

**QUALITY BEEF SUPPLY CHAIN EFFICIENCY AND CONSUMPTION IN
ARUSHA AND DAR ES SALAAM CITIES, TANZANIA**

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**A THESIS SUBMITTED IN FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN AGRICULTURAL
ECONOMICS OF SOKOINE UNIVERSITY OF AGRICULTURE.
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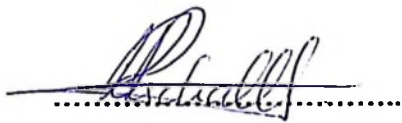
ABSTRACT

This study investigated efficiency along quality beef supply chain and consumption of quality beef in Arusha and Dar-es-Salaam cities, Tanzania. Specifically the study investigated: (i) efficiency of supplying quality beef (QB) (ii) consumption pattern for QB (iii) consumers' preferences for QB and (iv) consumers' willingness to pay (WTP) for QB. Added cost/kilogram and returns/shilling were used to indicate efficiency of QB supply. Almost Ideal Demand Systems was used to analyze consumption pattern of QB while Principal Component Analysis and Contingent Valuation Method were used to determine beef consumers' preferences and WTP for QB respectively. Data were collected using questionnaires administered to two cattle fattening companies, three auction markets, 10 wholesale meat traders, 106 butchermen, six beef processors, 11 supermarkets, 34 tourist hotels, one beef importer and 278 households. Results showed that the cost of processing QB was almost 9 and 1.5 times the cost of producing and retailing QB, respectively. Electricity accounted for 84% and 73% of added cost for processing and distribution of QB respectively. Returns/shilling was highest (83%) and lowest (12%) at retailing and production nodes respectively. Only 9.5% of sampled households consumed QB amounted to 32.1kg/person/year priced at 14 250Tsh/kg. The average consumption of QB in tourist hotels amounted to 449kg/month/hotel priced at 25 608Tsh/kg. 'Freshness' and 'less fat content' were mainly preferred by household consumers; while cleanliness, safety and tenderness were mostly preferred by tourist hotels. Expensiveness, unfreshness and the misconception that QB was preserved using chemicals were major reasons limiting WTP for QB. To promote production and consumption of QB this study recommends that: (i) Investors should venture in

local QB supply because it is profitable. However, efforts should be made to use low cost alternative energy sources such as biogas and solar power to make the venture more profitable (ii) Tanzania Meat Board and other stakeholders in the beef industry should promote marketing of QB through introduction of meat consumption week, advertising, training in schools and participation in trade fairs and (iii) Linkages of major importers of QB with local QB producers should be made with proper taxation of imported beef to make locally produced QB more competitive.

DECLARATION

I, **Paschal Proscovia Kamugisha**, do hereby declare to the SENATE of Sokoine University of Agriculture that this thesis is my own original work and has neither been submitted nor concurrently being submitted in any other Institution.

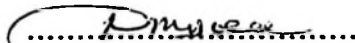


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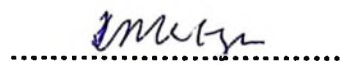
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LIST OF ABBREVIATIONS AND SYMBOLS

AIDS	Almost Ideal Demand Systems
AMC	Arusha Meat Company
BSE	Bovine Spongiform Encephalopathy
CVM	Contingent Valuation Methods
DAEA	Department of Agricultural Economics and Agribusiness
DEA	Data Envelopment Analysis
DASP	Department of Animal Science and Production
DMU	Decision Making Unit
DP	Dressing Percentage
FAO	Food and Agriculture Organization of the United Nations
FGD	Focused Group Discussion
FHH	Female Headed Household
GAIDS	Generalized Almost Ideal Demand Systems
GDP	Gross Domestic Product
GEF	Generalized Expenditure Form
GIT	Gastro Intestinal Tract
GM	Genetically Modified
IGMAFU	Income Generation through Market Access and Feed Utilization
IOLI	Investment Opportunities in the Livestock Industry
LA/AIDS	Linearized Almost Ideal Demand Systems
LES	Linear Expenditure Systems
LGAs	Local Government Authorities

LTD	Limited
LINKS	Livestock Market Information Network and Knowledge Systems
MHH	Male Headed Household
MITM	Ministry of Industry, Trade and Marketing
MLD	Ministry of Livestock Development
MLFD	Ministry of Livestock and Fisheries Development
MNRT	Ministry of Natural Resources and Tourism
MoHSW	Ministry of Health and Social Welfare
NARCO	National Ranching Company
NBS	National Bureau of Statistics
NLP	National Livestock Policy
NSCA	National Sample Census of Agriculture
OMASI	Orkonerei Maasai Social Initiative
PCA	Principal Component Analysis
PHDR	Poverty and Human Development Report
QB	Quality Beef
QUADS	Quadratic Almost Ideal Demand Systems
RATES	Regional Agricultural Trade Expansion Support
RUTF	Read to Use Therapeutic Foods
SAAFI	Sumbawanga Agricultural and Animal Feeds Industries
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SAP	Structural Adjustment Program
SFA	Stochastic Frontier Analysis

SNAL	Sokoine National Agricultural Library
SPSS	Software Package for Social Sciences
SQB	Specialty Quality Beef
TANMEAT	Tanzania Meat Company
TBS	Tanzania Bureau of Standards
TFDA	Tanzania Food Safety and Drugs Authority
TNPS	Tanzania National Panel Survey
TRA	Tanzania Revenue Authority
TTSR	Tanzania Tourism Sector Report
TSHZ	Tanzanian Short Horned Zebu
UAE	United Arab Emirates
UK	United Kingdoms
UN	United Nations
UNIDO	United Nations Industrial Development Organization
USD	United States Dollar
USA	United States of America
UWANA	Umoja wa Wauza Nyama Arumeru
UWANJU	Umoja wa Wauza Nyama Dar-es-Salaam
UWANYAMA	Umoja wa Wauza Nyama Manispaa ya Arusha
WTP	Willingness To Pay

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

This study is part of a bigger research project titled “Income generation through market access and improved feed utilization – production of quality beef and goat meat (IGMAFU –Meat)”. The overall objective of the project was to ensure that there is sustainable increase in income of cattle and goat farmers in Tanzania and Uganda. The project had six components: (i) Increasing the efficiency of the utilization of available feed resources at ranches and feedlots; (ii) Increasing meat production per live animal; (iii) Improving the quality of locally produced meat to reach international standards; (iv) Improving the marketing of quality meat and market information access by livestock farmers; (v) Improving sale and off take of cattle and goats by pastoralists; and (vi) Increasing research capacity in Tanzania, Uganda and Denmark on cattle and goats quality meat production and marketing.

Findings of studies undertaken since the commencement of the project in 2009 revealed that: (i) Pastoralists are willing to sell their cattle provided that there are good prices and large numbers of cattle to be purchased at ago; (ii) Resources for producing quality beef are available in Tanzania: including a large cattle herd, feeds and modern slaughter houses; (iii) Feeds such as molasses and other agricultural by-products which are not consumed by humans and which are not used for other purposes could be used for fattening cattle; (iv) Increasing the quality of the meat produced is possible for both Boran and Tanzania Short Horn Zebu (TSHZ) finished under feedlot conditions using locally available feed resources; (v) Grazing under

good pasture plus supplements seem to be the best option compared with total feedlot confinement and; (vi) Producing quality beef under feedlot condition has an extra cost of production compared to the production of beef under grazing alone, implying that there is need for a market that can pay higher price for such meat (Madsen *et al.*, 2010; Mwilawa, 2012 and Asiimwe *et al.*, 2012).

The above findings imply that, sustainable production of quality beef in Tanzania is dependent on addressing issues of efficiency in using resources to produce, process and distribute quality beef at relatively low cost. This study examines efficiency in the quality beef supply chain and consumption of quality beef because there is a link between efficiency on the supply chain and consumption of a product. In the supply side, the study examines efficiency with regards to production, processing and distribution of quality beef to consumers. Efficiency in production, processing and distribution allows a product to be produced, processed and distributed at low cost and thereby sold to consumers at an affordable price. It is common that consumers need good price deals on their purchases and will search for lower prices. This means the supply chain must not only supply the products but also seek for efficiencies at every stage of the chain to control costs (Trieken, 2011). In the consumption side, the study examines factors considered by buyers of beef and their willingness and ability to pay the premium price for quality beef.

1.2 Beef Sub-sector in Tanzania

The beef consumed in Tanzania can be categorized into conventional beef and quality beef. Conventional beef accounted for approximately 98% of the beef

consumed in the country in 2010 (MLFD, 2012; UNIDO, 2012; NSCA, 2012). In this study, conventional beef refers to the beef which is traditionally produced by pastoralists and agro-pastoralists through grazing on community owned pastures. These cattle are normally traded through auction markets, slaughtered in slaughter slabs/houses with poor hygienic conditions and the beef is produced without being chilled to improve its tenderness. On the other hand, quality beef refers to the beef which is produced in commercial production systems where cattle are fattened by feeding them with concentrates, slaughtered and handled under hygienic conditions as recommended by the Tanzania Food and Drugs Safety Authority (TFDA) and Tanzania Bureau of Standards (TBS). Also after slaughtering the cattle, the beef is chilled to improve its tenderness. It is important to note that quality beef has been defined based on consumers' perceptions since each consumer has his/her own view of what quality beef entails. According to Solomon *et al.* (2006); Mushi *et al.* (2008); Marreiros and Ness (2009), and Inness and Cranifield (2009) quality meat is a multifaceted trait which is influenced by flavor, juiciness, tenderness, leanness and freshness. However, it has generally been accepted among meat consumers that tenderness is the main attribute of quality (Burke and Monahan, 2003).

As indicated above, cattle management practices has an influence on tenderness of beef. In the traditional production system, cattle are raised all the way through up to slaughter age entirely on natural pastures, often of poor quality (MLFD, 2009). The animals therefore exhibit an oscillating type of growth and attain low slaughter weight at an advanced age of 5 to 7 years (Table 1). During this period, animals are, in most cases, trekked through long distances in search of water and pasture, which make

such cattle produce tough and unpalatable meat. The quality of beef from these animals becomes worse during dry season when there is shortage of pasture and water. Unlike cattle in the traditional production system, cattle in the commercial production system do not have to walk long distances for grazing because the cattle are normally fed in paddocks within the ranch. Furthermore, the cattle raised in commercial beef production system are slaughtered at an early age of 2 to 3 years (Table 1). This makes the beef from such cattle tenderer than the beef from cattle in the traditional production system.

Table 1: Cattle productivity indicators in traditional and commercial beef production systems

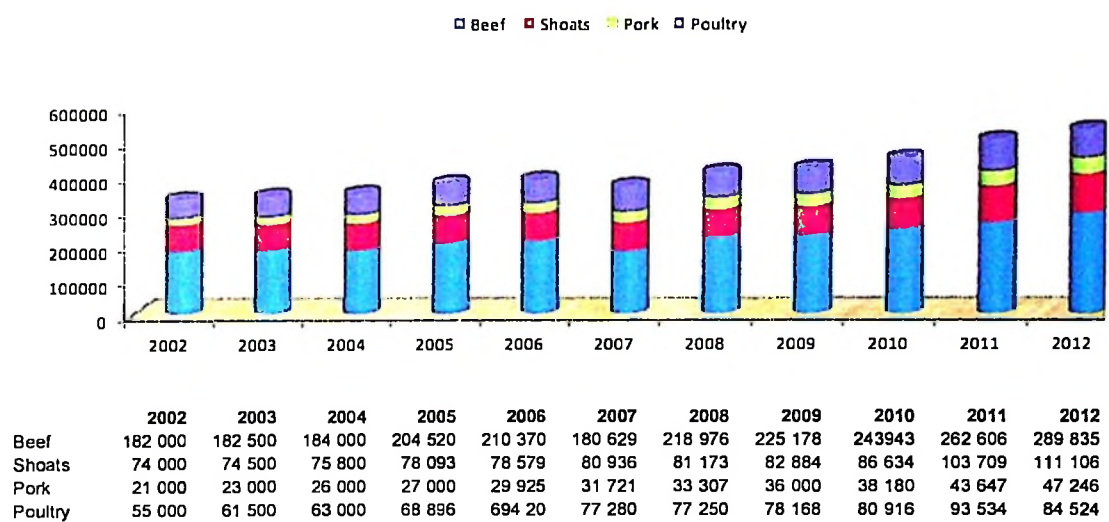
Parameter	Production System		
	Traditional Sector	Commercial NARCO Ranches	Recommended standard
Average stocking rate (acres/LU)	<3	4-5	4 -5
Calving rate	40-50	55-73	80
Calving interval (months)	18-24	15-21	12
Pre-weaning mortality (%)	25-40	4.3	<5.0
Calf mortality (%)	>25	3.3	<10
Adult mortality (%)	8-10	1.3	<5
Mature weight	200-300	250-300	350-400
Annual off take rate (%)	8-10	12	15
Carcass weight (kg)	100-175	120-175	200-250
Age at slaughter (years)	6-7	2-3	2-3

Source: MLFD, 2011

1.2.1 Conventional beef production

Conventional beef is the dominant meat type in Tanzania in terms of quantities produced and consumed. Figure 1 shows the quantities of conventional beef and other meat types produced in the country in the last decade. The figure shows that beef production in the country has increased by 59.25% from 182 500 tons in 2002 to 289 835 tons in 2012, with an average annual production growth rate of 5.1%

(MLD, 2008; MLFD, 2012). The share of beef is above 50% of the total meat produced in the country. Therefore, the beef sub-sector plays an important role as a source of food, income and employment. However, the contribution of beef sub-sector to livestock GDP is generally low. In 2009, for example, beef accounted for only 1.6% of the National Gross Domestic Product (GDP) (MLFD, 2010; MLFD, 2011).



Shoats = sheep and goat

Figure 1: Meat production statistics, 2002 – 2012 (Metric tons)

Source: MLD, 2008; MLFD, 2012

As indicated in Section 1.2 above, most (98%) of the beef consumed in the country is raised traditionally by smallholder cattle farmers; with Tanzanian Short Horned Zebu (TZHS) cattle breed dominating the herd.

1.2.2 Quality beef production

Beef cattle breeds kept in commercial farms include the Boran, Mpwapwa, Charolais, Chianina, Simmental, Hereford, Brahman, Santa Getrudes and Aberdeen Angus. The National Ranching Company (NARCO) has been the main producer of

quality beef in the country. Besides National Ranching Company (NARCO); the government is determined to commercialize traditional cattle sector by promoting cattle fattening among traditional cattle producers. One of the strategies was to privatize some of the NARCO ranches. To implement this strategy, the government, through NARCO, has subdivided some of its ranches into pieces of 2 000 – 4 000 hectares each capable of holding over 120 000 beef cattle and subleased them to local investors for commercial cattle farming (Njombe and Msanga, 2008). In addition, the government has established a system for livestock identification, registration and traceability through the beef supply chain (Maiseli *et al.*, 2010). Efforts have been going on to promote and support beef cattle fattening through a feedlot system. However, the response by the supply chain actors towards beef cattle fattening has been very low (UNIDO, 2012). Only a few enterprising individuals from among agro-pastoral and pastoral areas especially in Mwanza, Shinyanga, Mara, Dodoma, Morogoro, Arusha, Manyara and Coast regions have embarked on beef fattening to improve the quality of beef animals for sale in niche market within East Africa and the Comoro Island. In 2011/12 for example, only 133 204 heads of cattle were fattened of which 59% were fattened by small scale cattle traders mainly in the Lake zone, while the 40% and 1% of the cattle were fattened by the NARCO and private commercial farms respectively (MLFD, 2011; MLFD, 2012; MLFD, 2013). According to Mlote *et al.* (2012), cattle traders purchase unfinished cattle from traditional cattle farmers, fatten them for up to three months and resell them to the local and/or export markets at prices higher than that paid to the traditional cattle farmers. According to UNIDO (2012) estimates, the number of cattle fatteners in the country is about 100 holding at least 5 550 heads of cattle at any point in time. This

implies that the country has the potential for quality beef production and supply to meet the demands of both domestic and export markets.

Table 2 presents quality beef cattle production in the country. According to the table, Lake Zone (Mwanza, Shinyanga and Kagera) account for more than 65% of quality beef cattle produced in the country in 2013/14. Overall, the quality beef production has been fluctuating during the last two decades. According to NSCA (2012) quality beef cattle population has grown at the rate of 2.5% during 1995 -1999 period from 91 571 cattle heads in 1995 to 101 208 cattle heads in 1999. This was followed by a sharp decline between 1999 and 2003 to a negative growth rate of (-33%) from 101 208 cattle heads in 1999 to 20 527 cattle heads in 2003. The negative growth rate of quality beef cattle population might be aggravated by catastrophic incidence of El Nino rains in 1998/99 which led to deaths of not only quality beef cattle but also indigenous cattle and destruction of other agricultural products. In the period from 2003 to 2008, quality beef cattle population grew by 32.12%; with the annual growth rate of 5.86% from 20 527 in 2003 to 82 656 cattle head in 2008 (NSCA, 2012). The increase of quality beef cattle population in this period was partly associated with privatization of major means of production and commencement of the National Livestock Policy (NLP) in 2006 that aimed at commercialization of the livestock sector sustainably while conserving environment.

**Table 2: Quality beef cattle production (cattle fattened) by location
(Head counts)**

Regions	2010/2011	2011/2012	2012/13	2013/14
Mwanza	20 000	26 800	32 900	47 100
Shinyanga	24 000	32 000	39 300	54 400
Kagera	2 000	2 846	3 350	13 800
Sub total	46 000	61 633	75 550	115 300
Tabora	2 000	2 580	3 100	7 480
Singida	1 600	2 146	2 600	6 930
Dodoma	2 000	2 775	3 400	7 860
Sub total	5 600	7 501	9 100	22 270
Arusha	4 000	5 360	6 500	15 180
Manyara	2 400	3 216	3 900	12 250
Sub total	6 400	8 576	10 400	27 430
Rukwa (SAAFI)	480	729	800	1 000
Iringa (Mark Taylor Farm)	220	290	350	500
NARCO ranches	40 000	53 500	65 800	8 500
Grand total	98 700	132 246	162 000	175 000

Source: MLFD, 2014

1.2.3 Quality beef trade

Generally, it can be concluded that quality beef trade balance follows a semicircle path since the country's independence in 1961. Between 1961 and late 1970s, the country's imports and exports were relatively higher compared to the imports and exports in the subsequent periods (Figures 2 and 3) (FAO, 2013). The huge trade volumes in this period can be partly associated with the participation of private sector operators in the livestock sector while government remained with the regulatory role not only in the livestock sector but also in the whole economy. Thereafter, imports and exports of beef declined sharply (NSCA, 2012). The declining trend in beef imports and exports could be associated with the implementation of the Arusha declaration of 1967 whose main goal was the nationalization of major means of production. During the period between 1970s and 1990s, parastatals such as National Agricultural and Food Corporation (NAFCO)

and NARCO were established with the support from International Development Agency of the World Bank (IDA/WB). The parastatals engaged themselves in large scale production, processing, and distribution of livestock products. Moreover; the low beef trade balance in this period can partly be associated with the opportunism and free riding behavior among operators of common resources as presented in New Institution Economics by Coase (1937). The 1978/79 war against Idd Amin in Uganda and the collapse of world market prices accelerated Tanzanian economic deterioration during the 1980 – 1985 period. In 1984/85, the government launched its major reforms towards a liberal economy which includes, among others, the liberalization of food products markets including the livestock sector under the Structural Adjustment Program (SAP).

Imports and exports of beef rejuvenated by mid 1990s when SAPs were implemented to reduce state control over country's major economic means of production and promote private sector activities among others. Since then, beef export and import trade generally stabilized (FAO, 2013) consistent with the stabilization of the whole economy. However, an eruption of beef imports was experienced in 2009, 2010 and 2011 where by 477 180.9, 725 149.26 and 971 879.41 kilograms of beef were imported respectively and sold through supermarkets and tourist hotels (MLFD, 2012). Substantial quantities of quality beef importation might be associated with inadequacy of local production of quality beef to meet an increasing demand resulting from a number of factors including expansion of country's tourist industry. Tourists are major consumers of quality beef in hotels and restaurants in the country. SAGCOT (2012) estimated that only 140 metric tons

(16.17%) of quality beef were produced locally while 700 metric tons of quality beef were imported in 2010 to meet the national demand of quality beef.

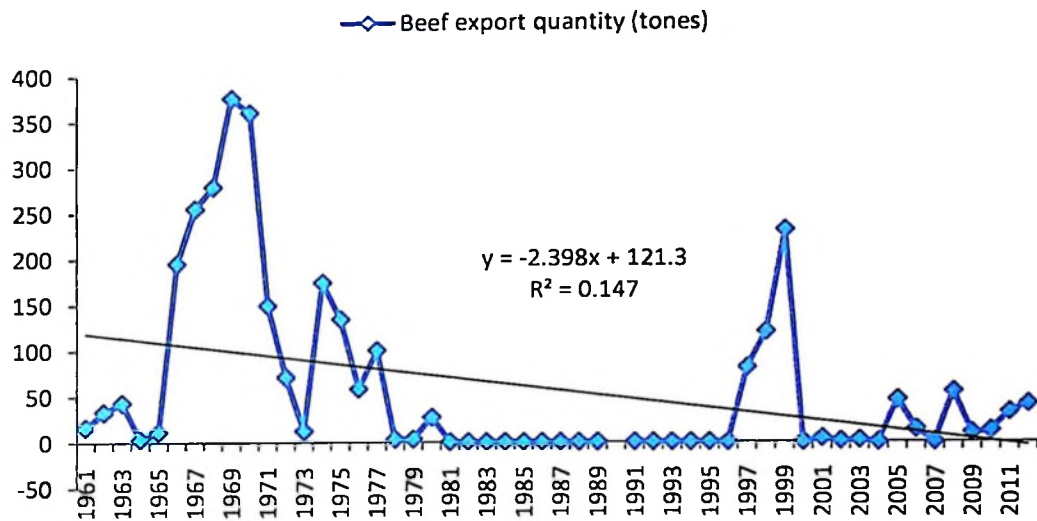


Figure 2: Quality beef export trend for 1961 – 2011 period

Source: FAO, 2013; FAOSTAT, 2014; MLFD, 2014

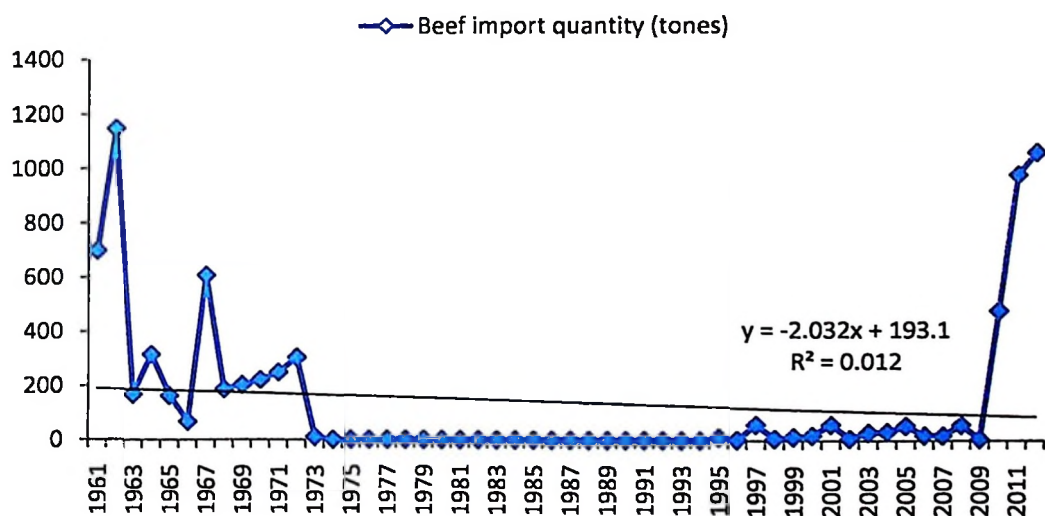


Figure 3: Quality beef import trend for 1961 – 2011 period

Source: FAO, 2013; FAOSTAT, 2014; MLFD, 2014

1.3 Statement of the Problem and Justification

Despite having the largest cattle population in Africa after Sudan and Ethiopia, Tanzania has remained a net importer of quality beef products for more than a decade (Figures 2 and 3). For example in 2010, a large proportion (83.33%) of the country's quality beef demand that stood at 847 Metric tons was met through imports mainly from Kenya (UNIDO, 2011; Kurwijila *et al.*, 2011; SAGCOT, 2012; UNIDO, 2012). Importation of quality beef contributes to depletion of the nation's meager foreign exchange. The foreign currency spent on beef imports in Tanzania accounted for 0.05% of the total value of imports in 2011 (MLFD, 2012; FAOSTAT, 2014). Importation of quality beef suggests that the production of quality beef in the country is lower than the country's demand for quality beef. The imported beef is mainly sold in niche markets such as supermarkets and tourist hotels. Tourist and hotel industries which are main consumers of quality beef have been growing progressively since 1991. The number of tourists visiting Tanzania per annum has increased from 186 000 in 1991 to 800 000 in 2010 (TTSR, 2011; SAGCOT, 2012); and the number of hotels has more than tripled, from 205 hotels in 1991 to 679 hotels in 2009 (TanzaYP.com, 2009). Furthermore, the number of supermarkets that form the main retailing outlet of quality beef in Arusha and Dar-es-Salaam cities has grown for about tenfold; from one supermarket with two branches in 2007 to about 7 supermarkets with more than 25 branches in 2011 (Ashimogo and Greenhalgh, 2007; Kamugisha, 2011).

