasons
 - Who are your reliable customers?
 - Who are buying in bulk??
 - Where are your buyers' come from?)
 - What type of cattle and at what quality are more demanded? By the group of your buyers
 - Feedlots operators
 - Butcherers
 - Mddlemen
 - What strategies do you use in price setting?
 - Who is more responsible in price setting when selling to
 - Feedlots operators
 - Butcherers
 - Middlemen.....
6. Do your goals achieved when selling cattle?
7. If not why do you think is the reason?
8. What style of selling cattle would you prefer most?
9. What ae challenges your facing in this business
10. Would you like to practice feedlots
11. If yes what prevent you from practicing?

Thank you

Appendix 4: Focus Group Checklist for Feedlots Operators

1. Where did you learn about traditional feedlots, how did you started and why did you decided to learn
2. What motivated you to enter this business?
What do you hate about this business?
3. What do you think of the following issue on development of this business
 - A. Strength
 - (i) Enough energy to perform work
 - (ii) Enough capital
 - (iii) More experience
 - B. Opportunity
 - (i) Availability of cattle
 - (ii) Available grazing land
 - (iii) Availability of inputs
 - (iv) Availability of expatriates
 - C. Weakness
 - (i) Lack of skills on livestock keeping
 - (ii) Lack of cooperation
 - D. Threats
 - (i) Competition on business
 - (ii) Unreliable markets
 - (iii) Quality of cattle in relation to beef
 - (iv) Quantity to meet the demand
4. Where do you get the cattle
Are they available?
If no. why?
How much do buy average price
To whom do you buy?
From the Farmer direct
Why do you buy from the farmer??

From Middlemen

Why?

What do you say about middlemen

5. Who are your buyers?
 Where do they come from?
 Why do you sell your cattle in this market?
 What are your market strategies?. Which is more reliable strategy?
 Do you meet the markets specification in terms of
 - (i) Quality
 - (ii) Quantity
 - (iii) Price
 - (iv) Demand

What are the challenges you are facing in selling your cattle

6. Have you ever heard about Contract selling?
 If yes what is it?
 Have you ever sell in contract?
 If yes how??
 What are the problems associated in selling in contract?
 What are advantages of selling in contract?
 What are your roles as a producer in contract selling?
 Can you fulfill your roles above?
 If yes explain how
 If no. explain why?
 What do you think, is it important to start an association of feedlots operators in your area??
 If yes , explain its important
 Can you enter the Contract if it appear?
 Can you meet the demand of big meat industry?
 Can you supply the cattle in time?
 Can you supply the quality beef cattle?
7. How do you feel to own your business

How many cattle do you think it is appropriate to start with?

8. How did you get your capital?
Borrow from bank
Selling of your asset
Surplus from other business
Changing business
Do you get benefits out of this business?
What are those benefits?
What are other business you establish out of this business?
9. What are opinion on general performance of business

Thank you

Appendix 5: FGDs Checklist for Butchers

1. Where do buy cattle ?
2. To whom do you prefer to buyi?
 Farmers Price
 Middlemen Price
 Feedlots operators Price.....
- To whom you prefer most?
 Why?
3. Do you buy cattle of what weight??
4. How many cattle do you buy in average of a week?
5. Which cattle do you prefer most?
 Why?
6. Meat preference by your consumers?
7. What do you say about meat from feedlots cattle?
8. Do you get cattle of (a) Quality
 (b) Quantity
9. When availability of cattle does is? Why?
10. Do you buy cattle in cash or by contract?
11. What are your contributions in the development of feedltos business.
12. What are challenges you are facing in your business.
13. What are your opinion

Thank you

Appendix 6: FGD Checklist of Government Officials

1. Do you know the presence of feedlots operations in your area?
2. What do you say out the existing of this business?
3. What are your contribution in development of this business
4. What do you comment on meat quality from feedlots?
5. Most of the feedlots operators treat the animal themselves as veterinary DR. what do you say on this?
6. Feedlots operators are complain on unfair permit, levies and taxes. Comment on this.
7. What need to be done to improve this business?

Appendix 7: FGDs Checklist for Inputs Suppliers

1. When did you start business with feedlots operators?
2. What proportion of your customers are feedlots operators?
3. What do you sell to them?
4. Are they your permanent customer? Have you ever let them down?
5. What type of sell transactions do you use?
6. Explain your relationship with your
7. Are the inputs available?
8. Can you do a business in contract? If yes, suggest conditions of contract
9. What do you say about this type of customers
10. Give your general opinion

Thank you

Appendix 8: FGDs Checklist for People Living Nearby Feedlots

1. When these feedlots started in this area?
2. Did you learn anything about these operations?
3. What goods do you buy from these feedlots?
4. What do you sell to these feedlots operators?
5. What are benefits in general do you obtain from these operations?
6. What are problems associated with these operations?
7. What need to be done so as to improve the feedlots operations
8. Give your general opinions