This study investigated the efficiency with which beef was produced, processed and distributed along quality beef supply chain. The study also analyzed the consumption pattern of quality beef in Arusha and Dar-es-Salaam cities as two

major food consumption centers of Tanzania. The study provides additional information to the existing empirical literature on production and consumption of quality beef in Tanzania. Previous studies on quality beef production have mainly been on the impact of feeds and breeds on production of quality meat (Ryoba and Mtenga, 2006; Mushi *et al.*, 2006; Shija *et al.*, 2009; Mwilawa *et al.*, 2009; Zakaria *et al.*, 2009; Asiimwe *et al.*, 2012; Mlote *et al.*, 2012). Ryoba and Mtenga (2006) evaluated the preservative effects of animal fat in meat products stored under ambient temperature for five months. Mushi *et al.* (2006) reviewed parameter indicators of meat quality from ruminants and suggested some means of harnessing production and marketing environment for the country to have quality beef. Shija *et al.* (2009) evaluated carcass composition from steers of Boran and TSHZ finished under different concentrate levels in Tanzania, Mwilawa *et al.* (2009) studied the effects of breeds and dietary treatment on quality meat from finished Boran and TSHZ steers during the wet season. Zakaria *et al.* (2009) assessed the effects of nutrition and breed on body measurement and cut yields using TSHZ and Boran steers. Mwilawa (2012) studied the effects of different diets on weight gain, carcass and meat quality characteristics of two Tanzanian indigenous cattle; and Asiimwe *et al.* (2012) assessed growth performance and meat quality of TSHZ cattle finished with agro processing by products. In addition to the impact of feeds and breeds studies, the upstream sector of quality beef live cattle supply chain was studied. Mlote *et al.* (2012) characterized beef cattle supply chain strands, identified key actors with their roles and interrelationships in the beef supply chain and identified challenges and opportunities facing cattle fattening industry. In addition to examining cattle fattening like the above studies, the present study examined

efficiency with which quality beef was processed and distributed in the downstream chain nodes.

Unlike studies on quality beef production, studies on consumption of quality beef in Tanzania are few (Mapunda, 2007; Nandonde *et al.*, 2012; Nandonde *et al.*, 2013_a). Mapunda (2007) examined relative efficiency of the existing beef marketing system and exploration of potential market opportunities for quality beef in Arusha and Dar-es-Salaam cities. The study did not examine efficiency in production and processing of quality beef. Nandonde *et al.* (2012; 2013_a) looked at preference and Willingness To Pay (WTP) for finished and chilled tender beef and factors influencing WTP in Iringa municipality and Mbeya city in the southern highlands of Tanzania. The study was not only limited in terms of coverage but also did not examine quality beef attributes preferred by niche markets that form major component of quality beef market in the country. The present study adds to the existing knowledge on consumption of quality beef by examining the consumption pattern of quality beef; determining consumers' preferential attributes for beef and consumers' WTP for quality beef in Dar-es-Salaam and Arusha cities. This is because the consumption of quality beef is most prominent in both cities since the two cities account for about 38% of tourist hotels that are major consumers of quality beef in the country. Furthermore the two cities are known for having relatively higher income earners who are main consumers of quality beef than any other city in the country (TRA, 2013).

Besides its contribution to the existing literature on quality beef production and consumption, the study provides information to beef stakeholders that include government, Non Governmental Organizations (NGOs) and private sector on quality attributes required by niche markets, quality beef consumption pattern and efficiency with which quality beef is produced, processed and distributed to meet consumers' needs. The information is useful to stakeholders interested in the beef sub - sector especially for making informed decisions about investment in the quality beef supply chain operations.

1.4 Objectives of the Study

1.4.1 Overall objective

To investigate the efficiency in the production, processing and distribution of beef along the quality beef supply chain and the consumption of quality beef in Dar es Salaam and Arusha cities, Tanzania

1.4.2 Specific objectives

- i. To analyze efficiency in the production, processing and distribution of quality beef in the study area
- ii. To analyze the consumption pattern of quality beef in the study area
- iii. To determine consumers' preferences for beef
- iv. To examine consumers' willingness to pay for quality beef

1.5 Research Hypotheses

- i. Quality beef is not produced efficiently at all nodes of the quality beef supply chain in the study area
- ii. Many households in the study area do not consume quality beef.
- iii. Beef consumers in the study area do not prefer quality beef.
- iv. Beef consumers in the study area are not willing to pay for quality beef.

1.6 Conceptual Framework of the Study

Figure 4 portrays the conceptual framework of the study. Presence of drivers of chain efficiency enhances operations of chain activities. For example, the presence of advanced technology facilitates efficient operations of chain activities. Moreover, regulatory environment harmonizes quality control mechanism which in turn assures safety of consumers of quality beef; while support services provide products and services required for the chain and which can be outsourced by chain actors (Figure 4).

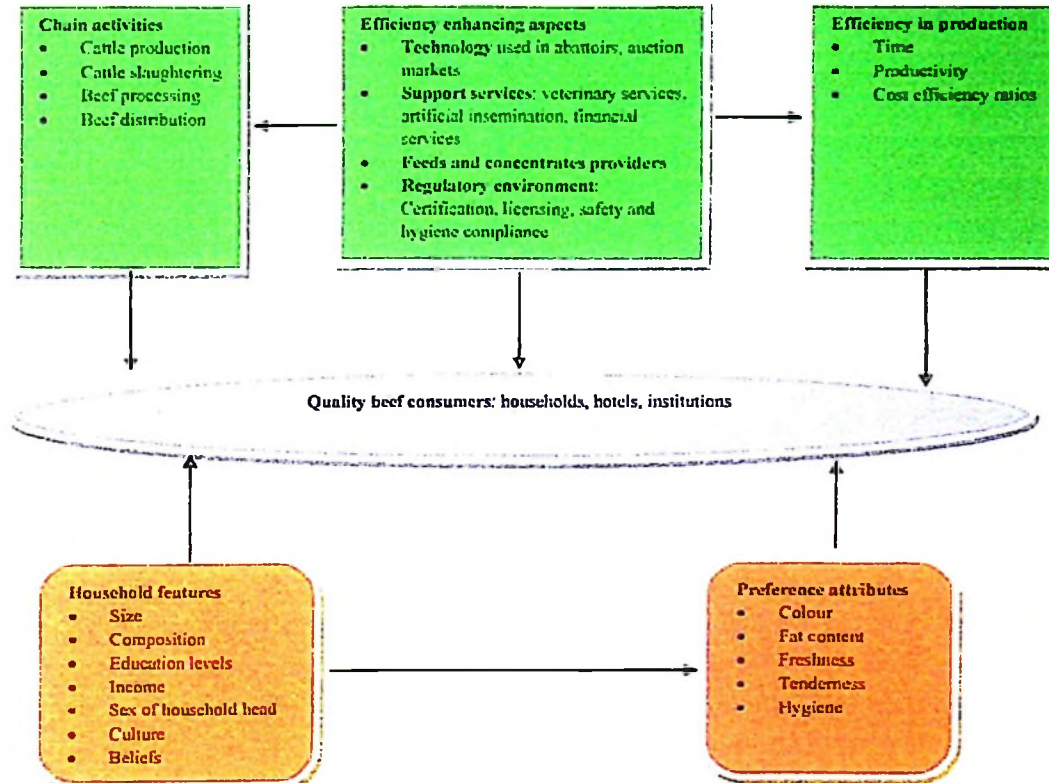


Figure 4: The Conceptual framework for the study

Efficiency, with which quality beef is produced, processed and distributed influences consumption of quality beef since it is reflected in the costs incurred by chain actors which in turn affects prices and the quantity supplied to the market and eventually affects the consumption of quality beef. Low efficiency leads to high cost per unit of beef produced and handled, high price of the produce and low quantity of quality beef supplied to the market which leads to low consumption. On the other hand, high efficiency leads to low cost per unit of beef handled, reasonable unit price of the produced quality beef and substantial supply to the market which in turn enhances availability of the product in the market at low price and therefore high likelihood of quality beef consumption.

In addition to the price of quality beef which influences costs of production and handling, the consumption of quality beef is also influenced by socioeconomic characteristics of households which include household size, household composition; household income, culture, and belief; and features of household heads such as sex, occupation, and education (Olaizola *et al.*, 2005; Bopape and Myers, 2007; Cranifield *et al.*, 2010) (Figure 4). Small sized male headed households with higher income and high education levels are expected to consume more quality beef than large sized female headed households with low income and low education levels. This is because; small size households are expected to spend less on basic needs that leave enough income to allow them spend on expensive products such as quality beef.

Quality beef is known for not only its quality attributes but also for its higher costs compared to other sources of protein. Education levels have a link with income levels. Therefore household heads with higher education levels are expected to have higher levels of income, and they can, as a result, consume more quality beef than households whose heads have lower levels of education. Also some social economic characteristics can influence preferences for quality beef. For example, it is expected that consumers with advanced education levels would prefer to consume quality beef than consumers with relatively low education levels even when the income levels of the two groups are the same. This is because consumers with advanced education levels are likely to have knowledge and exposure that lead to preference on quality beef than consumers with limited knowledge and exposure

In addition to social economic factors, preference attributes of consumers influence consumption of quality beef since it determines levels of satisfaction/utility derived from consuming quality beef (Carpenter *et al.*, 2001; Bond *et al.*, 2008).

1.7 Organization of the Study

The remainder of the thesis is organized in four chapters. Chapter Two reviews literature on theoretical aspects of neoclassical theory of the firm and the theory of consumer behaviour; empirical studies on meat supply, and food consumption patterns. Chapter Three presents methodology including analytical framework, sampling design; development of data collection tools and data collection approaches. Chapter Four presents and discusses the findings while Chapter Five presents conclusions and recommendations emanating from major findings of the study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Theoretical Background

The study is concerned with efficiency of quality beef supply chain and the consumption of quality beef. It is therefore underpinned by two theories: neoclassical economic theory of the firm in relation to efficiency and the theory of consumer behavior.

2.1.1 Neoclassical theory of the firm

The neoclassical economic theory identifies three important efficiency measures (Boris *et al.*, 1997; Onyenweaku and Effiong, 2006). These include technical, allocative, and economic efficiency. Technical efficiency is reached when it is impossible for a firm to produce large outputs from the same level of inputs, or a given output from fewer inputs (Greene, 1993; Barnes *et al.*, 2010). Allocative efficiency reflects the firm's ability in using inputs optimally to produce a given level of output with respective prices (Khai and Yabe, 2011). Finally, economic efficiency refers to the ability of a firm to produce a given level of output at the least cost or producing an optimal level of output from a given input level (Russell and Young, 1983). It is the combination of technical and allocative efficiency (Farell, 1957). In practice, efficiency of the firm is measured by considering relative position

in terms of efficiency of a particular firm compared to others (Farrell, 1957). Hence, a firm is considered to be technically efficient compared to others if it produces the same level of output using less inputs or use the same level of inputs to produce more outputs (Shahooth and Battall, 2006).

On the supply chain perspective, efficiency has been defined differently by different authors. Cooper *et al.* (2000) define supply chain efficiency as an overall efficiency measure that depends on the efficiency of nodes' members along the supply chain. Vorst (2000) defines supply chain efficiency as the degree with which a supply chain fulfills the end user requirements; while Wong and Wong (2007) define supply chain efficiency as the efficiency which takes into account the multiple performance measures related to the supply chain members as well as integration and coordination of the performance of those members. Although supply chain efficiency has been defined differently by various authors, its overall meaning remains the same, being efficiency of individual nodes along the chain focusing on satisfying the end user.

Several models have been developed to measure efficiency of supply chains for chains' improvement (Gerber, 2010). Spider/radar diagram and Z chart are popular tools used to measure supply chain efficiency (Yakovieva *et al.*, 2009; Gerber, 2010;

Shafiee and Shams-e-alam, 2011; Mishra, 2012). However the tools are graphical in nature that cannot measure efficiency using multiple inputs and outputs on one hand; and fail to account for different challenges and opportunities faced by different companies along the supply chains on the other hand. The limitation identified in simple measures of supply chain efficiency has been amended by development of multivariate approaches. Multivariate approaches are categorized into two main clusters: deterministic (non parametric) such as Data Envelopment Analysis (DEA) and parametric such as least square methods and stochastic frontier methods.

Numerous models/approaches have been developed to measure supply chain efficiency using deterministic approaches (Charness *et al.*, 1978; Fare and Primont, 1984; Banker *et al.*, 1984; Fare and Grosskopf, 1996; Seiford and Zhu, 1999; Fare and Grosskopf, 2000; Farsi and Fillippini, 2003; Golany *et al.*, 2003; Chen and Zhu, 2004; Rayeni and Saljooghi, 2010). However, deterministic approaches generally employ linear programming methods that are used in estimating multiple inputs and multiple output production frontiers.

Deterministic approach has been widely used in the measurement of supply chain efficiency in different industries since its development by Farell in 1957. Examples include the Banking sector (Shahooth and Batall, 2006; Fiorentino *et al.*, 2006); Telecommunication (Collier and Storbeck, 1993); Health (SCRCSP, 1997; Mishra, 2012); Energy (Farsi and Fillipini, 2003); and Food (Chaowarat and Shi, 2013). However, the approach prescribes solutions under certain assumptions (Ganapath *et al.*, 2003) which confounds inefficiency with statistical noise since the entire

residual is considered as inefficiency. The use of DEA models in measuring supply chain efficiencies eliminates the use of unrealistic assumptions in the supply chain optimization models and probabilistic models (Yang *et al.*, 2006). Furthermore, the models are weakened by the fact that their application requires weighing of different factors of production and handling along the chain. This process is subjective from firm to firm hence it poses biasness in comparing efficiency across firms along the chain. Moreover, DEA models require production and handling of multiple inputs and outputs that are not the case for this study since various inputs are employed to produce, process and handle a single output (beef).

The Bayesian methods developed by Broeck *et al.* (1994) are common stochastic frontier analytical techniques in literature. The model employs Monte Carlo integration technique to examine the effects of exogenous factors on the production frontier or inefficiency component. Its advantage lies on the fact that it provides point and interval estimates of technical efficiency, its use of small sample that yield robust results, and its conformity to economic theory (Galany *et al.*, 2012). Tsionas (2002) developed a random effect model whereby efficiency is separated from technological differences using Bayesian model involving Gibbs sampler with data augmentation. In this model, the term inefficiency is assumed to be one sided Independent and Identical Distributed (i.i.d) random variable, uncorrelated with regressors and statistical noise.

Stochastic Frontier Analytical (SFA) models have been widely employed by various authors to estimate efficiency in the energy sector in different economies (Fillippini

and Wild, 1998; Farsi and Fillippini, 2003); and in agribusiness enterprises (Battese and Corra, 1977; Ali and Byelee, 1991; Fillippini and Wild, 1998; Farsi and Fillippini, 2003; Ogundari *et al.*, 2006; Adeyemo *et al.*, 2010; Barnes *et al.*, 2010; Khai and Yabe, 2011; Ajao *et al.*, 2012; Mlote *et al.*, 2013_a; Audu *et al.*, 2013).

Although SFA models are considered superior to DEA models due to their ability of decomposing residual component of production and/or cost function into statistical noise from inefficiency, the approaches impose an explicit functional form and distribution assumption on data that can lead to mis - specification. Generally, most deterministic and stochastic frontier models deal with isolated parts of the supply chain system such as supply – production, production – distribution or inventory – distribution (Yang *et al.*, 2006). Therefore, DEA and SFA models were not found suitable in measuring efficiency of quality beef supply chain in this study; since the chain involves a series of simple business functions (cattle farming, cattle slaughtering, beef processing, and distribution of beef and beef products). The efficiency of quality beef supply chain was measured by computing the ratio of revenue over the cost from the output - input orientation at each node as suggested by Shafiee and Shams-e-alam (2011).

2.1.2 Theory of consumer behavior

Theory of consumer behavior has been a central topic in economics for many years and in the modern formalized economic theory that has dealt with consumer demand for some considerable time (Edgerton *et al.*, 1996). The economic theory of consumer decision making was based on the utilitarian maximizing approach

whereby consumer is assumed to maximize his/her utility from consumption of a product or service given the budget constraints (Schiffman and Kanuk, 2001).

In studying consumer behavior, we explore why consumers buy what they buy and how they respond to changes in the market environment. Various theories on consumer behavior have been developed including Walras demand theory, Marshall Theory of consumer behavior and Hick's theory of consumer behaviour.

Walras demand theory is named after his founder Leon Walras in 1874 who derives demand function based on marginal utility theory of value for economic agent. Walras equilibrium state is reached when demand and supply are equilibrated in all markets and all economic agents maximize their satisfaction given their prevailing incomes and prices (Misaki, 2012). The theory considers endowments, preferences and technology used in optimizing the agents' satisfaction employing the price adjustment rule until the market equilibrium is reached (Vriend, 1991). When all transactions have been made, consumption and production start again. However, the theory has been criticized for lack of realism in the assumption of complete contracting at no cost and limitation of transaction to be made until equilibrium is reached (Bowles and Gintis, 2000). The identified weakness of Walras demand theory opened the door for Marshallian theory of demand.

Marshallian theory of demand is based on the assumption of the law of diminishing marginal utility and constant utility of money. The theory states that 'as a consumer consumes more of good within a given time period, the additional utility s(he) gets

from successive units (marginal utility) declines' (Schiffman and Kanuk, 2001). If marginal utility (MU) is plotted versus the quantity consumed in a graph, we yield downward sloping line. Marshall contends that consumer buys quantity of a good such that marginal utility of the last unit s(he) buys is equal to what s(he) would have to give up in the exchange process. This relationship is clearly portrayed with consumers' demand curve derived from marginal utility curve of a good dividing by marginal utility of money across the equation. The results is normal demand curve and is named after the theorist name to be called the Marshallian demand curve showing the quantity demanded of a good at different prices (Misaki, 2012). The limitation of the theory is based on the fact that it assumes constant marginal utility of money. Commentators argue that this assumption is wrong since marginal utility of money differs between the rich and the poor (Zaratiegui, 2002). These questions were answered in the Hicks theory of consumer behavior.

The Hicksian theory of consumer behavior views utility as a subjective concept which varies from one consumer to another, and can only be ranked in order of preference. With this perspective, indifference curve was defined as a locus of quantity bundles (different combinations) demanded by a consumer as a function of price of goods that yield the same level of utility to the consumer (Hicks and Allen, 1934). The Theory stipulates how consumer chooses bundles of commodities among alternative bundles which minimize expenses while yielding the same utility levels.

The Hickisian theory bases on six major assumptions: (1) A Consumer uses her limited resources in buying goods and services to satisfy her needs and wants. (2) A

consumer is assumed to be able to rank all possible combination of bundles available to her (completeness). (3) If a consumer prefers bundle A to B, and B to C; then she must prefer bundle A to C (Transitivity). (4) If a consumer prefers bundle A to B, then she must prefer all bundles B and those close to B (Continuity). (5) The more of a good is always preferred than less (non – satiety); and (6) Diminishing marginal rate of substitution (Schumpeter and Perlman, 2006)

Generally, it can be concluded that, the indifference curve approach introduced the concept of marginal rate of substitution instead of diminishing marginal utility in the Marshallian demand approach. Furthermore, the approach assumes that a consumer is at equilibrium state when the budget line is tangent to the indifference curve; that is when marginal rate of substitution of good X for Y (MRS_{xy}) is equal to the price ratios of the goods (Brown and Deaton, 1972).

Although indifference curve approach was considered superior to Marshallian theory of consumer behavior, the model has not gone without shortcomings. Robertson (1954) had the opinion that, Hicks and Marshall demand approaches are similar, only that Marshall uses the term marginal utility while Hicks uses marginal rate of substitution but both had the same meaning. Schumpeter (1954) argues that not only that both models view a consumer as a rational man which is violated with the notion that a consumer acts under social, economic and legal disabilities, but also Hickisian approach assumes that a consumer buys only two commodities which is unrealistic since a consumer buys large number of commodities to satisfy his/her unlimited wants.

Generally, economic theories on consumer behavior viewed a consumer as a rational man whose purchasing decisions are made based on economic calculations. Therefore, the focus of economic theory was on how a consumer allocated her income to determine her demand for goods and services she desires. However, it was realized that economic factors alone can explain the consumer decision only partially; and it was generally acknowledged that sociological, demographical and psychological factors influence consumer's behavior (Brown and Deaton, 1972). Hence accommodation of factors other than economic ones in the demand models was made to analyze the influence of such factors on consumer demand analysis. Here is where statisticians like Ducpetiaux (1855) and LePlay (1855) investigated the influence of income on consumption patterns through family budgets. However, the great contribution was made by Engel in 1857 to reveal relations between family expenditure and consumption patterns of various goods consumed (Brown and Deaton, 1972).

The estimation of complete demand systems within Engel framework is consistent with classical demand theory. It has originated from Stone (1954) who contributed largely to a body of literature today (Hannan *et al.*, 2010). Since then, consumer demand literature has been conducted using different demand functional models. Some of them are the Translog model of Christensen *et al.* (1975), the Almost Ideal Demand System (AIDS) developed by Deaton and Muellbauer (1980), the Rotterdam model of Barten (1969) and Theil (1965); and Generalized Almost Ideal Demand System (GAIDS) proposed by Bollino (1987). However the functional forms of demand systems elaborated above are locally flexible; in the sense, that

they do not put a priori restrictions on the possible elasticity at a point. These models possess enough parameters to approximate any elasticity at a given point. But locally flexible functional forms often exhibit small regular regions consistent with microeconomic theory. As a result, a number of alternative flexible functional forms with larger regular regions have been developed. Examples include the Quadratic AIDS model (QUAIDS) (Banks *et al.*, 1997), the Laurent model (Barnett, 1983, 1985; Barnett *et al.*, 1987), and the Generalized Exponential Form (GEF) (Cooper and McLaren, 1996).

In applied microeconomics, the AIDS and the Rotterdam models are frequently used, since each can be derived from consumer theory and can be estimated in a linearized form with theoretical restrictions easily imposed and tested. Earlier linear demand models possessed awkward connections with economic theory that tended to be difficult to impose or test (Barnett and Seck, 2007). The AIDS model with linearized price index (LA-AIDS) can be rewritten in a first difference form, such that LA-AIDS has the same dependent variables as the Rotterdam model in its absolute price version. However, some authors contended that AIDS is capable to explain high proportion of the variance for the commodity budget shares and product elasticities (Deaton and Muellbauer, 1980; Blanciforti *et al.*, 1983). Hence this study employed AIDS linearized model to examine consumption of quality beef in the country. This is because AIDS linearized model outweighs other demand estimation models.

Apart from the Engel analytical models, economists accept that consumers' decisions on purchasing are not only explained by socio-economic factors but are

also influenced by psychological factors. The theory of consumer behavior classifies factors influencing consumers' preferences in two groups: macro and micro approaches. Macro approach include factors that affect consumers' perception collectively such as through psychological and cultural manipulation for example, through advertising (Kacen and Lee, 2002; Khan, 2006; Bashir and Malik, 2009) culture (Kacen and Lee, 2002; Khan, 2006; Sian *et al.*, 2010) and creation of awareness on the role of diet on health (Magdalena, *et al.*, 2011). However, the macro approach is silent on the individual consumer behavior within a shared economy under which the same macro factors exists.

The micro approach of consumer behavior assumes that given the available income, a consumer chooses a product that maximizes utility derived from different product's quality attributes. From the micro approach point of view, quality concept has been categorized into two major perspectives: objective and subjective quality perceptions. The objective quality perspective involves three types of quality concepts: product oriented quality, process oriented quality and quality control based criteria (Brunso *et al.*, 2002). The *product oriented quality* covers all aspects of physical attributes of a product such as fat content, and muscle size in meat. *Process oriented quality* involves mechanism through which a product has been produced for example, organically produced and without pesticides while *control quality criteria* describe the standards which are abided by to meet specific class. On the other hand, subjective quality perception defines quality from end - user' consumer's point of view. In most cases the subjective quality is influenced by objective quality attributes (Steenkamp and Trijp, 1996). Generally, theories defining subjective

quality have been classified into four major classes: economics on information approach, multi-attribute approaches, hierarchical approaches and integrative approaches.

Economics information on consumer behavior approach clusters attributes influencing consumer decisions into search, experience and credence attributes (Darby and Karni, 1973). *Search* attributes are features of the product or service which can be ascertained before purchase such as meat color, smell of a product and proportion of fat composition in meat. *Experience* attributes are features of the product that can only be assessed after the product has been consumed such as taste while *credence* attributes cannot be validated by consumers. The possession of such features is based on credibility and reputation of suppliers or producers. These features include mechanism under which cattle have been raised, whether cattle producing carcass have been finished with grass or concentrates, whether the slaughtering procedures used the humanitarian approach in cattle slaughtering (Chrea *et al.*, 2010).

Multi attribute approaches, which are derived from multi attribute theory, consider quality as a multi-dimension phenomenon which is comprised of attributes that are perceived well by consumers. The approaches emphasize that consumers' buying decisions are influenced by not only economic considerations but also people's needs, perception and motivations as well as emotions, cultural norms, values and group affiliations (Chisnall, 1995; Steenkamp, 1997; Marreiros and Ness, 2009). These approaches assume that a product quality is influenced mainly by intrinsic and

extrinsic attributes. Intrinsic attributes refer to the physical characteristics of the product such as fat content (leanness), color and freshness and; extrinsic attributes which include brand name, place of origin and cleanliness of a selling point (Olaizola *et al.*, 2005; Innes and Cranfield, 2009). Multi-attribute models include models like Engel – Blackwell- Miniard (EBM) model, Haward-Sheth model, Nicorsia model and Andreason model (Loudon and Della, 1993; Engel *et al.*, 2001; Marreiros and Ness, 2009; Sahney, 2011)

Hierarchical approaches, through means end chain framework, are normally used where a consumer is considered to establish quality concept between product perceptions and abstract motives/values. The approaches show how a product attribute is linked to consequences of consumption that lead to attainment of consumers' life values. The approaches have predictive powers that provide insights on food choices (Petrovici, *et al.*, 2002). Hierarchical approaches include theory of reasoned action and theory of planned behavior.

Integrative approaches integrate multi-attribute and hierarchical approaches when viewing the quality perception of a product. The total food quality model (TFQM) proposed by Grunert *et al.* (1996) is the main model in these approaches. The model accepts product quality concept as being multi-dimension in nature and integrates explanation of intention to purchase as a trade-off between give and get means end chains perspective (Grunert, 2005; Brunso *et al.*, 2002). The first part of TFQM (before purchase) presents mechanisms under which quality expectations are formed based on intrinsic and extrinsic quality cues of the product that can be objectively

measured (Grunert *et al.*, 2004). Then, TFQM encompasses the means -end chains perspective whereby quality is desired because it satisfies purchase motives/values (Oliver, 1980). The second part of the model (after purchase) portrays the notion that consumers will have quality experience that may either conform to or deviate from the expected quality (Krutulyte *et al.*, 2006). The gap between quality expectation and experienced quality is assumed to determine customer satisfaction hence leading to future consumption or non consumption of the product (Bozkurt *et al.*, 2011).

Generally, it can be concluded that models of analyzing food preferential quality concept in the body of literature are classified into four groups namely, *economics on information approaches, multi-attribute approaches, hierarchical approaches and integrative approaches* as presented above. This study combined two strands of literatures on consumer behavior. The first strand was the concept of consumers' utility maximizing behavior whereby rational consumer is assumed to consume a good with attributes that yield him/her maximum utility given budget constraints at hand (Baker, 1999; Innes and Cranifield, 2009). The second strand of knowledge employed in this study is from marketing point of view that considers preference of consumer for a product being viewed as multi dimensional in nature and which is influenced by intrinsic and extrinsic attributes of the product (Grunert *et al.*, 1996; Steenkamp, 1997). The intrinsic attributes refers to the physical characteristics of a product such as colour, leanness of meat while extrinsic attributes refer to other attributes which are not related to physical characteristics of a product like hygiene of retailing outlet, product origin and brand name. The Total Food Quality Model unifies the utility maximizing approach and multi dimensional models in explaining

consumer choice preferences; that builds a stronger foundation of consumer behavior framework, hence it was used for the study.

On the other hand, firms accept that superior pricing capability has a significant influence on profitability of their companies (Roegner and Zawada, 2004) such that the firms consider it as marketing decision (Krishnamurthy, 2004). Therefore, economists view pricing based on a consumer's perception of a product value as an important aspect in economic literatures. However, the challenge of the value - based pricing lies in the estimation of willingness to pay (WTP) for a product. Consequently several approaches of measuring WTP have been developed in recent literatures.

Willingness to pay has been estimated through two major approaches: revealed preference (RP) techniques and stated preference (SP) techniques. Revealed preference techniques involve observation of prices that people pay for goods and services in various markets; and expenditures of their economic resources such as money, time and labour to obtain the goods and/or services or to avoid their losses (Wedgwood and Sansom, 2003). On the other hand, stated preference techniques entail the use of respondents' statements about their willingness to pay for a particular good or service (Kroes and Sheldon, 1988).

Revealed preference techniques employ historical data to estimate future WTP from selling outlets. Historical data lack substantial price variations to cover the desired spectrum of WTPs and are mostly available at aggregate level (Christoph, 2005;

Sattler and Nitschke, 2003). The use of SP methods over RP techniques is due to their applicability to wider disciplines in which consumer behavioral responses were either not available or was difficult to assess substantially attributes associated with RP techniques (Louviere and Hensher, 1983; Hensher, 1994).

Stated preference techniques can further be classified into direct and indirect models of estimating WTP. Direct approach is executed when respondents are asked directly to indicate their maximum WTP for a good or service offered. Alternatively, indirect approach is done when respondents are presented a good or service with different profiles accompanied by different price levels to indicate whether or not he/she would pay for a product. Direct approaches have been noted to have serious shortcomings in eliciting consumers' willingness to pay (Balderjan, 1988; Nagle and Holdon, 2002). Therefore, indirect approaches have been adopted in this study.

Two major approaches of eliciting WTP indirectly are Conjoint Analysis (CA) and Contingent Valuation Method (CVM). Conjoint Analysis involves the stated choice experiment whereby respondents are asked to make choices on goods with different attributes and levels accompanied with various price levels (Sattler and Voelckner, 2002). The Conjoint Analysis is known to be incentive neutral in revealing the true WTP of respondents since a respondent has a tradeoff among entire price/performance of bundles (Hair *et al.*, 1998). However, the approach is acknowledged to have some shortcomings in eliciting respondents' WTP: (i) In CA, WTP values are elicited using combination of different product attributes that might lead to inaccurate estimate if the choice of estimation technique is wrongly

specified. (ii) The CA estimates part-worth for discrete price levels while WTP is a continuous variable that necessitates deduction of the respondents' utilities other than those specified in the research design (Pekelman and Sen, 1979). Moreover, the CA approach treats price as an attribute in estimating part- worth utilities. The inclusion of price as an attribute violates neoclassical economic theory of consumer behavior whereby price is treated as exogenous variable that can be included in the model through budget constraint (Breidert *et al.*, 2006).

The Contingent Valuation Method (CVM) is a survey/questionnaire based approach which asks respondents their WTP for market and non market goods and services (Rahim, 2008). The CVM approach elicits stated preferences from a sample of consumers using either open ended questions that directly asks for WTP, or referendum (closed ended) questions that presents a bid to the respondent and asks for a Yes or No vote on the bid subjects to WTP (McFadden, 1994). In this approach, the stated preference is commonly used as a mean value of WTP (Spash, 2008). Its theoretical basis lies in the micro economic welfare theory whereby individuals are assumed to maximize their utility subject to budget constraint or minimize expenditure subject to utility constraint (Spash, 2008).

The Contingent Valuation Method has proved to be a reliable approach in eliciting peoples' WTP through dichotomous choice model (Kanninen, 1993). It has been widely used to protect non – market resources in various sectors: environmental economics (Hanemann, *et al.*, 1991; Tanriverimis, 1998); transport economics (Ortuzar, *et al.*, 2000) and health economics (Warlaven, 1996; Cawley, 2006; Shone, 2007). Gradually, the CVM was applied in agricultural and food economics

to elicit WTP for foods regarding safety measures (Boccaletti and Moro, 2000; McCluskey, *et al.*, 2001; Lin *et al.*, 2006; Lacaze, *et al.*, 2009; Lee, *et al.*, 2011). For that case, this study applied CVM to examine the WTP of quality beef in Arusha and Dar-es-Salaam cities among household beef consumers.

2.2 Empirical Literature

2.2.1 Studies on food supply chain efficiency

Supply chain studies in the meat industry are widely documented (Simons *et al.*, 2005; Francis *et al.*, 2006; Jie and Parton, 2009; Pica-Ciammara *et al.*, 2011). However, studies on supply chains' efficiency are generally limited. Most of studies on efficiency have concentrated on single node of the chain both in developed countries (Food Chain Center, 2007; Khai and Yabe., 2011; Balezentis and Krisciukaitienel., 2013; Isyanto *et al.*, 2013; Ali and Samad., 2013) and developing countries (Ogundari *et al.*, 2006; Adeyemo *et al.*, 2010; Ajao *et al.*, 2010; Al-Feel and Al-Basheer, 2011; Otieno *et al.*, 2012; Ani *et al.*, 2013; Riddel and Bevan, 2013; Chaowarat and Shi, 2013; Mlote *et al.*, 2013_a). Food Chain Centre (2007) applied 'lean thinking' to examine efficiency of red meat supply chain in the United Kingdom. The results revealed that meat chains were fragmented at various nodes of the chains; and the levels of fragmentation varies from one chain to another. Khai and Yabe (2011) analyzed technical efficiency of rice production in Vietnam using Stochastic Frontier Approach with Cob-Douglass production function. The study results revealed that technical efficiency of rice production stood at 81.6% suggesting that with given inputs level, Vietnamese would increase rice production by 18.4%. Balezentis and Krisciukaitiene (2013) estimated production efficiency of

Lithuanian family farms for a period between 2004 and 2009 using Data Envelopment Approach. The study revealed technical efficiency of 70.5% implying that the farms' production would be improved by 30% using the same inputs. Isyanto *et al.* (2013) employed Stochastic Frontier Model to measure farm level efficiency of beef cattle fattening in West Java province. The study results reveal a technical efficiency of 0.77 implying that output from beef cattle fattening would be increased by 23% using available inputs and technology. Ridell and Bevan (2013) investigated the efficiency of Scotland sheep supply chain using 'lean thinking'. It was revealed that Scots sheep industry was operating inefficiently. The study suggested that some activities should be reduced along the entire chain for the industry to operate efficiently. Chaowarat and Shi (2013) measured efficiency of frozen vegetable export supply chain in Thailand using network DEA. The results implied that most of Decision Making Units (DMUs) were efficient in their operations.

In developing countries the efficiency studies were mainly categorized in agricultural crops (Ogundari *et al.*, 2006; Adeyemo *et al.*, 2010; Al-Feel and Al-Sheer, 2011; Ajao *et al.*, 2012) and upstream chain actors (Otieno *et al.*, 2012; Mlote *et al.*, 2013_a). Otieno *et al.* (2012) employed Stochastic Metafrontier models to estimate technical efficiency of cattle production in Kenya. It was revealed that beef in Kenya was produced with efficiency of 0.69 implying that there is considerable scope to improve Kenyan beef production. Mlote *et al.* (2013_a) estimated technical efficiency of small scale cattle fattening using stochastic frontier production function. The results indicated that farm level average technical efficiency stood at

91% suggesting that beef cattle fatteners in the study area were highly efficient though not at 100%.

Although food supply chain analytical studies exists worldwide (Food Chain Centre, 2007; Riddel and Bevan, 2013; Chaowarat and Shi, 2013), the supply chain studies on food are limited in developing countries. To the knowledge of the author, there is no study on supply chain efficiency in meat industry that has been conducted in Tanzania. Given information gap on meat supply chain efficiency in developing countries and Tanzania in particular, this study evaluated efficiency in producing, processing and distributing quality beef along the beef supply chain in the country.

2.2.2 Studies on food consumption

2.2.2.1 Studies on meat consumption patterns

Considerable work has been done regarding meat consumption patterns both in developed countries (Gossard and York , 2003; Olaizola *et al.*, 2005; Stefani *et al.*, 2008; Hupkova *et al.*, 2009; Liu *et al.*, 2009; Muzayyanah and Maharjan, 2011) and developing countries (Kaliba, 2008; Betru and Kawashima, 2009; Lowassa *et al.*, 2011; Martin *et al.*, 2012; Nandonde *et al.*, 2012). Some studies on meat consumption patterns in developed countries are presented below. Gossard and York (2003) examined factors influencing meat and fish consumption among 132 nations using multivariate regression analysis. They found that ecological conditions (such as climate & resource availability) and the level of economic development influence meat and fish consumption. Olaizola *et al.* (2005) employed multivariate regression analysis to examine the influence of consumers' socioeconomic factors on the

perception of consumers of Specialty Quality Beef (SQB) in Spain. The study revealed that income and education levels had a positive influence on the consumption of SQB while price factor had a negative influence on the consumption of SQB. Stefani *et al.* (2008) assessed the determinants of intention to purchase chicken meat in Italy using a causal model estimator. They found that attitudes, subjective norms and perceived risks play a major role in determining buyers' behavior. Hupkova *et al.* (2009) employed the white period robust coefficient estimator and multivariate regression model to investigate social economic factors which influence household beef meat consumption in Slovakia. Beef consumption was found to be price and income inelastic. The consumption was influenced mainly by purchasing power and occurrence of Bovine Spongiform Encephalopathy (BSE) disease in the study area. Liu *et al.* (2009) employed censored linear approximate AIDS model to examine meat consumption patterns in China. They found that income levels and meat price are major influential factors of Chinese meat consumption. As income levels increase, meat consumption increases, and meat consumption composition change. Furthermore urbanization was found to have positive impacts on Chinese meat consumption. Hogbo *et al.* (2006) employed a censored LA/AIDS model to estimate the meat consumption in China. The study found that Chinese meat consumers have a negative consumption pattern on beef compared to other meat types basing on the following quality attributes: high cost of beef, unfamiliarity of beef cooking methods, unpalatable taste and unwanted flavor. Muzayyanah and Maharjan (2011) used linear Approximate AIDS model to examine socioeconomic determinants of the consumption of livestock products in Indonesia. It was revealed that household size, age of household head, education levels of

wives and household head occupation had an impact on the consumption of meat, eggs and milk for urban households while only occupation of household head had a significant impact on the consumption of these products in the rural households. Moreover, the study found that own price elasticities were negative and statistically significant indicating complementarities among livestock products. Moreover, elasticity for meat and milk were found positive, greater than one and statistically significant suggesting the luxury nature of the products.

In developing countries, scarce information on consumption patterns exists in the meat industry. Betru and Kawashima (2009) analyzed Ethiopian meat consumption patterns between 1996 and 2004 using Cohort specific model. The study revealed that urbanization and income influence meat consumption positively and significantly at 1% and 5% significance levels respectively. Bett *et al.* (2012) estimated demand for indigenous chicken meat in Kenya using LA/AIDS model. The findings from this study indicated that socio economic factors such as household location and family size are responsible in explaining perceived variation of Kenyan consumption patterns for chicken meat products. Indigenous chicken meat, beef and mutton were found to be necessities. On the other hand, indigenous chicken meat and beef were revealed to be substitutes while, goat meat and exotic chicken meat were found to be complements.

Very few studies have been done in Tanzania regarding meat consumption patterns. Weliwita *et al.* (2003) estimated food consumption patterns in Tanzania using linearized almost ideal demand systems. They found that meat was price inelastic, which is mainly influenced by household income, family size and family

demographic composition. However, the study was too broad dealing with 12 different food groups such that quality beef did not feature well in their analysis. Kaliba (2008) estimated demand flexibilities for beef, sheep and goat meat, pork and poultry meat in Tanzania using Inverse AIDS model. The author found that own uncompensated price flexibilities were less than one indicating that both direct and indirect price effects through a change in total expenditure have little impact on budget shares. Moreover, estimated scale flexibilities were all found to be negative suggesting that an increase in income would lead to more quantities of meat consumed. However, Kaliba aggregated different beef types in his analysis that quality beef did not feature in the analysis. Lowassa *et al.* (2011) focused on devising strategies to reduce illegal hunting in Serengeti National Park. Martin *et al.* (2012) examined bushmeat consumption among different ethnic groups in the same ecosystem, while Nandonde *et al.* (2012) assessed the role of hygiene of the butcher shops among household consumers. To the knowledge of the author, quality beef consumption pattern studies have not been undertaken in Tanzania. Hence this study adds to the existing body of knowledge on the food consumption pattern by evaluating quality beef consumption pattern in Tanzania's major cities of Arusha and Dar-es-Salaam.

This study employed the Engel theory since the theory has been proven to be useful by various authors in the analysis of food consumption patterns. This is because the theory encompasses not only effects of economic factors on commodity but also other factors affecting consumption such as socio-demographical factors (Lewbell and College, 2006; Chai and Moneta, 2010).

2.2.2.2 Studies on food preference

Up to now considerable studies have been done on meat preferences mainly in developed countries (Becker *et al.*, 2000; Carpenter *et al.*, 2001; Olaizola *et al.*, 2005; Hogbo *et al.*, 2006; Innes and Cranifield, 2009). Becker *et al.* (2000) used descriptive statistics to examine consumer perception on fresh meat quality in Germany. The study found that consumers' value quality attributes include: country of origin, place of purchase (marketing outlet) and freshness. Carpenter *et al.* (2001) examined the effect of beef colour and packaging towards US consumers' preferences by using the complete factorial analytical model. The study revealed that colour and packaging influenced appearance scores and likelihood to purchase but did not influence the eating satisfaction. Innes and Cranifield (2009) examined consumer preferences for chicken production methods in Southern Ontario using conjoint analysis and cluster analysis of part-worth utilities. The study revealed that medication and housing had the highest utilities followed by price and brand ownership. Olaizola *et al.* (2005) employed Likert scale ratings to quantify the importance of quality attributes towards Specialty Quality Beef (SQB), and clustering technique to segment consumers of SQB into groups of homogenous characteristics in Spain. The study found that income and education levels had a positive association with quality perceptions and attitudes towards SQB. Meike *et al.* (2007) employed Likert scale ratings to quantify levels of agreement on various aspects of regional food preference in Germany. They found that cognitive and normative factors are the main determinants of consumer preference for regional food while socio-demographic and affective variables have marginal influence. Bond *et al.* (2008) utilized Likert scale measures to explore consumers' interest in

product and process based attributes for fresh produce in USA. The study found four clusters of consumers based on motivation of choice of products: 'personal value buyers', 'quality and safety consumers', 'urban assurance seekers' and 'price conscious consumers'. Innes and Cranifield (2009) measured preference attributes on the statements pertaining local production, medication and housing when assessing chicken consumers' preference for production derived quality in Ontario by using Likert scale measures and clustering techniques. The study revealed three consumer clusters namely, 'price conscious consumers', 'consumers focusing on naturalness' and 'those who focused on animal health'. Cranifield *et al.* (2010) utilized Likert scale measures, multinomial logit models and cluster analysis approaches to assess consumer preference for fair trade coffee in Toronto Vancouver. The study revealed three consumer segments based on premium price paid and labeling claims namely: 'fair trade focused consumers', 'price focused consumers' and 'balanced buyers'. Barcellos *et al.* (2011) used the five Likert scale measures and clustering analysis to study attitudes towards environmental and nature conservation when investigating the "Gap between citizens' sustainability attitudes and food purchasing behavior with empirical evidence from Brazilian pork consumers. The study revealed three clusters of consumers namely: 'indifferent', 'environmental consciousnesses and 'sustainability oriented' consumers. Ricardo and Azzura (2012) employed clustering analysis to investigate Italian consumer awareness of layer hens' welfare standards. The study employed Likert scale ratings and clustering techniques to examine preferences of quality beef consumers. The study found three consumer clusters 'inactive consumer cluster', 'conflicted consumer cluster' and 'the competent consumer cluster'. Since the Likert scale and

cluster analysis approaches have been successfully applied in food preferential studies elsewhere in the globe this study employed the approaches in analyzing quality beef consumers' preferences in Tanzania. Although several studies have been done on food preferences globally, such studies are quite few in developing countries and Tanzania in particular. The few studies done developing countries have been executed in other countries excluding Tanzania (Gambo *et al.*, 2010; Teklebrhan, 2012); while the studies done in Tanzania have concentrated on foods other than meat (Weinberger and Msuya, 2004; Tomlins *et al.*, 2007; Kiria *et al.*, 2010). Gambo *et al.* (2010) investigated the level of acceptability and preferences of ruminant meat in Maiduguri Metropolitan, Nigeria. It was revealed that beef was the most preferred of all ruminant meats. Teklebrhan (2012) examined consumer perceptions and preferences of meat types in Ethiopia. The author unveiled that Ethiopian' meat consumers preferred chicken, beef and goat and sheep meat than other meat types. The study revealed further that lean and red meat was most preferred than fatty and white meat.

On the other hand, Tanzania meat preference studies are few and hardly found in the beef industry. Weinberger and Msuya (2004) examined significance and prospects of indigenous vegetables in Tanzania. Tomlins *et al.* (2007) examined the consumption characteristics of Pale-fleshed sweet potatoes. Kiria *et al.* (2010) investigated the sensory evaluation and willingness to pay for quality protein maize in rural Tanzania; while Nandonde *et al.* (2013_b) assessed consumer preferences for finished and chilled tender beef in Iringa and Mbeya regions, Tanzania. Although Nandonde *et al.* (2013_b) assessed the preference of attributes of chilled tender beef; the beef could not be considered 'quality beef' since cattle was not finished with

concentrates as per definition of quality beef in this study. Furthermore, the study was done only to household consumers and excluded the niche markets. This study complements the existing knowledge by examining the niche markets preferential quality attributes; and household beef consumers in Arusha and Dar es Salaam cities that form major consumers of quality beef in the country.

2.2.2.3 Studies on Willingness to Pay for food

The WTP studies on food sector have been extensively done in developed countries (McCluskey *et al.*, 2001; Carberg *et al.*, 2007; Umberger, *et al.*, 2009; Lyford *et al.*, 2010; Chiang *et al.*, 2012). McCluskey *et al.* (2001) estimated WTP for GM free food products and analyzed factors influencing consumers to choose GM-free food products in Japan using semi-double bounded logit model. The study revealed that Japanese consumers are willing to purchase GM noodles and GM tofu with a 60% and 62% discount respectively. The study further revealed that consumers who were less concerned about food safety, less knowledgeable about biotechnology, more positive about the use of biotechnology in food production and less concerned about labeling of GM products were more willing to choose GM foods when offered more discount. Carberg *et al.* (2007) estimated WTP for branded beef products in Canada using experimental Auction of Becker-DeGroot- Marshack mechanism. Authors found that consumers would pay premiums ranging from USD 1.12 to USD 1.83 per unit of steak depending upon the brand name, age, gender and income levels of consumers. Umberger, *et al.* (2009) estimated factors affecting US consumers' willingness to purchase and pay higher premium for natural and regionally produced beef products using probit models. The study results unveiled that consumers' WTP

for more or less premium depends on purchase behavior and shopping locations, stated importance of production attributes, awareness and interest in private and civic agricultural issues and consumers demographic variables. Lyford *et al.* (2010) evaluated the WTP of consumers for the defined levels of eating quality; and interactions with consumer demographic factors and meat consumption preferences in Australia by using Probit models analysis. The study revealed that consumers are willing to pay more for high quality grades than lower grades. Moreover, willingness to pay was found to be significantly influenced by age whereby consumers aged between 25 -35 years are willing to pay more for high quality beef grades compared to older consumers. Chiang *et al.* (2012) employed multinomial logistic model and the accelerated failure time model to investigate consumers' WTP a premium for Genetically Modified (GM) foods and their prior purchase intentions in Taiwan. Their study revealed that Taiwan consumers are willing to pay 7% more of the given average price for non – GM salmon to avoid the GM soya bean – fed salmon.

Beef consumers' willingness to pay studies in developing countries are generally scanty. In Tanzania, WTP studies have been mostly done in health sector (Shone, 2007; Saulo *et al.*, 2008; Geneau *et al.*, 2008; Kapinga *et al.*, 2009), water supply systems (Economic Research Bureau, 2006; Kaliba *et al.*, 2010); and other food products than beef (Weinberger and Msuya, 2004; Kiria *et al.*, 2010; Valerian *et al.*, 2011; Alphonse and Alfenes, 2012). The only study conducted on the WTP for beef in the Tanzania was done by Nandonde *et al.* (2013_a) who assessed WTP for finished and chilled tender beef in southern highland regions of Tanzania. However,

the study was done in peri-urban towns of the country. The current study expands the present knowledge by examining consumers' WTP for quality beef in the country's major cities of Dar-es-Salaam and Arusha. This is because the residents in the two cities include larger proportion of high income earners who are major consumers of quality beef.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Analytical Framework

3.1.1 Analysis of cost efficiency in production, processing and distribution of quality beef along the supply chain

Before analyzing efficiency, beef supply chain was mapped to reveal channels through which quality beef passes from production to consumption and identify cost centres at the subsequent nodes of the chain.