Thank you

Appendix 9: The Data Envelopmental Analysis Results

NO	DMU	Score	Benchmark(Lambda)	Projection (Inputs)	Projection (Outputs)
001	0.596221	053(0.670787); 099(0.329213)	9210000	21468536.11	001
002	0.735161	053(0.797863); 099(0.202137)	7354500	17003085.98	002
003	0.666107	009(0.414258); 031(0.585742)	42395000	79266569.22	003
004	0.552922	009(0.074861); 031(0.925139)	29950000	66103405.69	004
005	0.686748	009(0.788347); 031(0.211653)	56112100	93775241.8	005
006	0.596316	053(0.647023); 099(0.352977)	9557000	22303627.02	006
007	0.760854	053(0.264391); 099(0.735609)	15144000	35749312.74	007
008	0.498116	031(0.283544); 099(0.716456)	21329700	50189153.34	008
009	1	009(1.000000)	63873000	101984000	009
010	0.592885	009(0.353551); 031(0.646449)	40169000	76912113.45	010
011	0.515883	053(0.840427); 099(0.159573)	6733000	15507382.8	011
012	1	012(1.000000)	123018000	119200000	012
013	0.427458	009(0.373050); 031(0.626950)	40884000	77668373.95	013

014	0.472932	053(0.379139); 099(0.620861)	13468500	31717050.99	014
015	0.615762	009(0.976742); 038(0.023258)	64763500	102312309.1	015
016	0.414659	053(0.073862); 099(0.926138)	17926000	42444479.68	016
017	0.565946	053(0.879464); 099(0.120536)	6163000	14135619.63	017
018	0.821791	053(0.066260); 099(0.933740)	18037000	42711612.51	018
019	0.546442	031(0.744528); 099(0.255472)	25110000	58560624.35	019
020	0.569362	031(0.305225); 099(0.694775)	21507500	50582891.29	020
021	0.413232	012(0.018507); 038(0.981493)	102547000	116157371.6	021
022	0.606297	031(0.380769); 099(0.619231)	22127000	51954773.49	022
023	0.819881	053(0.750676); 099(0.249324)	8043500	18661234.8	023
024	0.512733	031(0.419548); 099(0.580452)	22445000	52658984.21	024
025	0.449142	053(0.572099); 099(0.427901)	10651000	24936449.68	025
026	0.542289	031(0.261508); 099(0.738492)	21149000	49788993.35	026
027	0.292628	053(0.163374); 099(0.836626)	16619000	39299050.78	027
028	0.604405	053(0.881519); 099(0.118481)	6133001	14063423.97	028
029	0.512439	053(0.476492);	12047000	28296066.16	029

		099(0.523508)			
030	0.572805	053(0.963771); 099(0.036229)	4932000	11173092.49	030
031	1	031(1.000000)	27205000	63200000	031
032	0.55622	053(0.053830); 099(0.946170)	18218500	43148410.78	032
033	0.738852	053(0.692436); 099(0.307564)	8893899	20707806.79	033
034	0.440321	053(0.603123); 099(0.396877)	10198000	23846258.95	034
035	0.422382	053(0.338493); 099(0.661507)	14062000	33145369.31	035
036	0.721476	009(0.944284); 031(0.055716)	61830000	99823104.61	036
037	0.492819	053(0.473308); 099(0.526692)	12093500	28407973.15	037
038	1	038(1.000000)	102161000	116100000	038
039	0.669898	053(0.262199); 099(0.737801)	15176000	35826324.01	039
040	0.579705	053(0.299935); 099(0.700065)	14625000	34500286.27	040
041	0.578877	053(0.888450); 099(0.111550)	6031800	13819873.44	041
042	0.626993	031(0.057984); 099(0.942016)	19480000	46092994.33	042
043	0.833664	053(0.037489); 099(0.962511)	18457100	43722626.03	043
044	0.490383	053(0.509913); 099(0.490087)	11559000	27121644.35	044
045	0.545409	009(0.025063); 031(0.974937)	28124000	64172032.73	045

046	0.585787	053(0.076944); 099(0.923056)	17881000	42336182.58	046
047	0.592564	031(0.865252); 099(0.134748)	26100000	60752978.48	047
048	0.523378	053(0.150772); 099(0.849228)	16803000	39741865.56	048
049	0.76663	009(0.536408); 031(0.463592)	46874000	84004038.83	049
050	0.536915	053(0.391295); 099(0.608705)	13291000	31289879.12	050
051	0.870393	009(0.681071); 031(0.318929)	52178500	89614645.58	051
052	0.468262	053(0.765161); 099(0.234839)	7832000	18152238.47	052
053	1	053(1.000000)	4403000	9900000	053
054	0.515776	031(0.690702); 099(0.309298)	24668600	57583144.44	054
055	0.5327	009(0.064539); 031(0.935461)	29571500	65703063.6	055
056	0.688028	009(0.618959); 031(0.381041)	49901000	87205717.9	056
057	0.462284	009(0.880332); 031(0.119668)	59485000	97342781.72	057
058	0.48892	053(0.857952); 072(0.142048)	4252500	9203964.134	058
059	0.510094	009(0.235655); 031(0.764345)	35846000	72339646.12	059
060	0.601851	053(0.856179); 099(0.143821)	6503000	14953864.33	060
061	0.694543	053(0.566305); 072(0.433695)	3943500	7774893.818	061