Efficiency was computed from two different orientations: input orientation and output orientation. Conceptually, efficiency from input – orientation refers to the total cost of goods produced per unit of goods produced. Cost efficiency ratios at successive stages of beef supply chain were computed using equation 1.

$$CER_{ii} = \{ \sum_{x=1}^m (P_{xi} Q_{xi}) / \sum Q_{yi} \} \dots \dots \dots (1)$$

Where: CER_{ii} is cost efficiency ratio at node i, P_{xi} is price of inputs at node i and Q_{xi} is the quantity of variable inputs at node i. Q_{yi} is the quantity of outputs at node i. *The lower ratio the higher efficiency.* Table 3 shows cost items considered in the estimation of costs at each node of the conventional and quality beef supply chain.

Table 3: Costs incurred along beef supply chains

Chain node	Costs incurred along conventional beef channel	Costs incurred along quality beef channel
Production	Grazing, Veterinary services, Dipping, trekking cattle to markets	Cattle purchase, transport of cattle to the farm, feeds purchase, veterinary services, grazing costs
Processing	Cattle purchase, transporting cattle to slaughtering facilities, slaughtering service fee, government fees	Cattle purchase, transporting cattle and/or beef to the factory premises, slaughtering and chilling, packaging materials
Distribution (retailing)	Carcass purchase, transporting beef from slaughtering facilities to butcher shops, packaging materials (plastic bags, used news papers)	Carcass purchase, utilities: water and electricity, packaging materials

On the other hand, efficiency from output orientation refers to returns per shilling invested. Hence, efficiency from output orientation was computed using equation 2.

$$Ro_i = \frac{TR_i - TVC_i}{TVC_i} \dots \dots \dots (2)$$

Where: Ro_i - Returns per shilling invested at node i ; TR_i - Total Revenue at node i ;
and TVC_i – Total variable costs at node i . i represents different nodes of the quality beef supply chain e.g. cattle production, cattle slaughtering and processing, and beef retailing node. *The higher the ratio the higher the efficiency.*

3.1.2 Analysis of quality beef consumption pattern

Descriptive statistics such as frequency distribution, means and standard deviations were used to describe consumers of quality beef, quantities consumed and retailing outlets from which the beef was sourced.

A Linear Approximated Almost Ideal Demand System (LA/AIDS) model, which was derived from Engel framework, was used to examine factors influencing the consumption of quality beef.

The Engel model is frequently expressed in budget shares form after differentiating the Marshallian demand function with respect to expenditure/income to meet the adding up axiom of regular demand function as expressed in equation 3

$$S_i = f_i [\log (Y), Z] \dots\dots\dots (3)$$

Where S_i is the proportion of consumer's expenditure spent by household i on good i over a specified period of time, Y is the total household expenditure/budget spent on various goods and services, and Z is vector for household characteristics affecting consumption pattern such as household income, household size, age, education and occupation of household head.

AIDS model with two stage budgeting procedures was used to estimate the consumption of quality beef. At the first stage, the total expenditure was assumed to be allocated to broad groups of goods namely, beef, other meat types and all other goods. At the second stage, expenditure allocated to each group of goods was reallocated to individual commodities. At this point, beef budget share was

reallocated to specific beef types namely: quality beef, conventional beef and other animal non-carass component.

With the application of two budgeting procedures that involves division of expenditure to the composite goods (beef, meat and other goods) and beef commodities (quality beef, conventional beef and other animal non-carass component), the AIDS model was specified as in equation (4)

$$S_i = \alpha_i + \beta_i \ln Y \dots\dots\dots (4)$$

Whereby; S_i is the i^{th} good budget share; β_i is the expenditure coefficients, and Y is the total expenditure spend on all goods.

However, quality beef consumption was assumed to be influenced by socio economic and demographic variables. Therefore, equation (4) was modified using Heien and Wessels (1990) translation to cater for effects of socio – demographic variables on consumption of quality beef. The α_i becomes equation 5

$$\alpha_i = \delta_i + \sum \gamma_i Z_i \dots\dots\dots (5)$$

Whereby Z_i is the vector for socio – demographic variables influencing consumption of quality beef. Incorporation of equation (5) into equation (4) yield equation (6) that presents effects of expenditure and socio-demographic variables on quality beef budget shares.

$$S_i = \delta_i + \sum \gamma_i Z_i + \beta_i \ln Y \dots\dots\dots (6)$$

Empirically, consumption of quality beef was estimated using equation (7)

$$S_i = \delta_i + \gamma_1 Ed + \gamma_2 Sex + \gamma_3 Occp + \gamma_4 HHS + \beta_i \ln Y + \phi \dots\dots\dots (7)$$

Where: S_i is the share of the total budget spent on i^{th} good (beef, meat, all other goods in stage one and quality beef, conventional beef and other animal non-carass components in stage two; Y is the total household expenditure; Ed is education of household head; Sex is sex of household head; $Occp$ is the occupation of the household head; HHS is household size (number of people in the household); and ϕ is the residual which represents the effect of variables not included in the model (error term). Regression analysis generated values for α , β , γ_1 , γ_2 , γ_3 and γ_4 so that the equation best describes the data.

However, some households had zero expenditure on some commodities indicating non purchase of the commodities. The zero expenditure on some commodities was due to unaffordability, non preferences and skepticism of providing information during data collection. The zero expenditure were replaced with group averages of the non zero commodity groups.

The effect of changes in total expenditure on good consumption is measured by β coefficient. If $\beta > 0$, the budget share rises with expenditure, and the good is considered luxury; $\beta < 0$, the budget share falls with higher incomes and the good is considered a necessity. The effect of changes in total expenditure on quality beef consumption was expected to have $\beta > 0$ to reflect the fact that quality beef is

considered luxury good in Tanzania since there are other protein foods such as conventional beef, fish and legumes that are cheaper than quality beef.

The γ coefficient indicates changes in budget share associated with a unit change in the corresponding variable. The γ_1 measures changes in budget share associated with education level of household head. Large values of γ_1 were expected in households whose heads have attained at least tertiary education than households whose heads had lower education. This is due to the fact that people with higher education levels secure high paying jobs compared to those with lower education levels.

γ_2 measures the change associated with sex of household heads. Male headed households were expected to have large values of γ_2 to reflect high incomes in those families. This is because men have relatively higher access to employment and economic assets due to high education, and are financially stable.

Changes associated with occupation were taken care by γ_3 . Households whose heads are employed were expected to have large values of γ_3 than households whose heads are self employed. This is due to the fact that, employed heads are assured of regular income while self employed heads are not assured of regular income to allow purchase of quality beef.

γ_4 caters for changes in budget shares on quality beef associated with household size. It was expected to have low values of γ_4 in households with members more

than six than households with members fewer than six indicating low consumption of beef. This is because household with large numbers of household members would likely substitute quality beef with other cheaper sources of protein such as legumes and sardines.

Expenditure elasticities of meat products were then computed to examine responsiveness of beef consumers on respective meat types. The expenditure elasticity was computed using equation 8.

$$\eta = 1 + (\beta / s) \dots\dots\dots (8)$$

Where η - expenditure elasticity. If $\eta > 1$, beef would be regarded as luxury and $0 < \eta < 1$, the beef was considered necessity. Expenditure elasticity coefficient was expected to have $\eta > 1$ to reflect the fact that quality beef is relatively an expensive source of protein compared to other protein foods; hence it is considered as luxury commodity.

3.1.3 Analysis of consumers' preference for quality beef

Characterization of beef consumers' preferences were done through likert scale measures and principal component analysis. Conceptually, a consumer of quality beef was assumed to be rational such that s(he) consumes quality beef with intrinsic and extrinsic attributes that yield him/her the maximum utility. Previous literature suggested that Tanzanian beef consumers' preference attributes include tenderness, freshness, fat content, price, and hygiene of retailing outlets and safety of the product (Mapunda, 2007; Nandonde *et al.*, 2012). Other meat quality attributes were revealed to include meat colour, sources of beef (warm butchers vs. supermarkets

and modern butchers), and presence of municipal stamps catering for beef being inspected and hence its suitability/safety for human consumption (Kamugisha, 2011). Hence intrinsic features of quality beef included in the analysis are freshness, fat content, tenderness and colour of beef, while extrinsic features of quality are hygienic condition of retailing outlets, price and presence of municipal stamps on the beef sold. Equation 9 shows the utility function of beef consumers in the study area

$$U_i = f(P_i, INT_i, EXT_i, M, \alpha) \dots\dots\dots (9)$$

whereby: U_i is the utility of consumer, P_i is the vector of prices, INT_i is the vector of intrinsic characteristics of beef, EXT_i is the vector of extrinsic characteristics of beef, M is the vector of expenditure levels of consumers and α is the vector of household characteristics influencing consumers' preferences. The intrinsic characteristics included freshness, fat contents, color and tenderness of beef sold in retail outlets, while extrinsic characteristics included in the model are levels of hygienic condition of the retail outlets, price and presence of municipal stamps on the retailed beef.

Likert – scale measures were used to quantify importance of quality attributes preferred by beef consumers: 1 - strongly important to 5 – strongly unimportant) on the quality attributes stated. Then frequency distribution was done on beef consumers' preference attributes stated. Percentages for respective quality attribute were computed and presented in charts.

Principal Component Analysis (PCA) and Wards Method of hierarchical analysis were used to cluster consumers in terms of attitudes and/or preferences towards major beef quality attributes.

3.1.4 Analysis of willingness to pay (WTP) for quality beef

Estimation of WTP for quality beef was done using contingent valuation method (CVM) and Probit regression analysis. The CVM was used to elicit consumers' WTP for quality beef. This was done through double bounded model of dichotomous choice questions. Each respondent was initially asked whether or not s(he) was willing to purchase conventional beef and/or quality beef at the same price. If the respondent indicated a preference on quality beef, then s(he) was asked if s(he) was willing to pay a premium bid to quality beef. If s(he) did not show preference on the quality beef the subsequent questions were not asked. Bids incremental were 33%; 66% and 100%. These subsequent questions on higher bids were based on the fact that, there are increased costs in fattening of cattle and ageing of beef to make it tender leading to an increase in the final price of quality beef.

It was assumed that a respondent i has unobserved true WTP for quality beef equal to Y_i^* . The true WTP Y_i^* for quality beef has some relationship with the household head characteristics X_i as specified in equation 10.

$$Y_i^* = X_i\beta + \varepsilon_i \dots\dots\dots (10)$$

Whereby ε_i is assumed to be normally distributed with mean zero and variance δ^2 . The functional form of true WTP was specified as Tobit model since the dependent variable cannot assume negative values because the respondent would either decide to buy quality beef (1) or decide not to buy quality beef (0).

Each respondent was initially asked whether he/she was willing to purchase conventional beef and/or quality beef at the same price, that is, the price differential (PD_L) equals to zero. If the respondent indicated a preference on quality beef, s(he) was further asked whether s(he) is willing to pay a premium bid, that is, the price differential (PD_H) is greater than zero (Carpio and Isingildina, 2009). The true WTP Y_i^* for quality beef is not known but lies between PD_L and PD_H due to responses given to the series of contingent valuation questions and is specified in equation 11.

$$\Pr (PD_L \leq Y_i^* \leq PD_H) \dots\dots\dots (11)$$

When replacing the true WTP value for quality beef Y_i^* with equation (11), then the function can be written as in equation (12)

$$\Pr (PD_L \leq X_i\beta + \varepsilon_i \leq PD_H) \dots\dots\dots (12)$$

In general terms, outcome of bidding procedures can be presented as equation 13 due to three expected outcomes of the contingent valuation questions. That is, (i) A ‘No’ to the first bid (i.e. no preference for quality beef vs. conventional beef) at 0 premium. (ii) A ‘Yes’ followed by ‘No’ (i.e. there is a preference at 0 price difference but not at higher bid) and (iii) A ‘Yes’ to both bids (i.e. preference at 0 premiums and at higher bids)

$$D_i = \begin{cases} Y_i^* \leq PD_L & \text{(outcome 1)} \\ PD_L \leq Y_i^* < PD_H & \text{(outcome 2)} \\ PD_H \leq Y_i^* & \text{(outcome 3)} \end{cases} \dots\dots\dots (13)$$

Hence, choice probabilities in line with equation 13 above are expressed in equations 14 to 16.

$$P(Y_i^* \leq PD_L) = P(\varepsilon_i \leq PD_L - \beta_i X_i) = F(PD_L - \beta_i X_i) \dots\dots\dots (14)$$

$$P(PD_L \leq Y_i^* < PD_H) = P(PD_L - \beta_i X_i \leq \varepsilon_i < PD_H - \beta_i X_i) = F(PD_H - \beta_i X_i) - F(PD_L - \beta_i X_i) \dots\dots\dots (15)$$

$$P(PD_H \leq Y_i^*) = P(\varepsilon_i \geq PD_H - \beta_i X_i) = 1 - F(PD_H - \beta_i X_i) \dots\dots\dots (16)$$

Stated probabilities above yield the log likelihoods presented in equation 17.

$$L = \sum_{D1} \ln F[(PD_L - \beta_i X_i)] + \sum_{D2} \ln [F(PD_H - \beta_i X_i) - F(PD_L - \beta_i X_i)] + \sum_{D3} \ln [1 - F(PD_H - \beta_i X_i)] \dots\dots\dots (17)$$

Where: D_i – is a group of respondents in the i^{th} bidding process outcome, F – is a cumulative distribution function with mean zero and variance δ^2 P – is the choice of probabilities corresponding to equation 13

Estimation of model parameters employed censored regression approach for the estimation of closed ended questions of contingent valuation surveys as developed by Cameron and James (1987).

Specifically, Tobit model was used to examine factors influencing WTP for quality beef consumers and was specified as equation 18.

$$Y_i^* = \beta_0 + \beta_1 HHI + \beta_2 HHV + \beta_3 HHS + \beta_4 HHA + \beta_5 HHO + \beta_6 HHE + \beta_7 HHM + \varepsilon_i \dots\dots\dots (18)$$

Whereby; β_0 is the equation constant term, β_i is the parameter coefficients of the model to be estimated, HHI – is the expenditure of household head, HHV – the size of household, HHS - sex of household head, HHA - age of household head, while HHO, HHE and HHM are occupation, educational level, and marital status of

household heads respectively; and ε_i is the error term that caters for the effects of variables not included in the model. Table 4 presents model explanatory variables and the expected relationship with WTP for quality beef.

Table 4: Definition of variables in WTP model and expected relationship

	Variable name	Units	Variable description	Expected signs
X ₁	Household expenditure	Number	Expenditures of household per year in Tsh	+
X ₂	Household size	Number	Number of members in the household	-
X ₃	Sex of household head	Binary	1 if the household head is female, 0 otherwise	-
X ₄	Age of household head	Number	Age of household head in years	+
X ₅	Occupation of household head	Dummy	1 if the household head is employed, 0 otherwise	+
X ₆	Education level of household head	Dummy	1 if the household head has tertiary education, 0 otherwise	+
X ₇	Marital status of household head	Dummy	1 if the household head is married, 0 otherwise	+

Household expenditure was expected to have a positive influence on WTP for quality beef. This is because expenditure is the income index; the higher the expenditure the higher the likelihood of household paying premiums for quality beef. This concept is built on the Engel model wisdom and empirical studies that have proven similar relationship between WTP for foods and income levels (Boccaletti and Moro, 2000; Carpio and Isingildina, 2009; Juma *et al.*, 2011; Alphonse and Alfenes, 2012).

Household size was expected to have a negative influence on willingness to pay for quality beef. This is because large households were expected to spend their resources on basic needs since the households require huge basic needs. Therefore, the size of households was expected to have a negative influence on WTP for quality

beef because quality beef is a more expensive source of protein than is the case with other protein foods. Empirical studies conducted suggest that there is a negative relationship between household size and WTP for quality foods (Phillip and Dipeolu, 2010; Juma *et al.*, 2011; Gratia *et al.*, 2011).

With regard to sex of household head, previous studies suggest a positive relationship between WTP for quality foods and female headed households (McClukey, 2001; Froehlich *et al.*, 2009; Alphonse and Alfenes, 2012). In this study, a negative relationship was hypothesized between female headed household and WTP for quality beef. This is due to the fact that women have poor access to the means of production and high paying jobs (Catagay *et al.*, 1995) that could allow them to earn higher incomes and thus increase the likelihood of paying premium prices for quality beef.

With regard to age, there are conflicting results on its influence on WTP for quality foods in the body of literature. Some authors revealed a positive relationship between age and WTP for foods (Carpio and Isingilda, 2009), while others revealed negative associations between age and WTP for quality foods (Engel, 2008; Lyford *et al.*, 2010; Gratia *et al.*, 2011). In this study, age of the household head was expected to have a positive relationship with WTP because as one gets older, s(he) develops skills to perform his/her job better, gets promotion in his/her carrier and increases his/her purchasing power. The increase in purchasing power is associated with higher likelihood of paying premium prices for quality beef.

A positive relationship was hypothesized between employed household heads and WTP for quality beef. This is due to the fact that employees are assured of regular income. Therefore it is easier for them to plan for use of this income even on luxury commodities like quality beef than is the case with other people such as self-employed, business men and farmers whose incomes are not regular. The study by Demont *et al.* (2011) revealed a negative association between traders' and farmers' occupations and WTP for quality rice parboiled in Benin.

Education level of household head was expected to have a positive influence on WTP for quality beef. This is because an increase in education level leads to more exposure of consumers that create awareness on quality beef attributes. Moreover, highly educated people are likely to get well paying jobs which can in turn lead to high likelihood of purchasing quality beef. Previous studies by Boccaletti and Moro (2000), Engel, (2008) and Gratia *et al.* (2011) revealed a positive association between education levels and WTP for premium priced foods.

Engel (2008) found a negative relationship between marital status and WTP for quality foods. In this study, a positive relationship was hypothesized between marital status and WTP for quality beef because married couples can pull together resources accrued for common consumption of the household hence increased purchasing power. The increase in purchasing power increases the likelihood of the household's willingness to pay a premium price for quality beef.

3.2 Data

3.2.1 Primary data

Most of the data used in this study were primary data collected from producers, cattle traders, beef processors, beef importers, supermarkets, tourist hotel operators, butchers, meat roasters and consumers along the beef supply chain in Simanjiro district in Manyara region, Arusha municipality and Dar es Salaam city.

The process of primary data collection involved several stages including exploratory survey, development of data collection tools, pilot survey, recruitment and training of enumerators, and administration of the questionnaires to sampled actors as described in subsequent sections below.

3.2.1.1 Exploratory survey

Exploratory survey was conducted between May and June 2011 to collect background information in the study area to enhance implementation of main survey and identify beef chain actors that would serve as a sampling frame.

3.2.1.2 Development of data collection tools

Data collection tools (questionnaires and checklists) were developed after the exploratory survey from July 2011 to September 2011. Six structured questionnaires were constructed. The first type of questionnaire was designed to capture data related to household socio - economic status, households' beef consumption and households' expenditure pattern on different goods and services (Appendix 1). The second and third types of questionnaires were designed to capture data from tourist hotels and supermarkets regarding the types of beef and beef products sold, sources

of beef and beef products; and preference attributes of beef and beef products desired by customers in niche markets (Appendices 2 & 3). The fourth questionnaire was designed for cattle fatteners in the country (Appendix 4). The fifth and sixth questionnaires were designed to collect information from butchers and meat roasters selling conventional beef. The questionnaires captured information on sources of meat sold, quantities sold and preference attributes desired by customers in the conventional beef channel (Appendices 5 and 6). Finally, checklists were made for soliciting qualitative data from groups of cattle keepers, cattle traders, processors and beef and beef product importers (Appendix 7) from the sampling frame (Appendix 8)

3.2.1.3 Pilot survey

Pilot survey was conducted prior to main survey to check the adequacy of data collection tools. The survey was carried out in December 2011. During the survey 25, 2 and 1 respondents were interviewed using household questionnaire, hotels' questionnaire and supermarkets' questionnaires respectively in Ilala municipal, Dar-es-Salaam. Cattle fatteners were not interviewed during pilot survey, because they were only two in the study area. During the pilot survey, it was found that some questions especially those regarding incomes were sensitive to the respondents.. For this reason, questions regarding income were replaced by questions on household expenditures as a proxy for household income. The time spent to interview a respondent using the household questionnaire (Appendix 1) was longer than was the case in interviewing respondents using other types of questionnaires. It took about 70 minutes to complete an interview with one respondent as opposed to about 25

minutes taken to complete an interview using the other data collection tools (Appendices 2, 3, 4, 5 and 6).

3.2.1.4 Recruitment and training of enumerators

Four enumerators assisted the researcher to collect data from household respondents. Recruitment of enumerators was done three days before the beginning of data collection exercise. Their recruitment was based on academic qualifications possessed, ability to interact with people, readiness to participate in data collection process and fluency in both Kiswahili and English languages. Three out of four enumerators had a Bachelor Degree while the remaining one had a Master Degree. Enumerators were trained for one day. Training involved proper way of recording data during interview, ethics of data collection and means of dealing with sensitive questions.

3.2.1.5 Sampling

Various sampling techniques namely, purposive sampling technique, multi-stage sampling technique, stratified sampling technique convenience sampling technique and snowball sampling technique were employed.

Three regions (Arusha, Dar-es-Salaam and Manyara) were selected using purposive sampling technique as a case study. Arusha region was chosen on the basis of being one of the potential quality beef consumption areas with different categories of consumers including high income consumers who are likely to buy quality beef. Moreover, the existence of meat processing factories, tourist hotels and

supermarkets makes Arusha region a suitable case study for the supply and demand of quality beef. Its proximity to major tourist attractions in the country such as Kilimanjaro Mountain, Ngorongoro conservation area, Lake Manyara and Serengeti National Parks makes Arusha the hub of most tourists in Tanzania. Hence, income from the tourism industry allows multiplier effects for income growth of Arusha region to permit consumption of quality beef. Moreover, Arusha region has huge cattle populations of about 1 699 541 cattle heads, ranking second in the country after Shinyanga (NSCA, 2012).

As is the case with Arusha, Dar-es-Salaam city is potentially a major quality beef consumption area with different categories of consumers including high income consumers: prominent business men, highly paid workers and expatriates who are likely to buy quality beef. According to TRA (2013), Dar-es-Salaam city accounted for 70% of internal Government revenue collections in the country for a period between 1997 and 2011.

Manyara region was included in the sample to explore cattle fattening. This is because the region was the only one dealing with commercial cattle fattening during data collection exercise in the northern zone.

A multi-stage cluster sampling technique was then used. In the first stage, municipals and districts were chosen from the sampled regions. In Dar es Salaam, Kinondoni municipal was selected as a case study because it has the most diverse society with different income levels including high income earners who are likely to consume quality beef. More than 50% of Dar-es-Salaam's tourist hotels and

supermarkets are located in Kinondoni municipality and it is the only municipality with a meat processing plant (Tanzania Meat Processing Co. Ltd); and most of modern butchers are in this municipality. Arusha municipality was selected based on the fact that its residents have higher incomes compared to other districts in the region. This is because, the municipal serves as the Arusha regional economic base whereby most organizations that employ highly paid expatriates exist; and it is the centre for the regional business activities that allow income multiplier effect among its residents. Moreover, the municipality is the home of 80% of meat processing industries located in the region. Lastly, Simanjiro district in Manyara region was chosen as a case study because it was the only district where cattle fattening, modern cattle slaughtering; and modern beef production and processing took place in the study area prior to and during data collection.

In the second stage, wards under study were selected. In Dar es Salaam, Tandale and Manzese wards were chosen to cater for low income households while Sinza and Msasani wards were chosen to cater for households with middle and high income respectively. In Arusha, Unga Ltd, Kaloleni, and Lemara wards were included in the sample to represent wards with low, middle and high income households respectively.

In the third stage, proportionate stratified sampling technique was used to select household respondents, tourist hotels and supermarkets, meat roasters and butcher men. Proportionate stratified sampling was used to obtain a sample comprising of clusters of respondents with different characteristics such as sex, education, occupation and income levels. Sampled tourist hotels and supermarkets were

selected using stratified sampling technique in order to ensure inclusion of hotels and supermarkets with different sizes.

Convenience sampling technique was used to select cattle farmers and cattle traders (assemblers and wholesalers). This is because cattle farmers and cattle traders had no specific routine to come to the auction markets where the survey was executed. Moreover, their homes were scattered in different localities of the country such that it was not possible to go to their homes for interviews. Finally, snowball sampling technique was used to sample cattle fatteners, beef processors and beef importers due to the fact that their population was very small. Table 5 shows the distribution of the sampled chain actors.

Table 5: Distribution of Sampled Actors by Location

Id.	Actor's name	Numbers	Location
1	Cattle keepers	8	Arusha
2	Fatteners	2	Arusha
3	Auction market operators	3	Arusha & DSM
4	Cattle traders	12	Arusha & DSM
5	Slaughtering facilities operators	10	Arusha & DSM
6	Beef Processors	6	Arusha & DSM
7	Supermarkets	15	Arusha & DSM
8	Tourist hotels	34	Arusha & DSM
9	Butcher shops	106	Arusha & DSM
10	Meat roasters	42	Arusha & DSM
11	Households	278	Arusha & DSM
12	officials: LGAs, TFDA, TBS, VICs, meat inspectors	12	Arusha & DSM

3.2.1.6 Primary data collection

Primary data were collected using checklists and questionnaires as described in section 3.3.1.2 for the period of five months between February and June, 2012. Table 6 shows techniques used to collect primary data from the sampled chain actors. Checklists were used to collect data from groups and key informants while questionnaire were used to collect data from individual respondent. Focused Group

Discussions were conducted to groups of cattle farmers and cattle traders to collect information regarding modes of cattle production, their profiles, prices of animals, market arrangements in cattle transaction, producers and traders associations; and quality attributes required by cattle customers. Key informant interviews involved downstream beef supply chain actors that include slaughtering facilities operators, auction market operators and meat processors. Structured questionnaires were used to collect data from household respondents, tourist hotels, supermarkets operators, butcher men, meat roasters and cattle fattening respondents as shown in Table 6. Appointments were made two days before the date of interview through extensionists and Wards Executives. Interviews with household heads/representatives took place at their homes, while interviews with hoteliers, supermarkets, processors, cattle fatteners, and importers of beef and beef products were done at their respective offices. Although questionnaires and checklists were constructed in English; the interviews were carried out in Kiswahili and English languages. Kiswahili language was used during interviews with Tanzanian respondents while English was used during interviews with non-Kiswahili speaking respondents in Modern butchers, supermarkets and beef importing companies.

Table 6: Techniques used for primary data collection from sampled actors

Id.	Actor's name	Data collection technique
1	Cattle keepers	Focus Group Discussions
2	Fatteners	Structured interviews
3	Auction market operators	Key informant interviews
4	Cattle traders	Focus Group Discussions
5	Slaughtering facilities operators	Key informant interviews
6	Beef Processors	Key informant interviews
7	Supermarkets	Structured interviews
8	Tourist hotels	Structured interviews
9	Butcher shops	Structured interviews
10	Meat roasters	Structured interviews
11	Households	Structured interviews
12	Officials: LGAs, TFDA, TBS, VICs, meat inspectors	Key informant interviews

3.2.2 Secondary data collection

Secondary data were collected to supplement primary data. Different secondary sources were visited to secure data including Sokoine National Agricultural Library (SNAL), Regional and District livestock offices, Ministry of Livestock and Fisheries Development (MLFD) reports, Ministry of Natural Resources and Tourism (MNRT) reports; National Bureau of Statistics (NBS), web based information and Tanzania Revenue Authority (TRA). Beef production, consumption and trade statistics were obtained from MLFD and Local Government Authorities (LGAs) while policies and regulations governing the beef chain were sourced from LGAs, Tanzania Food and Drugs Authority (TFDA), Tanzania Bureau of Standards (TBS), Northern Veterinary Investigation Center and the government website. A list of hotels and their classification were obtained from the Ministry of Natural Resources and Tourism (MNRT). Table 7 presents types of data solicited from different secondary sources.

Table 7: Sources of secondary data

Secondary Data collected	Source of data	Use of the data
Cattle and beef production, consumption and trade statistics	MLFD, LGAs, NBS,	To familiarize with the sector structure and identification of trends on the stated statistics
Acts, policies and regulations governing the beef chain	MNRT, MLFD, Web information	To develop awareness of the beef chain governance to the researcher
Hotels statistics and classification, tourist numbers	MNRT	Establishing hotel sampling frame and sampling procedures, examine tourist industry as it caters for main market of quality beef
Supermarkets and beef importers list	Tanzania Revenue Authority (TRA)	Establishing supermarkets and beef importers sampling frames

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Structure of Beef Supply Chain in the Study area

As indicated in section 1.2 of Chapter One, beef consumed in Tanzania can be categorized into quality and conventional beef. Quality beef refers to beef which is produced in commercial production systems where cattle are fattened by feeding them with concentrates in feedlots, slaughtered and handled under hygienic conditions as recommended by Tanzania Food and Drug Authority (TFDA) and Tanzania Bureau of Standards (TBS). Furthermore, the beef is chilled after slaughtering to improve its tenderness. On the other hand, conventional beef refers to the beef which is traditionally produced by pastoralists and agro-pastoralists through grazing on community owned pastures, traded through auction markets, slaughtered in slaughter slabs/houses normally with poor hygienic conditions and sold in the meat selling points located in urban centers and along the road sides in villages without being chilled to improve its tenderness.

This study revealed that 95% of beef traded in the study area passed through conventional beef supply channel; while the rest (5%) passed through quality beef supply channel. Figure 5 is a beef supply chain map showing conventional and quality beef supply channels and functions performed by various actors at subsequent nodes of these channels. The functions executed by different actors include input supply, cattle production, live cattle trading, transportation, cattle slaughtering, beef processing and beef products trading. A detailed description of

these functions and actors performing such functions are presented in the subsequent sections.

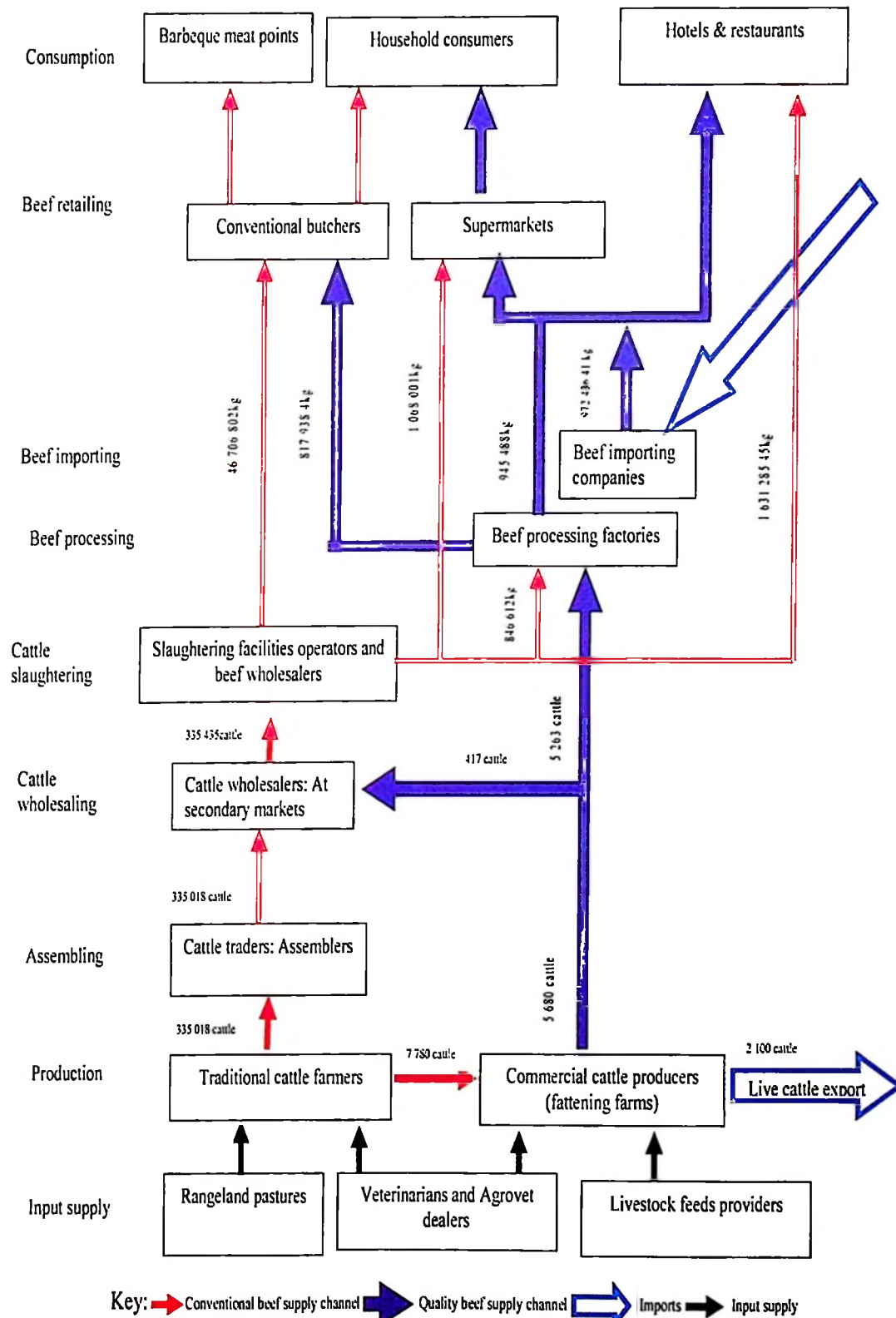


Figure 5: Beef supply chain in Arusha and Dar-es-Salaam cities

4.1.1 Input supply

4.1.1.1 Input supply in the conventional beef supply channel

Veterinary services were provided as inputs to cattle farmers in both conventional beef supply channel and quality beef supply channel. Farmers in conventional beef supply channel used veterinary drugs from agro vet shops mainly without advisory services from Extension Officers. Veterinary doctors and other animal health attendants were found far away (about 40 km) from homes of cattle producers in the conventional beef channel. Long distances between cattle farmers and veterinary service providers minimized the use of veterinary services by cattle farmers in the conventional channel. Furthermore, cattle farmers treated their animals with a combination of herbs and veterinary drugs. Similar findings on low provision of veterinary services as observed in this study are reported by other authors (Minja, 1999; Mafuru *et al.*, 2006; Covarrubias *et al.*, 2012). Minja (1999) revealed that Maasai pastoralists in Simanjiro district use different parts of about 36 plants to treat their cattle on various animal diseases. Mafuru *et al.* (2006) noted constraints with the use of veterinary services in Shinyanga region whereby veterinary service providers are available in rural areas only during auction market days due to long distances of cattle farmers' home from veterinary service centers; while Covarrubias *et al.* (2012) noted low level of vaccination rate (29%) in rural households of Tanzania

Cattle farmers in the conventional beef channel fed their animals on crop residues after harvest; and on natural pastures normally owned privately by different individuals and by village governments.

4.1.1.2 Input supply in the quality supply beef channel

Cattle farmers in quality beef supply channel used veterinary services more prominently than those in conventional beef supply channel despite long distances (65 km) between quality cattle farmers' production sites and where veterinary doctors and other animal health attendants are available. Veterinary services used in this channel were accompanied with proper advisory services from veterinary officers. Veterinary officers were paid additional income by cattle farmers upon veterinary services required. The private and additional payment to veterinary officers in quality beef channel can be associated with the prominence of the use of veterinary services in the quality beef channel. The payment to veterinary services by cattle farmers in quality beef supply channel was different from that paid to veterinary doctors by cattle farmers in the conventional beef supply channel who depend on government paid veterinary doctors to attend their animals.

Feed producers in quality beef supply channel supplied concentrates to farmers. Feeds were used as supplements in cattle fattening. Fattening of cattle was done as a preparatory stage of quality beef production for subsequent stages of cattle slaughtering and processing of beef.

4.1.2 Cattle production

4.1.2.1 Cattle production in the conventional beef supply channel

Two cattle production systems in conventional beef supply channel were found in the study area. These were pastoralism and agro-pastoralism. Pastoralism and agro-pastoralism cattle production systems are mostly practiced by Maasai with different

cattle herd sizes ranging from 10 to 2 000 cattle heads. About 80% of cattle farmers in the study area owned herd size ranging from 50 to 200 heads of cattle, while 15% of cattle farmers owned fewer than 50 cattle; and the remaining 5% owned more than 200 cattle heads. Cattle production coefficients in the conventional beef supply channel were low with an average calving interval of 30 - 40 months, calf mortality rate of up to 20% and slaughter age of six to seven years. The production coefficients identified in the conventional beef supply channel are lower than the recommended estimates of calving interval of 18 – 24 months, calf mortality rate of <10% and slaughter age of 2-3 years. These production coefficients are more or less similar to the national herd average production coefficients reported by Njombe and Msanga (2008). The authors reported the calving intervals of 24 – 40 months, mortality rate of 10 – 20% and an average slaughter age of six years. The low production coefficients in the conventional beef supply channel can be associated with low rate of application of veterinary services due to long distances from the sources of veterinary services and inadequate pastures which are mainly experienced during dry seasons. Feeding of cattle on natural pastures that become scarce during the dry season observed in this study are similar to the findings reported by other authors in South – Western Highlands of Tanzania and elsewhere in the country (Pica-Ciammara *et al.*, 2011; MLFD, 2011; Mwambene *et al.*, 2012). Pastoralism and agropastoralism production systems practiced in the study area along conventional beef channel are known for their low production coefficients that in turn adversely affect beef cattle production. Cattle population in Arusha region was not equally distributed among the region's districts. For example, Ngorongoro district had the highest cattle population (26%) followed by Longindo district (23%).

This was followed by Arusha, Meru, Karatu and Monduli districts with 16%, 15%, 10% and 10% of cattle population respectively (MLFD, 2010). Figure 6 shows the cattle population distribution in Arusha region.

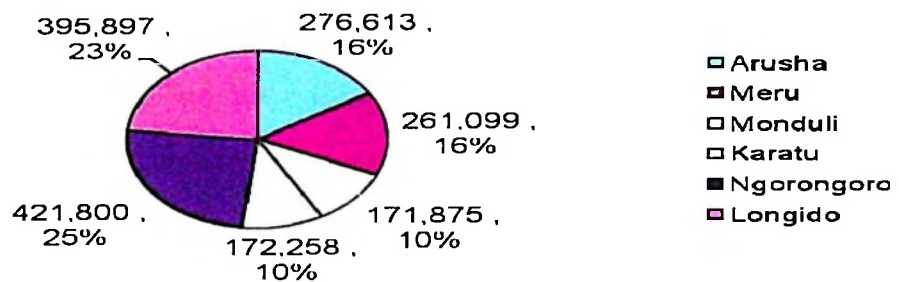


Figure 6: Distribution of cattle population in Arusha region

Source: MLDF, 2010.

In the conventional beef supply channel, cattle were kept to meet various objectives: cash provision, food security during famine and the means of paying for bride price. Non-commercial reasons for keeping cattle by farmers lead to informal contractual relations between them and other chain actors in the downstream of the supply chain. Raising cattle for non-commercial reasons among cattle farmers in the conventional beef supply channel has been reported by researchers in other pastoral areas of Sub Saharan Africa (Almayehu, 2011; Covarrubias *et al.*, 2012; Mwambene *et al.*, 2012). Covarrubias *et al.* (2012) noted that only 10% of the rural Tanzania farmers are market oriented (selling more than 50% of their produce), with only 7% originating from livestock; while Mwambene *et al.* (2012) revealed that Fipa cattle in South-Western highlands of Tanzania play different roles including provision of draught power, income, meat, manure for nutrient recycling and security against uncertainties. In Ethiopia, the situation is similar whereby cattle producers farm

cattle to meet cash requirements in times of need, prestige, meeting social obligations and for use as draught power. Generally, the sales of live animals are taken as the last resort to mitigate immediate cash needs (Almayehu, 2011).

4.1.2.2 Cattle production along quality beef supply channel

Arusha's beef cattle production for quality beef was still at an infant stage. Only two companies (i.e. Manyara Ranching Company (Monduli district) and Ormoti Tukutta Co. Ltd (Simanjiro district) were engaged in the production of cattle for quality beef in the region during the time of data collection. Beef cattle production was done through grazing and supplemented with concentrates. In this system, animals were grazed in natural pastures during the day on private owned land in paddocks and supplemented with concentrates in the evening. The fattened cattle are known for producing beef that is tender and which is preferred by consumers (Mwilawa, 2012).

Manyara ranching company is under Tanzania Land Conservation Trustee (TLCT) since 2000. Initially, it was owned and operated by NARCO. The ranch is a large scale enterprise rearing a minimum of 1 500 cattle head with 100 fattening stock at any point in time (Table 8). It owns 45 000 acres of land. The ranch has 52 paddocks in which cattle are grazed in rotation from one paddock to another to allow pasture growth. During dry season, cattle were grazed in respective paddocks but they are supplemented with hay and concentrates. Moreover the ranch had a breeding program to produce breeder cows for the surrounding community. Breeder cows were sold at half price, that is, 400 000 Tsh/breeder cow instead of the prevailing market price of 800 000 Tsh/cow as part of meeting corporate social responsibility

of Tanzania Land Conservation Trustee. The herd structure of the ranch is presented in Table 8

Table 8: Herd structure of Manyara ranch

Cattle type	Fattening stock	Cows	Bulls	Steers	Heifers	Weaner heifers	Weaner bulls
Number	100	472	97	82	128	127	282

Source: Manyara Ranch Report, 2011

The fattened stock consists of steers aged 2 – 5 years and culled cows aged 3 – 8 years. The concentrates used in fattening process were maize bran, sunflower seed cake, cotton seed cake, minerals, common salts, urea and molasses. The estimation of concentrates used per day for cattle are presented in Table 9. Cattle in this farm were fattened for a period of about 90 days. Since cattle were kept intensively, acaricides were used to prevent diseases. The ranch takes precautionary measures against cattle diseases by using veterinary medicines.

Table 9: Costs of concentrates for 100 cattle per day

Concentrate name	Concentrate price (Tsh/kg)	consumption of concentrate /cattle/day	Concentrate costs /cattle/day (Tsh)	Concentrate costs for 100 cattle heads /day (Tsh)
Maize bran	200	1 kg	200	20 000
Hay	200	3 kg	600	60 000
Molasses	200	4 litr	800	80 000
Minerals	400	75 gm	30	3 000
Salt	150	50 gm	8	750
Cotton seed cake	250	2 kg	500	50 000
Sunflower seed cake	200	2 kg	400	40 000
Grand total				253 750

Source: Manyara Ranch Report, 2011

Ormoti Tukutta Conservation Ltd started in 2011 focusing on three programmes: fattening, dairy production and breeding. The ranching program was for dairy and provision of better breeds to the surrounding community while fattening was for beef production. Cattle fattening was of medium size with the herd of about 250 cattle at any point in time. Ormoti prefers fattening cross breeds of Sahwal-Zebu and Boran-Zebu. These cross breeds were said to have rapid weight gain during fattening and produce relatively tender meat that is preferred by consumers.

The company raises three grades of cattle bought from cattle farmers in conventional beef supply channel. These grades were A, B and B⁻ based on the weight of the animal (Table 10). The herd was composed of 12% Grade A animals, 25% Grade B animals and 63% Grade B⁻ animals. This herd composition was attributed to availability of such grades of cattle from cattle farmers in the conventional beef supply channel. Most of the cattle bought from the traditional cattle keepers were of B⁻ grade.

Table 10: Ormoti Tukutta Co. Ltd fattening herd structure

	Weight range (kg)	Herd % composition	Fattening period (weeks)
Grade A	300 – 350	12	2
Grade B	280 – 300	25	3 – 6
Grade B ⁻	250 – 280	63	5 - 8

The time span for cattle to stay in feedlots depended on the quality attributes of the cattle bought that ranged from two to eight weeks (Table 10). During the rainy season, cattle were fed on fresh grass and concentrates such as cotton seed cake, red sorghum, maize bran and wheat bran; while during the dry season cattle are fed on

hay, sorghum, silages and the above concentrates. The fattening period is relatively shorter (14 -60 days) compared to 90 days at Manyara ranching Co. Ltd as reported above and for individual traders who fatten cattle in the Lake zone (Mlote, *et al.*, 2012). Plate 1 shows cattle under fattening in a feedlot at Ormoti Co. Ltd in Simanjiro district. Fattening of cattle that gain slaughtering weight relatively faster enhances the profitability of cattle fattening venture.



Plate 1: Cattle fattened at Ormoti Fattening Company

4.1.3 Live cattle trade

4.1.3.1 Live cattle trade in the conventional beef supply channel

Three cattle auction markets were visited during the field survey. Table 11 shows the auction markets visited, cattle transacted per day and prevailing prices of cattle at the respective auction markets. The average cattle transactions at Pugu auction

market were higher (750 cattle/day) than the average cattle transaction at Meserani and Kikatiti auction markets in Arusha that stood at 500 and 350 cattle heads per day respectively (Table 11). The huge cattle transactions at Pugu market can be associated with high meat demand due to large population of Dar-es-Salaam city. In 2012, Dar-es-Salaam had a total population of 4 364 541 as opposed to Arusha which had a total population of 1 694 310 (Tanzania population and housing census, 2012).

Table 11: Average cattle sales per day at auction markets

	Number of cattle transaction/day			Price of cattle on respective markets (Tsh/head)		
	Min.	Max.	Mean	Min.	Max.	Mean
Pugu	300	850	750	450 000	1 200 000	732 000
Meserani	250	700	500	150 000	800 000	480 000
Kikatiti	180	500	350	300 000	1 000 000	600 000

Furthermore, the average price of cattle at Pugu market was higher (732 000 Tsh/cattle) than the price of cattle at Meserani market (480 000 Tsh/cattle) and Kikatiti market (600 000 Tsh/cattle) (Table 11). The higher price of cattle at Pugu market can be attributed to higher transportation cost of cattle to Pugu market which is estimated to be 38 000 Tsh/head; compared to the transportation costs to Meserani and Kikatiti cattle auction markets that stood at 16 800 Tsh/head and 5 250 Tsh/head respectively (Table 12).

The major means of transporting cattle to cattle markets were trekking and trucking (Table 12). Trucking of cattle from their sources in Central and Lake Zones to Pugu auction market was facilitated by good road condition constructed to the tarmac level. However, the conditions of roads from the Lake and Central zones to Arusha

markets were rough and therefore cattle trekking take many days. Cattle traders in Arusha auction markets stated that cattle from Lake Zone to entry check points of Karatu, Mang'ola and Makuyuni in Arusha region were trekked for two weeks. From Arusha checkpoints, cattle were transported by lorries to Meserani secondary auction market. The cattle sold at Kikatiti auction market were mainly from the nearby cattle farmers such that the cattle could be easily trekked to the market.

Table 12: Means of transport to cattle auction market

Auction market	Region	Means of transport	Transport cost (Tsh/cattle)
Pugu	Dar-es-Salaam	Truck	38 000
Meserani	Arusha	Trekking + truck	16 800
Kikatiti	Arusha	Trekking	5 250

On average, 24, 50 and 16 cattle were reported to be sold per month by one cattle trader at Pugu, Meserani and Kikatiti auction markets respectively (Table 13). The small number of cattle sold per cattle trader at Kikatiti market can be associated with the fact that, some traders from the nearby villages in Meru highlands sold few animals mainly bulls which were culled out of their dairy cattle herds.

Table 13: Average number of cattle sold by one trader at auction markets per month

Number of cattle sold by one trader/month	Pugu	Meserani	Kikatiti
Minimum	14	10	2
Maximum	100	80	200
Mean	24	50	16

As indicated previously, on average, 750 heads of cattle were traded daily at Pugu auction market in Dar es Salaam. These cattle were distributed to different parts of the city for slaughtering. The number of cattle traded at Pugu market normally

increased to 850 cattle heads per day during festivals such as Christmas, New Year, Easter, Eid-El-Fitr and Eid-El-Hajj. Besides festivals, peak seasons for cattle trade occurs between July and August when most farmers are harvesting their rice and cotton. This supply drops to about 300 cattle per day during low season between December and March (Figure 7). Seasonal variation in live cattle trade correlates with availability of pastures in communal grazing land in cattle production areas supplying cattle to Dar-es-Salaam. This suggests that pasture availability is a major factor influencing cattle sales in the conventional beef supply channel. The correlation between cattle transaction and pasture availability conforms to the findings reported by Mafuru *et al.* (2006) who found more or less similar trend of livestock marketing in Shinyanga where high supply season of live cattle was found to be between July – September.