062	0.654557	053(0.943841); 072(0.056159)	4343500	9624823.03	062
063	0.559782	009(0.070094); 031(0.929906)	29775200	65918518.51	063
064	0.65112	009(0.580097); 031(0.419903)	48476000	85698485.44	064
065	0.624181	053(0.932952); 099(0.067048)	5382000	12256063.42	065
066	0.796724	031(0.007987); 099(0.992013)	19070000	45185049.69	066
067	0.532243	009(0.288835); 031(0.711165)	37796000	74402174.76	067
068	0.642007	031(0.221633); 099(0.778367)	20822000	49064852.14	068
069	0.699237	053(0.366024); 099(0.633976)	13660000	32177915.28	069
070	0.987468	031(0.397293); 099(0.602707)	22262500	52254838.12	070
071	0.779156	009(0.025063); 031(0.974937)	28124000	64172032.73	071
072	1	072(1.000000)	3343500	5000000	072
073	0.870393	009(0.681071); 031(0.318929)	52178500	89614645.58	073
074	0.870393	009(0.681071); 031(0.318929)	52178500	89614645.58	074
075	0.570778	053(0.646047); 099(0.353953)	9571250	22337921.1	075
076	0.699752	009(0.530610); 038(0.469390)	81845000	108609907.6	076
077	0.120204	009(0.429666); 031(0.570334)	42960000	79864173.67	077

078	0.471425	031(0.323212); 099(0.676788)	21655000	50909529.91	078
079	0.580714	053(0.594932); 099(0.405068)	10317600	24134088.55	079
080	0.623324	009(0.025063); 031(0.974937)	28124000	64172032.73	080
081	0.763616	053(0.432045); 099(0.567955)	12696001	29857953.3	081
082	0.63917	053(0.066260); 099(0.933740)	18037000	42711612.51	082
083	0.942615	009(0.832279); 031(0.167721)	57723000	95479102	083
084	0.53498	053(0.404034); 099(0.595966)	13105000	30842251.14	084
085	0.857696	053(0.983118); 099(0.016882)	4649500	10493227.41	085
086	0.482573	053(0.992775); 099(0.007225)	4508500	10153896.52	086
087	0.568452	053(0.861213); 099(0.138787)	6429500	14776979.08	087
088	0.530098	009(0.026644); 031(0.973356)	28182000	64233379.73	088
089	0.558788	009(0.308443); 031(0.691557)	38515000	75162666.08	089
090	0.700821	053(0.420881); 099(0.579119)	12859000	30250227.03	090
091	0.435742	031(0.401134); 099(0.598866)	22294000	52324594.84	091
092	0.756524	009(0.074561); 031(0.925439)	29939000	66091770.92	092
093	0.432241	031(0.577343);	23739000	55524546.06	093

		099(0.422657)			
094	0.969066	009(0.765081); 031(0.234919)	55259000	92872911.97	094
095	0.796724	031(0.007987); 099(0.992013)	19070000	45185049.69	095
096	0.509601	009(0.495500); 031(0.504500)	45374000	82417478.35	096
097	0.39472	053(0.596822); 099(0.403178)	10290000	24067666.34	097
098	0.486294	053(0.860391); 099(0.139609)	6441500	14805858.3	098
099	1	099(1.000000)	19004500	45040000	099
100	0.755024	009(0.146245); 031(0.853755)	32567500	68871953.75	100
101	0.601706	009(0.530163); 031(0.469837)	46645000	83761823.93	101
102	0.560432	031(0.742638); 099(0.257362)	25094500	58526299.62	102
103	0.774869	009(0.134041); 031(0.865959)	32120000	68398629.87	103
104	0.496555	053(0.858782); 099(0.141218)	6465000	14862413.45	104
105	0.615083	053(0.393418); 099(0.606582)	13260000	31215274.46	105
106	0.951345	053(0.588485); 072(0.411515)	3967000	7883577.159	106
107	0.572105	053(0.684827); 099(0.315173)	9005000	20975182.69	107
108	0.750861	053(0.671541); 099(0.328459)	9199000	21442063.49	108
109	0.749785	053(0.048214);	18300500	43345752.15	109

		099(0.951786)			
110	0.82114	031(0.219011); 099(0.780989)	20800500	49017240.41	110
111	0.888708	053(0.641304); 099(0.358696)	9640500	22504578.3	111
112	0.746197	053(0.671541); 099(0.328459)	9199000	21442063.49	112
113	0.639948	053(0.347889); 099(0.652111)	13924800	32815183.51	113
114	0.738294	053(0.587919); 099(0.412081)	10420000	24380524.6	114
115	0.845193	053(0.338972); 099(0.661028)	14055000	33128523.1	115
116	0.890178	053(0.767815); 072(0.232185)	4157000	8762293.535	116
117	0.903248	053(0.620108); 099(0.379892)	9950000	23249421.63	117
118	0.836793	053(0.867514); 099(0.132486)	6337500	14555571.69	118
119	0.581361	053(0.459371); 099(0.540629)	12297000	28897716.67	119
001	0.596221	053(0.670787); 099(0.329213)	9210000	21468536.11	001