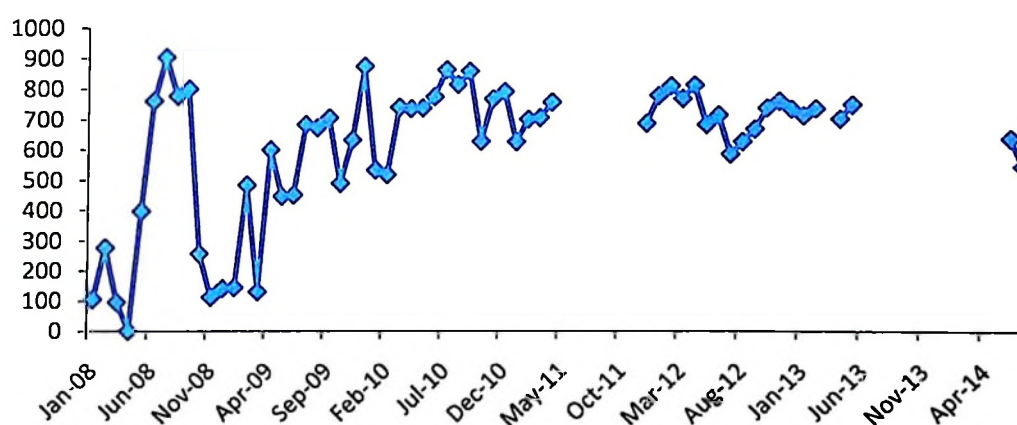


Figure 7: Average number cattle traded at Pugu market (January 2008 – March 2011).

Source: MITM, 2011; Marketing/LINKS (TZ), 2014

Figure 8 shows the sources of cattle traded in Dar-es-Salaam and Arusha cities. According to the findings in Figure 8, the main sources of cattle traded in Dar es Salaam include Shinyanga (19%), Dodoma (19%), Mara (17%), Tabora (15%), Singida (10%) and Morogoro (9%) regions (MITM, 2010). Plate 2 shows cattle being auctioned at Pugu auction market in Dar-es-Salaam. On the other hand, the cattle slaughtered in Arusha were reported to be sourced from cattle keeping areas outside and within Arusha region. Shinyanga was the major (51%) source of cattle supplied to Arusha municipality (Figure 8). This was followed by Singida (10%), Mwanza (8%), Dodoma (5%), and Tabora (15%). Other sources were Manyara (5%) and Arusha itself (6%) (MLFD, 2010)

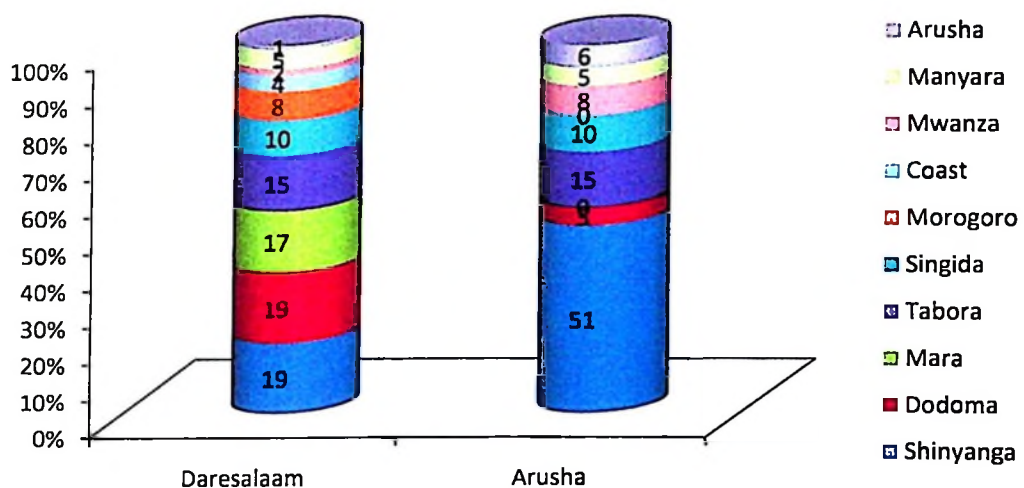


Figure 8: Sources of cattle to Dar es Salaam and Arusha cities

Source: MITM, 2010; MLFD, 2010



Plate 2: Cattle trading at Pugu auction market (Dar-es-Salaam)

4.1.3.2 Live cattle trade along quality beef supply channel

During data collection exercise, there was no cattle auctioning in quality beef supply channel in the study area. Ormoti Co. Ltd in Simanjiro purchased cattle for fattening directly from cattle farmers' homesteads while Manyara ranching company in Monduli district raised its own cattle for fattening. Ormoti Co. Ltd gave three reasons behind sourcing cattle directly from cattle farmers: (i) there was a wide range of choice of cattle available for purchase from pastoralists' bomas compared to the auction markets. (ii) Building of long term business relationship between pastoralists and the fattening company and; (iii) It was convenient to pastoralists since it reduced costs and risks that pastoralists would have incurred when trekking animals to the auction markets.

In purchasing cattle from farmers, the company considered the following attributes:

- (i) Minimum live weight of at least 250 kg. This weight reduced the cost of fattening animals in feedlot as it took less time to attain the slaughter weight of at least 350kg. Thus crosses of Tanzania short horn zebu (TSHZ) with Sahwal or Boran were more preferred due to their relatively bigger size and heavier weight than pure Tanzanian Short Horned Zebu (TSHZ)
- (ii) The age of cattle of between 3 and 5 years because fattening cattle of much older age was reported to add little value in terms of meat quality. The meat of older aged cattle was claimed to be loaded with more fat than the meat of young cattle. Beef with too much fat is not desirable to some consumers
- and (iii) Castrated steers and bulls which are known for their tender and marbled meat which is highly demanded.

The company paid 1 400 Tshs/kg live weight as a farm gate price. Thus, the price of cattle depended on its weight. *The heavier the animal the higher the price.* In most cases, bulls and steers were heavier than cows and heifers; hence bulls and steers fetched higher prices than cows and heifers. After fattening, Ormoti Co. Ltd sold fattened cattle to Orpul Company Ltd which is a sister company at a price of 1 700 Tsh/kg live weight. Orpul Co. Ltd has specialized in slaughtering cattle and processing beef into different beef cuts. Ormoti Co. Ltd sold about 100 cattle heads per week throughout the year.

As pointed out above, Manyara Ranching Company produced calves and reared them for sale to different customers. Customers were categorized into three groups: cattle traders from conventional beef supply channel, meat processing companies in

the quality beef supply channel and butcher operators around the ranch who account for 80%, 13% and 7% of the cattle sold by the ranch respectively.

Ranch management was reported to have sold about 40 cattle heads every month priced at 1,700 Tsh/kg live weight. The ranch management indicated that the cattle supply could not fulfill the requirements of its customers during dry season (October – December) when there is low supply of cattle from pastoralists in conventional beef supply channel due to inadequate pastures and water.

4.2.4 Cattle slaughtering and beef processing

4.2.4.1 Cattle slaughtering and beef processing along conventional beef supply channel

As indicated at the beginning of section 4.2, about 95% of beef traded and consumed in the study area passed through conventional beef supply channel. In general, slaughtering facilities in the conventional beef supply channel were poorly constructed, though relatively advanced in Arusha than in Dar es Salaam. Because of poor slaughtering facilities animals were stressed before killing them, making the beef tough. According to Colditz *et al.* (2007), any acute stress during the last 15 minutes before slaughter makes the meat poor in quality. The poor slaughtering facilities used in conventional beef supply channel reduced tenderness of beef. Moreover, beef produced in this channel was consumed warm without further processing. The slaughtering process took place during the mid-night; after which the beef was transported by meat vans to different places of the cities for retailing.

In Dar-es-Salaam city, the slaughtering service was of lower quality than that of Arusha. Ukonga and Vingunguti were major slaughter slabs slaughtering about 300 and 250 heads of cattle daily respectively and serving the Dar-es-Salaam city. Other slaughter slabs in the study area were relatively small in size with slaughtering capacity ranging from 30 to 50 cattle heads per day. Table 14 shows slaughter houses with their daily maximum slaughtering capacities. The slaughter houses include Kyatwa (Temeke), Pugu (Ilala), Lufaveso (Kinondoni) and Tegeta (Kinondoni). However, both Ukonga (Plate 3) and Vingunguti (Plate 4) slaughtering houses had poor slaughtering facilities which do not allow well and humanly slaughtering processes of cattle leading to low quality beef.

Table 14: Daily maximum slaughter capacities among slaughtering facilities in the study area

Slaughter house	Region	District	maximum capacity (heads/day)	Slaughter fee/head (Tsh)
Ukonga	Dar-es-Salaam	Ilala	400	4 800
Vingunguti	Dar-es-Salaam	Ilala	250	2 700
Pugu	Dar-es-Salaam	Ilala	30	4 000
Kyatwa	Dar-es-Salaam	Temeke	30	4 500
Lufaveso	Dar-es-Salaam	Kinondoni	50	5 000
Tegeta	Dar-es-Salaam	Kinondoni	30	5 000
Arusha Meat Co. Ltd	Arusha	Arusha	150	12 000
Tengeru	Arusha	Arumeru	18	4 000



Plate 3: Ukonga slaughter house (Dar es Salaam)



Plate 4: Vingunguti slaughter house (Dar-es-Salaam)

Arusha slaughtering facilities are relatively better than those found in Dar-es-Salaam due to the presence of modern abattoir (Plate 5) owned by Arusha Meat Co. Ltd, that served the municipal residents. The abattoir offered slaughtering services to cattle slaughterers at 12 000 Tsh/cattle as a slaughter fee. The slaughtering fee catered for slaughtering, hide flaying, separating GIT contents and dissecting an animal to get

half carcass on the same day. The storage fee of 4 000 Tsh/carcass /day was charged if the beef was left at the abattoir after slaughtering.

Arusha Meat Co. Ltd was established in 1991 by Arusha Municipal Council with the help of Murzzuschlag in Austria. The company provides environmental and hygienic conditions for slaughtering animals. The AMC is owned partly by Arusha Municipal Council and partly by the private sector. The abattoir slaughters 150 cattle and 160 shorts (goats and sheep) daily although its maximum capacity is to slaughter 200 cattle a day.



Plate 5: Arusha abattoir officer dissecting carcass into halves

4.1.4.2 Cattle slaughtering and beef processing along quality beef supply channel

Slaughtering facilities in quality beef supply channel was relatively advanced compared to those found in conventional beef channel. Modern slaughtering facilities in this channel allowed humanly slaughtering of cattle that produces tender beef. Moreover, beef traded through this channel was chilled before being sold to customers so as to improve its tenderness. Table 15 shows the distribution of abattoirs and meat processing factories along the quality beef channel in the study area.

Table 15: Abattoirs and meat processing factories along quality beef supply channel in Arusha and Dar – es - Salaam

Processing plant / abattoir	Region/ location	Full capacity/ day	
Both slaughtering & processing		Cattle	Shoat
Arusha abattoir	Arusha	200	300
Orpul Co. Ltd	Manyara	80	40
Beef processing			
Meat King	Arusha	Unknown	
Happy Sausage	Arusha	Unknown	
Jabe Investment	Arusha	Unknown	
TANMEAT Co. Ltd	Dar-es-Salaam	Unknown	

Cattle slaughtering and processing of quality beef were not well developed in both cities. However, cattle slaughtering and processing of quality beef is more advanced in Arusha than it is in Dar-es-Salaam. While there was only one meat processing factory in Dar-es-Salaam, there were three meat processing factories and two modern abattoirs in Arusha (Table 15). The only beef processing factory in Dar-es-Salaam was Tanzania Meat Products 2002 Ltd (TANMEAT). The factory sourced beef for processing from conventional beef supply channel. The butcher men supplied half carcasses to the factory. Then, the factory apportioned carcasses into

desired cuts and processed some into other beef products such as beef sausages, chilly bites and burgers.

In Arusha city, there were four beef processing factories namely Happy sausage, Meat King, Jabe Investment and Arusha Meat company. The factories were involved in the preparation of prime meat cuts and beef products. With the exception of Arusha Meat Company, the remaining three factories depend on orders from beef suppliers who slaughter their cattle at Arusha abattoir and supplied prime cuts to beef processing factories. In addition to the aforementioned beef processing factories, there was a modern beef processing plant in Simanjiro district owned by Orpul Co. Ltd. The plant has a modern slaughter house (Plates, 6, 7, 8, 9 and 10). The plant obtained fattened cattle for slaughtering and beef processing from the sister company, Ormoti Tukutta Co. Ltd. The slaughter house had a capacity of slaughtering 80 cattle heads per day in two shifts. However, the Company was operating below its slaughtering capacity slaughtering an average of 25 -30 cattle heads per day. The capacity under utilization was due to lack of customers who could afford to buy quality beef. The Company was still new since it started business in April 2011 and was still looking for customers of its products.

Apart from providing cattle slaughtering services to butchers in the conventional beef supply channel, Arusha Meat Company was involved in apportioning of carcasses into different beef cuts and process some into beef products mainly sausages. The company was estimated to be slaughtering and processing carcasses equivalent to five cattle heads per week.

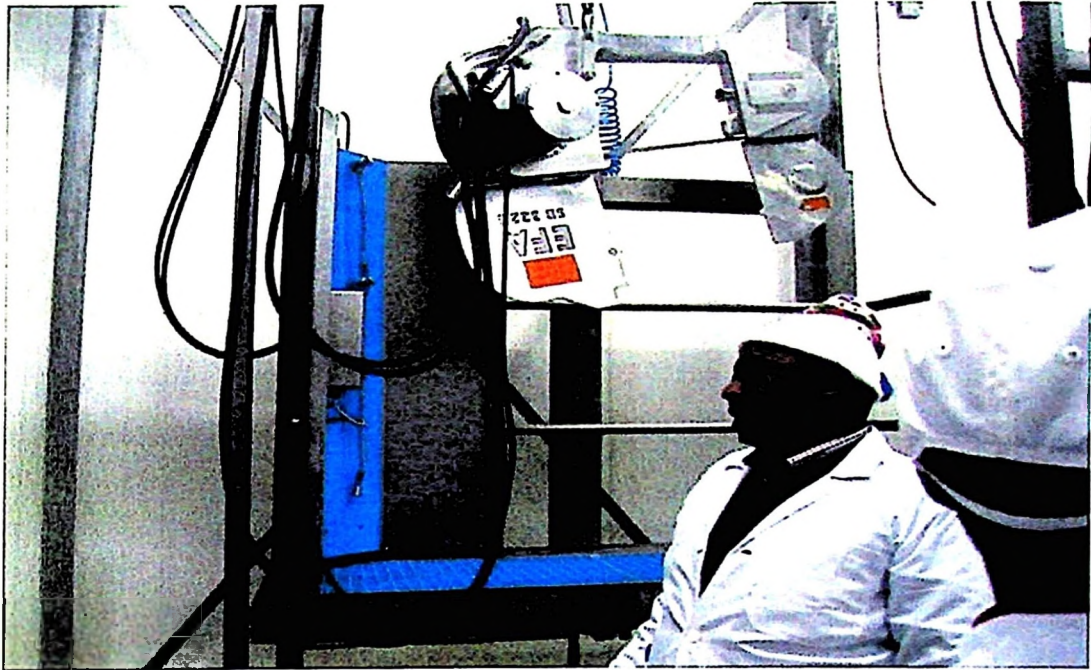


Plate 6: An officer of Orpul Beef Processing Plant explaining the functioning of the machines

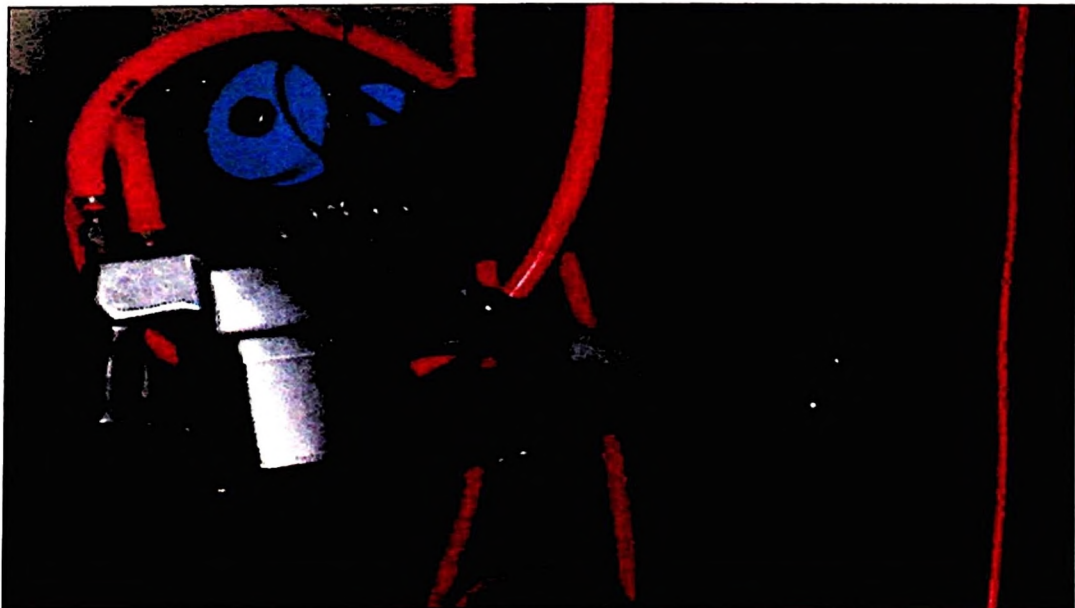


Plate 7: Orpul Co. Ltd machine for dissecting carcass into halves



Plate 8: Half carcasses being chilled in the Orpul cold rooms



Plate 9: Packed meat cuts ready for sale at Orpul Co. Ltd



Plate 10: Packaging boxes for beef products to be transported to Company's customers

Orpul beef processing plant supplies quality beef to customers in Arusha and Dar-es-Salaam cities. It received cattle from Ormoti Co. Ltd cattle fattening farm. It then slaughtered animals in hygienic and recommended standards. Thereafter, the carcasses were aged and chilled in chilling rooms (Plate 8). After chilling, the beef was apportioned into desired cuts, packed into appropriate packages (Plate 9 and 10) and transported to customers by using refrigerated trucks. The company supplies an average of 3 185 tones of beef cuts annually that accounted for 18.6% of the quality beef consumed in the surveyed area. The company's major customers were: Gold mines in the Lake zone (50%), supermarkets (15%) in Arusha municipal, Orkonerei Maasai Social Initiative (OMASI) (5%) and tourist hotels in Arusha and Dar es Salaam (30%). During the time of field survey, the gold mines which were buying beef from Orpul Co. Ltd were Tulawaka, North Mara and Barric Gold mines. These mines had contractual agreements with the processing company. Contract specifications included time interval of the supply, quantity supplied, quality

attributes and prices of the products supplied to the mines. In Arusha municipality, the company supplied carcasses to Meat King and Happy Sausage factories in half carcasses for further processing.

As indicated above, one third of customers for Orpul factory were tourist hotels in Arusha municipality and Dar es Salaam city. This proportion is significantly lower than the one reported by Ashimogo and Greenhalgh (2007) who observed that Tanzanian meat processing factories derive about 85% of their revenues from the sales of meat to tourist hotels and restaurants. The difference in the findings between the two studies is attributed to the category of respondents captured during the two surveys. While this study involved only tourist hotels in the sample, Ashimogo and Greenhalgh (2007) included tourist hotels and restaurants in their sample.

Generally, this study found that substantial proportion of beef (5%) traded in the surveyed area was processed and accessed the niche markets. The proportion of beef processed in the study areas is different from the one reported by SAGCOT (2012) and Kurwijila *et al.* (2011) who revealed that only 0.06% of the beef produced in country in 2010 was processed and thereby accessed niche markets to secure premium prices. The relatively high proportion of beef processed in this study might be due to the fact that the study was executed in the major cities of the country where most investments targeting high income earners are found as opposed to the rest of the country. Furthermore, the study findings are more or less similar to the findings reported by Mishili *et al.* (2009) who found that Tanzania's livestock sector performs relatively well than its counterpart in the neighboring countries of Burundi,

Uganda, Kenya, Mozambique, Malawi and DR Congo in terms of production; but the sector in Tanzania lags behind in livestock value addition which results in the export of live cattle rather than livestock processed products.

4.1.5 Beef and beef products retailing

4.1.5.1 Beef retailing in the conventional beef supply channel

Major retailing outlets for beef in conventional channel were butcher shops. Butcher shops usually cater for low and medium income earners. During the field survey, there were 160 and 73 butcher shops in Kinondoni and Arusha municipality respectively. Beef sold in most butcher shops (Plate 11) was a mixture of different parts of carcass chopped on wooden logs (Plate 12). The beef was bought from beef wholesalers at slaughtering houses in the midnight and transported to butcher shops early in the morning.



Plate 11: Butcher man retailing conventional beef in Dar-es-Salaam



Plate 12: Beef chopped on a wooden log in the conventional beef supply channel

Table 16 shows quantities of beef sold in sampled butcher shops in Dar-es-Salaam and Arusha. On average, the sales per butcher shop per day amounted to 136 kg with Dar-es-Salaam butcher shops having higher sales than is the case with butcher shop in Arusha (Table 16). Beef sales of 92 kg per butcher shop per day reported by Igbbhinosa (2011) in rural central Tanzania are lower than the average sales of 136kg/day/butcher for butcher shops in the study area. The difference of daily butcher sales observed in this study can be explained by the fact that Igbbhinosa (2011) conducted the study in rural areas where the population and income of the people are relatively lower compared urban centers of the country, where this study was conducted.

Table 16: Average daily sales of beef among butcher men (kg)

	n	Minimum	Maximum	Mean
Kinondoni (Dar es Salaam)	63	40	187	158
Arusha Municipality	43	32	155	114
Overall	106	32	187	136

Table 17 shows wholesale and retail prices of beef in both Dar-es-Salaam city and Arusha municipality. Grade A beef fetched the highest price in both Dar-es-Salaam city and Arusha municipality. Higher prices of Grade A beef was associated with quality attributes. In Arusha, grade A beef came from Manyara Ranch and bulls from dairy herds in Arumeru highlands. On the other hand, grade A beef in Dar-es-Salaam came from cattle fatteners in Lake and Central zones.

Table 17: Wholesale and retail prices of beef in Dar-es-Salaam city and Arusha municipality

Grades	Wholesale price (Tsh/kg)	Retail price (Tsh/kg)
Dar-es-Salaam		
Grade A	3 200	5 000 – 6 000
Grade B	2 800	3 600 – 3 800
Grade C	2 800	3 600 – 3 800
Grade D	2 000	3 600 – 3 800
Arusha		
Grade A	3 200	5 500 – 6 000
Grade B	3 000	3 700 – 4 000
Grade C	2 500	3 500 – 3 800
Grade D	1 900	3 400 – 3 700

4.1.5.2 Beef retailing in the quality beef supply channel

Retail outlets for quality beef and its products include modern butchers and supermarkets for raw beef products. During the field survey, there were 27 supermarkets and 5 modern butcher shops in Dar es Salaam city. In Arusha municipality, there were 18 supermarkets and two modern butchers selling raw quality beef cuts and beef products. In general, supermarkets in Dar-es-Salaam city

were bigger than supermarkets in Arusha municipality. Most (93.7%) of the supermarkets sold both imported and locally produced quality beef while the remaining supermarkets sold only imported beef. The imported beef was mainly from Kenya through Bright Choice Co. Ltd. On the other hand, the locally produced quality beef was obtained from processing factories and shops. Supermarkets normally chill the beef and apportion it into desired cuts as per consumers' preferences. These beef cuts and beef products were displayed in cold shelves for sale. Plate 13 shows beef cuts in cold shelves of supermarkets for retailing.

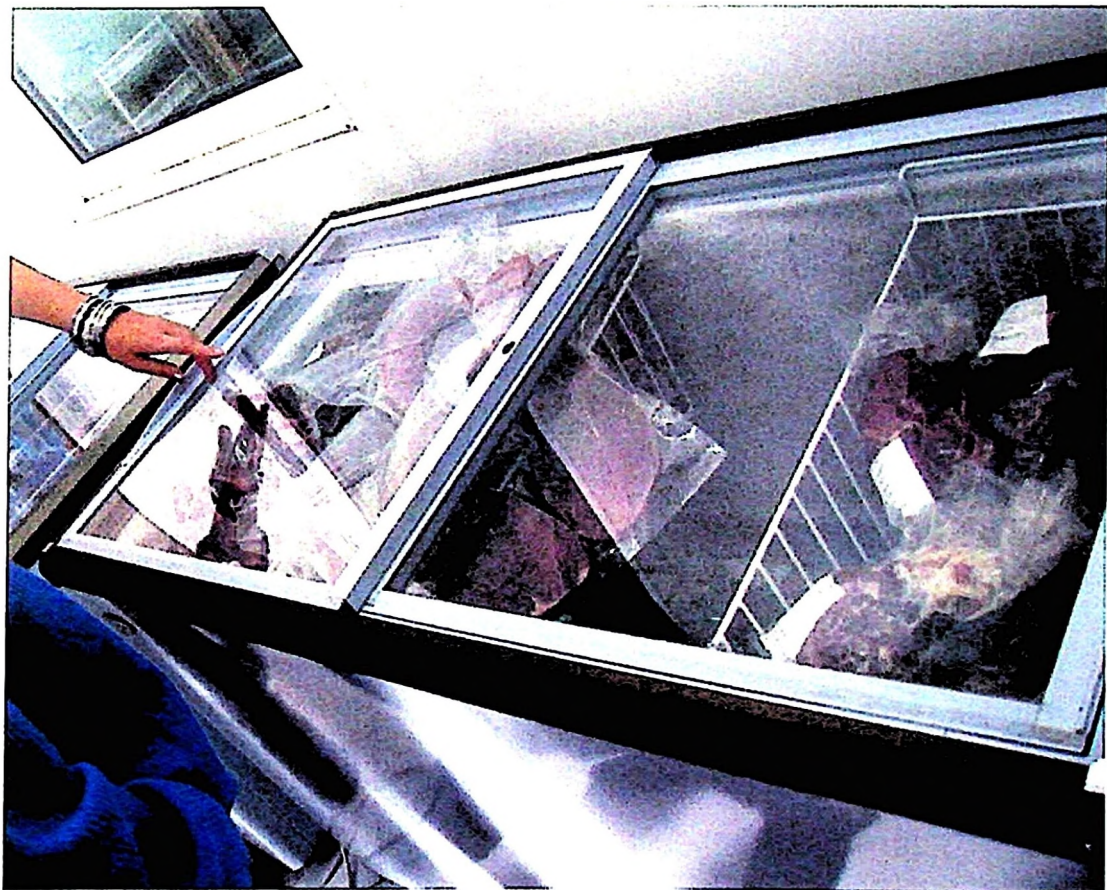


Plate 13: Beef parked and displayed on cold room for retailing in supermarkets

Butcher men dominated supplies of beef to tourist hotels as it accounted for 44.12% of the supply among interviewed tourist hotels (Table 18). Most tourist hotel operators contend that, tenderness of the beef depends on the competency of hotel chefs in preparing it. Different means of beef tenderization and preparation differentiate beef from one hotel to another. The reason behind domination of beef supplies by butcher men in tourist hotels is associated with limited supplies of beef from local meat processing factories. Inadequacy of quality beef supply and non availability of quality beef were mentioned by 27.27% and 13.04% of the interviewed tourist hotels and supermarkets respectively (Tables 20 and 21).

Table 18: Sources of beef and beef products sold in supermarkets and tourist hotels

Source/supplier	(%)Supermarkets	(%)Tourist hotels
Local meat processing industries	9.09	29.41
Importers	18.18	17.65
Importers and local meat processing industries	63.64	11.76
Butcher men	9.09	44.12
Total	100.00	100.00

About 63.6% of the supermarkets sourced beef and beef products from importers and local meat processing industries; while only 18.2% of the supermarkets sourced quality beef from local meat processing factories (Table 18). Generally, supermarkets and tourist hotels obtained beef from three main sources: (i) Suppliers from conventional beef supply channel in the form of half carcasses. These carcasses are processed into meat cuts and packed according to the requirements of their customers. (ii) Meat importers and (iii) Local meat processing factories. The findings on sourcing of beef from different dealers observed in this study is different from the findings reported by Farmer and Mbwika (2012) who found that Kenyan

major supermarkets are supplied with fresh meat from abattoirs that source their cattle mainly from fattening farms.

Supermarkets and tourist hotels that import beef and beef products accounted for 81.82% and 68% of the whole sample respectively. The major portion (91.67%) of the quality beef imported in Tanzanian niche markets came from Kenya. Revival of the East African Community that harmonizes business environment among member countries might have contributed to the dominance of the imports of beef and beef products from Kenya vis-à-vis from other countries outside the East African Community (Table 19). Proximity to Tanzania is another added advantage that Kenya has over other countries. This is accompanied by cheaper means of transport (trucks as opposed to airplanes) all of which might lead to competitive advantage for Kenya's beef products as opposed to those of other countries where tourist hotels and supermarkets import beef and beef products from.

Table 19: Countries where beef was imported from

Country	n	% Strongly Important	% Important	% Unimportant	% Strongly unimportant
Kenya	24	96.7	8.3	0.0	0.0
South Africa	24	0.0	41.7	33.3	25.0
Brazil	24	0.0	8.3	54.7	37.5
Denmark	24	0.0	4.2	54.7	41.7
New Zealand	24	0.0	4.2	54.7	41.7

Table 20 presents reasons for importing beef as stated by supermarkets. Customer preference was ranked as an important aspect by 45.45% of the sampled supermarkets. Supermarket operators were of the opinion that; requirements of customers determine what to sell. Imported beef and beef products were considered

to be of higher quality than similar products produced within the country. As was the case for tourist hotels, supermarket operators were of the opinion that unreliable electricity supply in the supply of quality beef within Tanzania might have contributed to consumers' skepticism on the quality of beef produced locally.

The high cost of locally produced quality beef was indicated by 36.36% of the sampled supermarkets as a very important aspect behind importation of beef (Table 20). The costs referred to here are those incurred by supermarkets in marketing quality beef, and these include the costs of transport and the cost of fixing cold chain facilities in their shopping halls which are required to keep quality beef cold when selling the beef stocks. The Farmers' Choice Co. Ltd which is the main supplier of beef and beef products in Tanzania, incurred costs on transport and on fixing cold chain facilities on identified supermarkets to allow efficient and effective marketing of their products. In this case, supermarkets in Tanzania acted like agents of the Farmers' Choice Co. Ltd.

Table 20: Reasons behind importation of quality beef among supermarkets

Reason	n	% Very important	% Important	% Unimportant
Customer preference	11	45.45	54.54	0.00
Lack of traceability	11	0.00	36.36	63.64
Inadequate supply	11	27.27	27.27	45.45
Quality inconsistency	11	18.18	45.45	36.36
Local quality beef is expensive	11	36.36	18.18	45.45

Inadequate supply was reported by 27.27% of the sampled supermarkets as the reason behind importation of beef and beef products (Table 20). Supermarkets who reported inadequate supply of quality beef produced was ready to purchase locally produced beef if sufficient stocks are available. This suggests that there is an

opportunity for investors wishing to produce quality beef in Tanzania to be competitive in this aspect.

On the other hand, reasons behind importation of quality beef among tourist hotels are presented in Table 21. The findings in Table 21 show that inconsistent supply was a very important aspect reported by 54.6% of the sampled tourist hotels. Customer preference ranked as the second most important reason indicated by 40.9% of the sampled tourist hotels. Inconsistent supply can be explained by the demand for huge capital needed in the production of quality beef as was the case of Orpul Co. Ltd whose initial capital investment was 30 billion Tsh, with a break even period of five years. This amount of money is huge for any company to operate effectively and have consistent supply of quality beef to the downstream chain actors like tourist hotels, supermarkets and export markets. About 40.9% of tourist hotels rated customer preference attribute as a very important attribute linked to the importation of quality beef (Table 21). Customer preference stated by tourist hotels as a reason behind beef importation can be attributed to customers' skepticism on the quality beef produced locally.

Table 21: Reasons behind importation of beef and beef products in tourist hotels

Reasons	n	% Very important	% Important	% Unimportant
Customer preference	22	40.91	45.45	13.64
Lack of traceability	22	18.18	31.82	50.00
Inadequate quality beef	23	13.04	56.52	26.09
Inconsistent supply	22	54.55	36.36	9.09

On average, large volume (1 248 kg) of imported beef was sold by one supermarket per month compared to 1 086 kg of locally produced quality beef sold by one

supermarket per month in the surveyed supermarkets (Table 22). Large volumes of imported beef sold in supermarkets can be associated with high demand of quality beef that cannot be met through local production. Inadequate supply of locally produced quality beef is one of the major reasons given by sampled supermarkets and tourist hotels for importing beef to supplement local supply. According to SAGCOT (2011), 83% of the country's quality beef demand in 2010 was met by imports.

Table 22: Major beef products sold in supermarkets

Products sold per month	n	Minimum	Maximum	Mean
Beef produced locally (kg)	7	250.00	5 000.00	1 086.25
Sausages produced locally (kg)	7	32.00	157.00	85.45
Imported beef (kg)	7	207.00	3 200.00	1 248.62
Imported sausage (kg)	7	48.00	377.00	149.37

Prices of beef cuts and sausages produced locally were generally lower than the prices of imported beef cuts and sausages (Table 23). The lower prices of beef produced locally can be explained by short distance between the source (Arusha) and supermarkets in Arusha and Dar-es-Salaam; compared to the distance between the source of imported beef cuts and sausages say from Kenya and the supermarkets located in Arusha and Dar-es-Salaam.

Table 23: Prices of beef cuts and sausages sold in supermarkets

Purchasing price (wholesale price)	n	Minimum	Maximum	Mean
Beef cuts produced locally (Tsh/kg)	11	6 500	12 500	7 333.33
Sausage produced locally (Tsh/kg)	11	4 500	5 200	4 889.27
Imported beef (Tsh/kg)	11	13 500	15 200	14 233.33
Imported sausages (Tsh/kg)	11	5 500	9 500	6 947.20
Selling price (retailing price)				
Beef cuts produced locally (Tsh/kg)	11	7 900	12 500	10 533.33
Sausage produced locally (Tsh/kg)	11	6 800	8 200	7 500.00
Imported beef (Tsh/kg)	11	15 900	34 000	28 800
Imported sausages (Tsh/kg)	11	12 550	15 900	14 372.87

4.2 Coordination along the Beef Supply Chain

Tanzanian beef supply chain is coordinated by three ministries, two quality control organs and local government authorities. The ministries include, the Ministry of Industry Trade and Marketing (MITM), the Ministry of Health and Social Welfare (MoHSW) and the Ministry of Livestock and Fisheries Development (MLFD). The quality control organs are Tanzania Food safety and Drugs Authority (TFDA) and Tanzania Bureau of Standards (TBS). MLFD is responsible for regulating all issues related to livestock development, MoHSW deals with assurance of safety and hygienic environment to beef operators in ensuring that consumers get quality and safety beef; the Ministry of Industry and Trade collects and disseminates information regarding different livestock auction markets in the country. The dissemination of marketing information ensures informed decisions for chain actors. Local Government Authorities (LGAs) are executors of policies and regulations to coordinate the beef supply chain. Municipal meat inspectors and health officers ensure that the meat sold in meat shops is safe by making regular inspection of slaughter facilities and meat shops.

LGAs played conflicting roles along beef supply chain. For instance; while Municipal meat inspectors and health officials were empowered to ban slaughter facilities and meat shops that did not comply with safety and hygienic standards, LGAs owned slaughter facilities and collected taxes that were part of LGAs' revenue.

Nine Acts governed beef supply chain: the Local Government Finances Act. 1982, the Animal Disease Act. 2003, the Tanzania Food, Drugs & Cosmetics Act. 2003, the Meat Industry Act. 2006, the Animal Welfare Act. 2008 and the Public Health Act. 2009. Others are: the Standards Act. 2009, the Grazing Land and Animal Feed Resources Act. 2009 and the Identification, registration and Traceability Act. 2010.

Some of these Acts had common compliant requirements while others were conflicting. An example of common requirements was the need to make regular medical check up on six months period which was required by Tanzania Food, Drugs and Cosmetics Act. 2003; Animal Disease Act. 2003 and the Public Health Act. 2009. Examples of conflicting compliance are (1) Animal Disease Act, 2003 requiring registration of abattoirs to have permit from the Director of Veterinary Services; while Tanzania Food, Drugs and Cosmetics Act. 2003 requires abattoir operators to have permit from TFDA, and the Public Health Act. 2009 requires slaughter facility operators to get approval for operation from Local Government Authorities. (2) The Tanzania Food, Drugs and Cosmetics Act. requires livestock and livestock products importers and exporters to be registered by TFDA while The Animal Disease Act. 2003 requires importation and exportation of livestock and their products to be regulated by the Director of Veterinary services. (3) While Grazing and Animal Resource Act. 2010 was made to promote livestock development in the contrary it hinders the development of livestock and could cause conflicts among livestock farmers and other land users. Part 17 Section 3 of the Act states that “subject to other written laws, the village council shall prohibit, restrict, limit or control entry into grazing land for the purposes of cultivation, mining,

establishment of wildlife protected areas or any other use other than livestock keeping”.

4.2.1 Coordination in the conventional beef supply channel

The findings of this study reveal that relationships among chain actors in the conventional beef supply channel in the study area were entirely governed by spot market transactions. There were no contractual agreements among cattle farmers and cattle traders. The interactions among cattle farmers and cattle traders at primary auction markets ended as the transaction deal was closed. Once cattle traders purchase cattle from primary auction markets, they transported the animals to resell at secondary and terminal markets. At these markets, cattle traders from primary markets meet with brokers, leave their cattle stock to the brokers and wait for their pay. The brokers keep the cattle for sometime while looking for customers. However, it was noted that, there was no communication between cattle traders who brought cattle from primary auction markets and the brokers. They just met at secondary or terminal markets and agreed on cattle prices as brokers wait for customers of the cattle. The cattle were sold to meat traders who further slaughter cattle and sell carcass at a wholesale price and/or retail price in their butchers. Generally, business relations among cattle traders, brokers and wholesale meat traders in the conventional beef supply channel were informal. Their relations were based on trust which was developed during the past transactions without formal contractual agreements.

However, wholesale meat traders exercised more market power since they were more informed on market demand and supply situations than other actors along the channel. Formation of meat traders associations would partly explain the power they had over others in the supply chain. During data collection exercise it was noted that meat wholesalers' associations were in their initial stage of formation and registration. These associations include Meat Traders Association of Arumeru district (UWANA), Meat Traders Association of Arusha municipal (UWANYAMA) and Meat Traders Association of Dar-es-Salaam (UWANJU). The possession of more market powers among wholesaling meat traders in terms of price setting observed in this study are in contrast with the findings reported by Mafuru *et al.* (2006) who found that cattle traders (assemblers) in Shinyanga region had better negotiation position in price setting since they were more informed than cattle farmers. Moreover, these findings are also in contrast with the findings by Almayehu (2011) who reported that cattle traders has better negotiation power since they are more informed than other cattle chain actors in Ethiopia.

4.2.2 Coordination in the quality beef supply channel

This study revealed that market arrangements were differently set among chain actors in quality beef supply channel. While spot market transactions governed cattle trade among upstream chain actors, informal business relations governed cattle trade among downstream chain actors. For example, in upstream node of quality beef supply in Simanjiro, Ormoti Co. Ltd had no contractual agreement with cattle farmers who supply cattle for fattening. The lack of contractual agreement is due to the fact that Maasai who were the main suppliers of cattle to the fattening company didn't keep cattle as a commercial enterprise. They usually sold cattle when in need

of immediate cash to meet life obligations such as school fees, medication of family and veterinary services. Therefore, it was difficult for cattle farmers to enter into contractual agreements with cattle fattening company. However, the company was amalgamated with sister companies under umbrella of OMASI. The companies named Orpul Co. Ltd and OMASI engaged themselves in cattle slaughtering and processing of beef and marketing of the beef products respectively.

Various market arrangements were identified among downstream chain actors in the quality beef supply channel. Approximately 91% and 74% of supermarkets and tourist hotels respectively sourced beef and beef products from regular suppliers (Table 24). When asked for the reasons behind sourcing from specific suppliers, quality beef buyers reported that suppliers gain experience and get acquainted with quality specifications as they supply from time to time. In addition to regular supplies, buyers coach suppliers on how to maintain quality beef from time to time. Sourcing of beef from regular suppliers creates reliability and long term business relations. This observation is in line with positive agency theory paradigm that hypothesizes that under bounded rationality opportunism behavior can be minimized through the provision of incentives among trading partners.

Table 24: Relationships governing quality beef buyers with their suppliers

	Supermarkets		Hotels	
	Freq	%	Freq	%
Sources of beef				
Same supplier	10	90.91	25	73.50
Different suppliers	1	9.09	9	26.50
Total	11	100.00	34	100.00
Relations				
Informal business relations	7	58.33	19	55.90
Formal business relations	5	41.67	15	44.10
Total	12	100.00	34	100.00

Informal business relations were found to be the main business relationship pattern between quality beef buyers and their suppliers. Of the interviewed supermarkets, 58.3% and 41.7% had informal and formal business relations respectively with their suppliers; while 55.9% and 44.1% of the sampled tourist hotels had informal and formal business relations with their beef suppliers respectively (Table 24). Reasons behind dominance of informal business relations among supermarkets and tourist hotels included the trust which was developed between trading partners over time; and flexibility between trading partners. Okello *et al.* (2010) reported similar results on business relations that broiler supply chain in Kenya are governed by formal and informal agreements among actors.

All of suppliers to supermarkets and tourist hotels shared commitment of supplying beef on credit at fixed prices for at least 30 days. This kind of relationship implies a barrier to entry of these suppliers to niche markets since it requires a supplier to have enough capital for supplying on credit per month. It also excludes small scale actors (conventional beef sellers) who usually sell small amounts of beef up to 187 kg per day on cash basis. Similar findings on credit mode of payment among supermarkets and tourist hotels and their suppliers are reported by Kamugisha (2006) who reveals that in Kilimanjaro, Arusha and Dar es Salaam; most of green beans supplies to supermarkets and tourist hotels (80%) were made based on credit payment regime while 20% transactions were made on cash mode of payment.

Terms and conditions specified between supermarkets and tourist hotels and their suppliers are presented in Table 25. Major terms and conditions specified in

marketing transactions between supermarkets and quality beef suppliers were found to be prices of the products (72%); quantity supplied (54%) and quality attributes (36%) as these were considered to be “very important” attributes (Table 25). The time interval was not an important attribute since it was rated as ‘unimportant’ aspect in the agreement by 82.6% of the sampled supermarkets.

Table 25: Terms and conditions in agreements between buyers and sellers of quality beef

Terms and conditions	n	% Very important	% Important	% Unimportant
Supermarkets				
Time interval	11	36.36	9.09	54.54
Quality attributes	11	36.36	63.64	0.00
Quantity supplied	11	54.55	36.36	9.09
Price of products	11	72.73	18.18	9.09
Tourist hotels				
Time interval	33	27.27	42.42	30.30
Quantity supplied	33	75.76	18.18	6.06
Quality attribute	33	75.76	24.24	0.00
Price of products	33	87.88	12.12	0.00

On the other hand, price of the products was identified as a very important aspect by 87.9% of the sampled tourist hotels. In both types of relationships, the price was fixed at least within a month of supply; in other words, the supplier had to supply hotel/supermarket at a specific price in a month. If the price changes consideration for the price changes were revised in the sub-subsequent month.

Both ‘quality attribute’ and ‘quantity supplied’ were ranked as very important by 75.8% of the sampled tourist hotels (Table 25). This is because orders of quantity and quality specifications to the suppliers were made through phone communication. The time interval was itemized as very important by only 27.3% of the sampled

tourist hotels. Hotel operators contended that, the time was not specified in their agreements to allow flexibility between hotels and suppliers.

During field survey, only meat processing companies had formed an association namely – Tanzania Meat Processors Association (TAMEPA). However, the association was at its initial stage of registration. Other chain actors in the quality beef supply channel had no associations.

4.3 Efficiency Along Beef Supply Chain

4.3.1 Efficiency at production node

4.3.1.1 Efficiency at production node in the conventional beef supply channel

As indicated in Section 3.2 of the methodology, efficiency with which beef was produced was assessed based on cost per unit of the beef produced and returns per shilling invested in cattle production. Table 26 displays the costs per kg of beef produced and returns per shilling invested in production in conventional beef supply channel. The findings indicate that veterinary services and grazing (looking for pastures) comprise major components of variable costs at production node accounting for 57% and 38% respectively. The remaining cost components (dipping and trekking cattle to markets) account for only 5% of the total variable cost incurred. The reasons behind higher cost component of veterinary services might be attributed to long distance between cattle farmers' homes and the locations of the centers of veterinary services that was estimated to be about 40 km. Moreover, dominance of grazing cost component might be aggravated by aridity nature in the surveyed area whereby cattle farmers were forced to trek cattle long distances in search for pastures. Sometimes, cattle farmers were forced to leave their homes and

feed away cattle especially during dry seasons. These findings are in contrast with the findings by SAGCOT (2011) who revealed that labour, feeds and other costs accounted for 5.05%, 93.43% and 1.52% respectively of the total variable costs which were incurred in beef production in southern corridor of Tanzania. Moreover, the study findings are in contrast with the findings reported by Okello *et al.* (2010) who found that feeds accounted for 68% of the variable costs in the production of broilers among Kenyan entrepreneurs.

Furthermore, Table 26 shows that the cost incurred to produce a kilogram of beef was 1 900Tsh (1.14 USD). This cost is more than twice the cost of producing a kilogram of beef reported by Mlote *et al.* (2012) of 768 Tsh (0.46 USD) in Tanzanian' Lake Zone cattle farmers; and it is also higher than the cost of beef producing kilogram of beef reported by Kadigi *et al.* (2013) of 885 Tsh/kg and 1 086 Tsh/kg in Magu and Ilemela districts of Mwanza region respectively. Higher costs of producing beef in the study area might be due to constraints in the availability of feeds and water especially during dry season when most cattle farmers are forced to migrate to other regions to search for pastures and water.

The findings of margin analysis indicate that the gross margin per cattle head at production node was 114 200Tsh, with returns per kilogram of beef produced of 380.67 Tsh and the returns per shilling invested of 40% implying that every shilling invested in cattle production in the conventional beef chain would yield 40 cents. Although it can be judged that, cattle production business is paying due to higher returns, the length of time employed in cattle production (6 years) to produce a kilo of beef might outweigh financial feasibility of cattle production. Hence, cattle breeds

taking shorter time to attain slaughter weight can outweigh this challenge. The higher returns per shilling for cattle farming business observed in this study are in contrast with the findings in a study by Sintayehu *et al.* (2013) who reported relatively lower returns per cost invested of 9.81% among cattle producers in the southern route of Ethiopia. The Differences between the two findings might be attributed to higher costs of water and feeds by Ethiopian cattle producers which accounted for 10.14% and 27.77% of variable costs respectively. These resources (feeds and water) are owned communally and are not being paid for in Tanzanian context.

Table 26: Costs and returns to cattle producers in the conventional beef supply

	Costs and revenue items	Monthly costs/ 200 heads	Annual costs/200 heads	Annual costs/ head	Total costs/ head (6yrs)	Percent of total
	Costs					
1	Grazing	300 000	3 600 000	18 000	108 000	37.79
2	Veterinary services	250 000	3 000 000	15 000	90 000	56.68
3	Dipping	30 000	360 000	1 800	10 800	3.78
4	Trekking to markets				5 000	1.75
5	Total variable costs (1 -4)	780 000	9 360 000	46 000	285 000	
6	Cost of producing kg (285000/150) (Tsh/kg)				1 900	
	Revenue					
7	Selling price (Tsh/head)				400 000	
8	GM (TR – VC i.e. (7) – (5))				114 200	
9	Estimated costs /kg (5)/300				950.00	
10	% Proportion GM/Sales (7/6)*100				28.55%	
11	Returns per shilling invested (8)/(5)*100				40.07%	
12	Returns per kg of beef (8)/150				380.67	
Assumptions: Cattle live weight 300kg, Dressing percentage 50%, Carcass weight/cattle 150kg						

4.3.1.2 Efficiency at production node in the quality beef supply channel

The analysis of cost structure and gross margin indicates that the cost of purchasing cattle for fattening accounted for 93% of the cost incurred by cattle fatteners in the quality beef cattle supply channel. The remaining cost items such as transportation,

veterinary services and feeds accounted for only 7% of the total cost incurred (Table 27). These findings differ from the findings reported by SAGCOT (2011) who revealed that calf purchase in red meat development marked the most significant cost, accounting for 51% of the total cost. However, if cattle purchase cost would be ignored and only consider additional cost due to fattening the animal, this additional cost would comprise 20% feeds, 38% veterinary services and 42% transportation. Surprisingly, feed cost as the percentage of the total fattening costs is significantly lower than what is reported by Mwilawa (2012) and Mlote *et al.* (2012) that feed was the major cost component in cattle fattening, accounting for 78% and 66% of the variable costs in Dodoma and Lake Zone respectively. The differences in the feed cost component between this study and studies by Mwilawa (2012) and Mlote *et al.* (2012) is due to the difference in feeding systems practiced in the two study areas. Studies by Mwilawa (2012) and Mlote *et al.* (2012) were carried out in areas where cattle were totally confined and fed with hays and concentrates; while this study was carried out in areas where cattle were grazed in privately owned paddocks during the day and supplemented with concentrates in the evening.

Table 27: Costs and returns to cattle farmers in the quality beef supply channel

	Costs and revenue items	TShs/ head	TShs/kg	Percent of total
	Costs			
1	Cattle purchase (Tsh)	514 333	1 714.44	92.64
2	Transportation (Tsh)	17 000	56.67	3.06
3	Feeds (Tsh)	8 150	27.17	1.47
4	Veterinary services (Tsh)	15 700	52.33	2.83
5	Total variable costs (1-4) (Tsh)	555 183	1 850.00	
6	The added cost/kg (2+3+4) (Tsh)		233.40	
	Revenue			
7	Sale of cattle (Tsh/head)	610 623.67	2 035.41	
8	Gross margin/head (7) – (5) (Tsh)	65 440.67	218.14	
9	% proportion GM/sale (8/6)*100	10.54%		
10	Returns per shilling invested (8)/(5)*100	11.79%		
11	Returns per kg of beef (8)/175 (Tsh)	373.94		

Assumptions: Cattle live weight/head 350kg, Dressing percentage 50%, Carcass weight 175kg

According to Table 27, the total cost of producing a kilo of quality beef was 1 850Tsh. This cost was relatively lower than that of 2 820 Tsh/kg and 3 015 Tsh/kg reported by Mwilawa (2012) among Boran and TSHZ respectively in Dodoma region. Furthermore, the costs of producing quality beef in the study area was less than the costs of producing quality beef in Ilemela and Magu districts which stood at 3 512.41 Tsh/kg as reported by Kadigi *et al.* (2013). Lower cost of producing quality beef in the study area can be associated with the difference in feeding systems of fattening cattle as described above.

Added cost per kilo of beef was about 233Tsh (0.13USD) (Table 27). The added cost of producing quality beef observed in this study is relatively lower than the added cost of producing a kilo of quality beef reported by Mlote *et al.* (2012) in Lake Zone that stood at 683.43 Tsh/kg (0.41USD/kg); and lower than that reported by Umar *et al.* (2008) in Nigeria which stood at 0.89USD/kg among Nigerians smallholder cattle fatteners. Lower added cost observed during the course of producing quality beef in the study area can be associated with the economies of scale enjoyed by Ormoti Co. Ltd and Manyara ranch that were involved in fattening of cattle. During field survey Ormoti Co. Ltd and Manyara ranch fattened 250 and 100 cattle per batch respectively, while smallholder cattle fatteners in Mwanza and Shinyanga regions fattened up to 10 cattle per batch; and cattle fatteners in Nigeria rose up to 8 cattle per batch. Moreover, while cattle fatteners in Mwanza region were reported to purchase cattle in weak condition for fattening which takes too long (three months) and require more feeds and time for it to be in good condition (Mlote *et al.*, 2012); Ormoti Co. Ltd buy cattle in good conditions (grades A and B) requiring relatively less time and feeds to gain the desired slaughter weight.

As shown in Table 27, the returns per kilogram of beef produced was 373.94 Tsh while the returns per shilling invested was 11.79%, implying that every shilling invested in quality cattle production would yield about 12 cents (Table 27). This rate of return in a short period of 14 to 60 days of fattening is substantially higher than the commercial interest rates charged by most banks in Tanzania that range between 18% and 25% per annum. This suggests that cattle fattening is a highly paying business. The returns to cattle fattening observed in this study is different from the returns to cattle fattening of 35% among cattle fatteners in Mwanza and Shinyanga regions reported by Mlote *et al.* (2013_a). Also the returns to cattle fattening in the study area differs from those reported by Sarma and Ahmed (2011); and Farmer (2010) of 34% and 91% among smallholder cattle fatteners in Bangladesh and Ethiopia respectively. Differences between these observations can be associated with the use of own resources in business like family labour that is not accounted for as a cost in the quality beef cattle production.

4.3.2 Efficiency at processing node

4.3.2.1 Efficiency in cattle slaughtering in the conventional beef channel

The findings in Table 28 show that cattle purchase cost account for most (98.2%) of the variable costs incurred by wholesale meat traders. Domination of cattle purchase cost among cattle slaughterers (wholesale meat traders) in the study area supports the findings by Igbinosa (2011) who found that cattle purchase cost accounted for 96% of the variable costs incurred by cattle slaughterers in rural areas in central Tanzania. The total cost incurred by wholesale meat traders of 4 073Tsh per kilogram of cattle slaughtered in the study area (Table 28) was relatively higher than

that of 3 489.65Tsh per kilogram reported by Kadigi *et al.* (2013) for the wholesale meat traders in Magu and Ilemela districts.

Table 28: Costs and returns to cattle slaughtering in the conventional beef supply channel

	Cost and revenue items	TShs/head	TShs/kg	Percent of total
	Costs			
1	Cattle purchase (Tsh)	600 000	4 000.00	98.20
2	Transportation (Tsh)	3 000	20.00	0.50
3	Government fees (Tsh)	6 500	43.00	1.07
4	Slaughter service fees (Tsh)	1 500	10.00	0.25
5	Total variable cost (1-4) (Tsh)	611 000	4 073.37	
6	Added cost/kg (2+3+4)Tsh		73.33	
	Revenue			
7	Carcass sale (5000/kg) (Tsh)	750 000	5000.00	90.14%
8	Head of cattle sale (Tsh)	10 000	66.67	1.20%
9	Liver sale (Tsh)	20 000	133.33	2.40%
10	Legs sale (Tsh)	7 000	46.67	1.00%
11	GIT content sale (Tsh)	20 000	133.33	2.40%
12	Skin sale (Tsh)	25 000	166.67	3.00%
13	Total Revenue (TR) (6-11) (Tsh)	832 000	5 546.67	
14	Gross margin (TR – TC) (13-5) (Tsh)	221 000		
15	% Proportion GM/Sales [14/13]*100	26.56%		
16	Returns per shilling invested (14/5)*100	36.17%		
17	Returns per kg handled (14/150) (Tsh)	1 473.33		

Assumptions: Cattle live weight/head 300kg, Dressing percentage 50%, Carcass weight 150kg

According to Table 28, the sales of carcass accounted for 90.14% of the total revenue accrued by wholesale beef traders while non carcass sales accounted for only 9.86% of the total revenues accrued. This is not surprising because carcass is the main product handled and is the major objective of cattle slaughtering business while non carcass components are just the by-products of cattle business. These observations are more or less similar to the findings reported by Shirima *et al.* (2012) who revealed that revenue from the sales of carcass ranged between 78 - 82% of the total revenue among fattened long tailed sheep in central Tanzania. The returns per shilling invested were 36.17% while the return per kilogram of beef was

found to be 1 473.67Tsh (Table 28). The returns per shilling from cattle slaughtering business observed in this study differs from that reported by Igbhinosa (2011) of 6.48% for every shilling invested in cattle slaughtering business in central rural Tanzania.

4.3.2.2 Efficiency in beef processing in the quality beef supply channel

Table 29 presents the costs incurred and the returns obtained by quality beef processors. The total variable cost incurred to process a kilo of quality beef was 6 212.49 Tsh. The total variable cost incurred by quality beef processors was 1.5 times higher than the cost incurred by wholesale meat traders when slaughtering cattle in the conventional beef supply channel. If the cost of purchasing fattened cattle is not considered, the costs of processing (slaughtering and chilling) would be astronomical, accounting for almost two thirds of the total variable cost incurred in processing of quality beef. High processing costs were due to high electricity cost of about 1 133 Tsh/kg, accounting for 84% of the total costs of slaughtering cattle and chilling beef. The added cost per unit of quality beef processed was 2 075 Tsh/kg (1.245 USD/kg) (Table 29). The added cost of processing one kilogram of quality beef observed in this study is higher than the added cost of processing a kilogram of quality beef in Ethiopia which is about 0.418ETB/kg (0.0229 USD) and 0.174ETB/kg (0.009USD) in Southern and Northern business routes of Ethiopia respectively (Sintayehu *et al.*, 2013).

Table 29: Cost and returns to quality beef processors

	Cost item and revenue items	TShs/head	TShs/kg	Percent of total
	Costs			
1	Cattle purchase (350kg) (Tsh)	620 623.67	4 137.49	66.60
2	Slaughtering & chilling (Tsh)	202 580.00	1 350.00	21.73
3	Transport (Tsh)	81 000.00	600.00	9.66
4	Packaging materials (Tsh)	16 875.00	125.00	2.01
5	Total variable costs (40-43)	920 998.67	6 212.49	
6	Added cost (2+3+4)		2 075.00	
	Revenue estimation			
7	Beef sale (Tsh)	1 215 000	9 000.00	
8	Gross margin (TR – TVC) (6)-(5) (Tsh)	294 001	2 787.00	
9	% proportion GM/sale [(7)/(6)]*100	24.19%		
10	Returns per shilling invested [(7)/(5)]*100	31.92%		
11	Returns per kg handled (Tsh)	2 787		

Also Table 29 shows that processors of quality beef earned a return of TShs 2 787 per kilogram which is about 32% per shilling invested in quality beef processing. This return per shilling is slightly higher than that of 30% reported by Spies (2011) among South African beef processors. However, it differs significantly from that reported by Funke (2006) among high end South African abattoir dealers.

4.3.3 Efficiency at retailing node

4.3.3.1 Efficiency at retailing node in the conventional beef supply channel

Beef purchase was the major cost item that accounted for 97.40% of the variable costs incurred by butchermen (Table 30). Transportation and packaging materials costs accounted for only 2.16% and 0.43% respectively of the total variable cost. Domination of beef purchase cost among butchermen observed in this study supports the findings by Sintayehu *et al.* (2013) who reported that 91% of the variable cost incurred by butchermen in Ethiopia was cattle purchase. If the costs incurred in adding value to purchased cattle are considered, transportation cost would become the major cost item, accounting for 83.33% of the total added costs

incurred by butcher men in the conventional beef supply chain. These findings are consistent with the findings by Emokaro and Amadasun (2012) who found transportation to be the major cost item accounting for 59.8% of the variable costs incurred by beef distributors in Nigeria.

Table 30: Costs and returns to conventional beef retailing in butcher shops

	Cost and revenue item	Costs/ head	Costs/kg	% cost
	Costs			
1	Beef purchase (Tsh/kg)	480 000	3 200	97.40
2	Transportation	15 000	100	2.16
3	Packing plastic bags	3 000	20	0.43
4	Total variable cost (1-3)Tsh	498 000	3 320	
5	The added cost/kg (2÷3) Tsh		120	
	Revenue			
6	Beef sale	750 000	5 000	
7	Gross profit (6 – 4) (Tsh)	252 000	1 680	
8	% Proportion GM/Sales (7/6)*100	36%		
9	Returns per shilling invested [(7)/(4)]*100	50%		
	Returns per kg handled (7/4) (Tsh)	1 680		

As shown in Table 30, the total variable cost of retailing a kilo of conventional beef was revealed to be 3 320Tsh/kg (1.992USD). This cost is slightly lower than that of 4 543.50Tsh (2.72USD) per kilogram of conventional beef reported by Igbbhinosa (2011) for butcher shops in rural areas of central Tanzania. The difference in the costs incurred by beef retailers can be associated with economies of scale enjoyed by urban beef retailers as opposed to those enjoyed by their counter parts in rural area. Beef sales in the study area averaged 136kg per day which contrasts that reported by Igbbhinosa (2011) of 92kg per day in rural areas of central Tanzania. These findings are also in contrast with the findings in a study by Emokaro and Amadasson (2012) who reported the cost of retailing a kilo of beef in Nigeria to be 168.8 Naira (1.082USD). Furthermore, the current findings are not consistent with those reported

by Sintayehu *et al.* (2013) who reported the unit cost of retailing a kilo of beef to be 1.4 Ethiopian Birr (0.0768USD) among butchers in Ethiopia.

The findings in Table 30 reveal further that the returns per shilling invested at retailing node is 50% and the returns per kilogram of beef retailed was 1 680Tsh. This implies that beef retailing business is a paying venture since the returns per shilling invested is above the normal bank lending rates that range from 18% to 25% in the country.

4.3.3.2 Efficiency at retailing node in the quality beef supply channel

According to Table 31, the cost of retailing quality beef was 1 487 Tsh/kg (0.89USD/kg). This cost is 12 times higher than the cost of retailing a kilogram of conventional beef of 120Tsh/kg as shown in Table 29. Moreover, the cost of retailing a kilogram of quality beef is relatively higher than the cost of retailing quality beef in Ethiopia that stood at 0.282USD/kg as reported by Addisu *et al.* (2012).

With regard to the returns of quality beef retailing, the returns per kilogram of quality beef retailed was 13 080 Tsh while the returns per shilling invested at supermarket retailing outlets was 83% (Table 31). This return is the highest among all the other preceding upstream beef chain actors. Huge returns in supermarkets might be associated with monopolistic powers enjoyed by high end markets in setting terms and conditions for their suppliers, since the former are a few in numbers. However, huge profit might be associated with the exclusion of overhead costs and

non food costs incurred at these nodes. These findings contrast those reported by Funke (2006) who noted a relatively low gross margin ranging from 17% to 33% among high end retailing outlets selling beef prime cuts such as rump, sirloin, topside, brisket and chuck to high income clusters in South Africa.

Table 31: Costs and returns to retailing of quality beef in supermarkets

	Cost and revenue items	TSh/kg
	Costs	
1	Beef purchase (Tsh)	14 233
2	Utilities	987
3	Packing materials (Tsh)	500
4	Total variable cost (TVC) (Tsh)	15 720
5	The added cost/kg (2+3) Tsh	1 487
	Revenue	
6	Beef sale (Tsh)	28 800
7	Gross margin (TR – TVC) (6) – (4) (Tsh)	13 080
8	% proportion (GM/sales) [(7)/(6)]*100	45%
9	Returns per shilling invested [(7)/(4)]*100	83%
10	Returns per kg handled (Tsh)	13 080

4.3.4 Summary of costs and returns along the beef supply chain

Efficiency in terms of costs per unit of output and returns per unit input was found to vary from one node to another along the beef supply chain. However, the costs in conventional beef supply channel were found to be significantly lower than those in the quality beef supply channel. Low costs in the conventional beef supply channel would be explained by having little value added activities among actors in the conventional beef supply channel compared to value addition activities among actors in the quality beef supply channel. Added cost of producing, processing and retailing a kilogram of quality beef was about twice the cost of producing, processing and retailing a kilogram of conventional beef (Table 32). High cost of processing and retailing quality beef in Tanzania can be explained by high electricity cost incurred in chilling and storing quality beef.

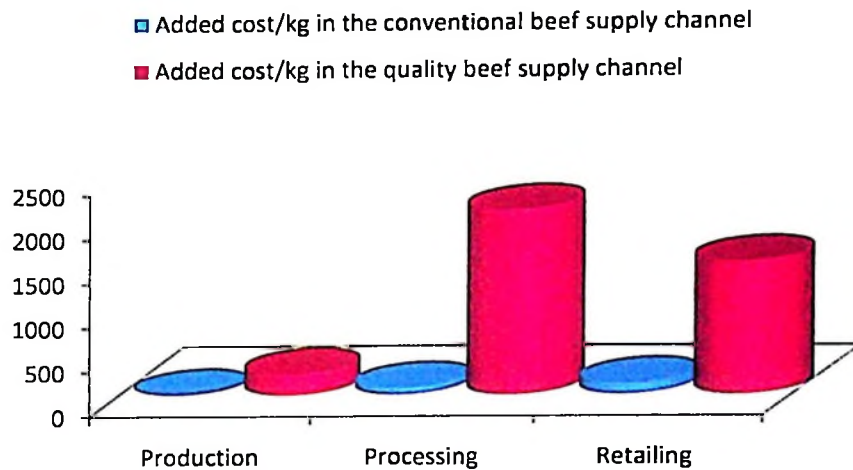


Figure 9: Added cost of producing, processing and retailing a kilo of quality beef

Added cost per kilogram along quality beef supply channel was found to be of 2 075 Tsh/kg at processing node. Processing and chilling cost of beef was significantly higher than the added costs incurred at the production node of 233 Tsh/kg and at retailing node of 1 487 Tsh/kg (Figure 9). The relatively low cost at the production node can be associated with non use of electrical energy in the production of quality beef. This is because electricity bills formed major (84%) component of costs at the processing node while non food costs at retailing node can be associated with relatively low costs as opposed to the costs incurred at the processing node. Moreover, low added costs at the production node could be explained by the fact that fattening company had a large piece of land to graze cattle in paddocks and supplement them with concentrates in the evening. Feed as a major cost item in quality beef production has been documented widely in the country (Mwilawa, 2012; Asimwe *et al.*, 2012; Mlote *et al.*, 2012) and elsewhere in developing countries (Sintayehu *et al.*, 2013; Umar *et al.*, 2008; Emokaro and Amadasson,

2012). Low cost of quality beef cattle production per kilogram at the production node due to possession of large piece of land implies that there should be demarcation and privatization of pastoral land. This could reduce environmental degradation in pastoral areas as a result of the current communal ownership of grazing land.

Table 32: Table Summary of costs and returns along beef supply chain

Cost and revenue item	Conventional beef supply channel	Quality beef supply channel
Production		
Added cost/kg (Tsh)	0	233.40
Returns /kg produced (Tsh)	380.67	373.94
Returns/shilling invested (%)	40%	11.79%
Cattle slaughtering & beef processing		
Added cost/kg (Tsh)	73.33	2 075
Returns/kg processed (Tsh)	1 473.33	2 787
Returns/shilling invested (%)	36%	32%
Distribution (retailing)		
Added cost/kg (Tsh)	120	1 487
Returns/kg retailed (Tsh)	1 680	13 080
Returns/shilling invested (%)	50%	83%

4.4 Beef Consumption in the Study Area

Dar-es-Salaam and Arusha cities accounted for 14.1% and 3.2% of the national beef consumption which was estimated to be 40 955 and 9 395 metric tons respectively in 2012 (Tables 33 and 34). The rest, (83%) was consumed elsewhere in the country. The national beef consumption in 2012 was 289 235 metric tons.

Table 33: Estimated quantities of beef consumed in Dar-es-Salaam in 2012

Month	Cattle sales/day at Pugu market (heads)	Number of days/ Month	Beef consumed/month (kg)
January	775	31	3 747 900
February	807	28	3 524 976
March	680	31	3 699 540
April	711	30	3 790 800
May	583	31	3 288 480
June	624	30	3 327 480
July	665	31	2 819 388
August	734	31	3 017 664
September	757	30	3 112 200
October	731	31	3 549 624
November	757	30	3 542 760
December	731	31	3 535 116
Total			40 955 928

Assumptions: Cattle sales per day at Pugu market derive all beef consumed in the city; Dressing percentage – 52%. Average cattle live weight – 300kg. All of cattle traded in the city were slaughtered and consumed internally in the city. Annual beef production is equivalent to the annual national beef consumption

Table 34: Beef consumption estimates in Arusha municipality in 2012

	Cattle slaughtered/ day	Number of days/ year	Beef obtained/ year (kg)
Arusha abattoir	150	365	8 541 000
Tengeru slaughter slab	165	365	854 100
Total			9 395 100

Assumptions: Dressing percentage 52%, Average cattle live weight 300kg, Carcass obtained after cattle slaughtering derive Arusha beef consumption. Annual beef national production is equivalent to annual national beef consumption

Most (95%) of the beef consumed in the study area in 2012 was conventional beef, quality beef accounted for only 5% of the beef consumed (Table 35). It is encouraging to note that most (64.45%) of the quality beef consumed in 2012 was produced locally with only 35.55% being imported (Table 36). These findings are not consistent with the findings reported by Agriterro (2012) who reported that beef traded in Kampala city accounted for only 7% of Uganda's beef consumption and premium segment accounted for 16% of the city's beef consumption estimated at 2 500 metric tons per year.

Table 35: Distribution of beef consumed in the study area in 2012

	Quantities of beef consumed (kg)	Proportion of beef consumed (%)
Conventional beef	50 252 700.00	94.8
Quality beef	2 735 862.39	5.2
Total	52 160 624.00	100.0

Table 36: Distribution of quality beef consumed in the study area in 2012

	Quantities of beef consumed (kg)	Proportion of quality beef consumed (%)
Imported beef	972 436.41	35.55
Locally produced quality beef	1 763 425.98	64.45
Total	2 735 862.39	100.00

4.4.1 Household beef consumption

4.4.1.1 Consumption of beef versus other meat types

Beef accounted for 51% of the meat consumed in the study area. This was followed by pork, poultry, and sheep and goat meat which accounted for 25%, 18% and 6% respectively of the meat consumed in the study area. Domination of beef among meats consumed in Tanzania was also reported by Kaliba (2008). In Kaliba's study, however, beef was found to account for only 34% of the meat consumed in Tanzania which is lower than 51% observed in the study area. Generally, several studies have found beef to be the main component of meat consumed in developing countries and Tanzania in particular. These studies include Weliwita *et al.* (2003) in Tanzania, Pica-Ciamarra *et al.* (2011) in Tanzania; Martin *et al.* (2012) in Tanzania; Teklebrhan (2012) in Ethiopia; Gambo *et al.* (2010) in Nigeria, and Farmer and Mbwiike (2012) in Kenya.

The interviewed households purchased meat from different sources. Butcher shops selling conventional meat were found to be major sources of different types of meat

(Table 37). This is not surprising because butcher shops selling conventional meat are widespread in the country. These study findings are similar to the findings by Igbbhinosa (2011) and UNIDO (2012) who reported the existence of butcher shops scattered in various places in Tanzania.

Table 37: Sources of meat consumed by households in the study area

Sources of meat	Beef	Shoat	Chicken	Pork	Fish
Conventional meat butcher shop	261	72	37	36	84
Supermarket	8	0	34	3	2
Quality meat butcher shop	3	0	2	3	0
Auction market	2	53	133	0	137
Own farm	0	2	35	0	0
Street vendors	1	0	16	2	38

The annual meat per capita consumption in the study area was found to be 29.8kg, 32.1kg, 13.6kg, 11.6kg and 9.8kg of conventional beef, quality beef, goat and sheep meat, chicken and pork respectively (Table 38). The annual per capita meat consumption in the study area is relatively higher than the total national per capita meat consumption of 12kg/person/year reported by MLFD (2012). The reason behind the difference between the study findings regarding annual meat per capita consumption and the country's annual meat per capita consumption might be due to the fact that the study was undertaken in major urban areas of the country whose residents have high income and therefore their meat consumption is likely to be higher than residents in rural areas. The finding that beef consumption in the study area was higher than the average national meat consumption is similar to the findings of a study by Farmer and Mbwiike (2012) who found high meat consumption levels in Nairobi and Mombasa in Kenya of 25.8kg/person/year and 21.2kg/person/year respectively versus the country's average meat consumption of

15kg/person/year. Apart from having residents with relatively high incomes, Arusha is located in pastoral communities whose meat consumption is normally high and therefore most households consume beef as their food of choice. The finding on having higher beef consumption in the urban areas than in rural areas observed in this study is also similar to findings by Betru and Kawashima (2009) in Ethiopia who revealed that for a given level of income, urban households consumed more meat than rural households.

Table 38: Annual Per capita meat consumption in the study area

	n	Annual beef consumption/ household (kg)	House hold size	Adults equivalent household size	Annual Per capita beef consumption (kg)
Overall					
Conventional beef	241	71.52	4.7	2.4	29.8
Quality beef	26	92.86	5.9	2.9	32.1
Goat and sheep meat	64	38.09	5.5	2.8	13.6
Chicken	173	32.41	5.3	2.8	11.6
Pork	31	30.41	6.1	3.1	9.8
Dar-es-Salaam					
Conventional beef	116	82.96	4.5	2.8	29.6
Quality beef	17	88.29	4.8	2.7	32.7
Goat and sheep meat	23	35.78	4.7	2.5	14.3
Chicken	103	40.26	5.2	2.8	14.4
Pork	27	33.58	5.6	3.0	11.2
Arusha					
Conventional beef	125	60.48	5.5	2.8	21.6
Quality beef	9	88.16	5.6	2.9	30.4
Goat and sheep meat	41	39.44	6.0	3.0	13.1
Chicken	70	21.51	5.4	2.7	7.9
Pork	4	12	3.8	2.2	5.5

Assumptions: OECD modified equivalence scale (1994) was used. Head of household = 1, other adults over 17 years = 0.5, children below 18 years = 0.3.

Generally, the annual quality beef per capita consumption was found to be relatively higher than that of conventional beef. Higher consumption of quality beef among interviewed beef consumers might be attributed to their relative small household size

that leads to higher purchasing power among households consuming quality beef. However, the consumption of quality beef does not depend on expenditure levels. This is because quartile 2 which has monthly expenditure levels ranging from 500 000 to 1 000 000 dominated consumers of quality beef as it accounted for 37.5%. Figure 10 shows the distribution of quality beef purchase and hence consumption among various expenditure quartiles in the study area.

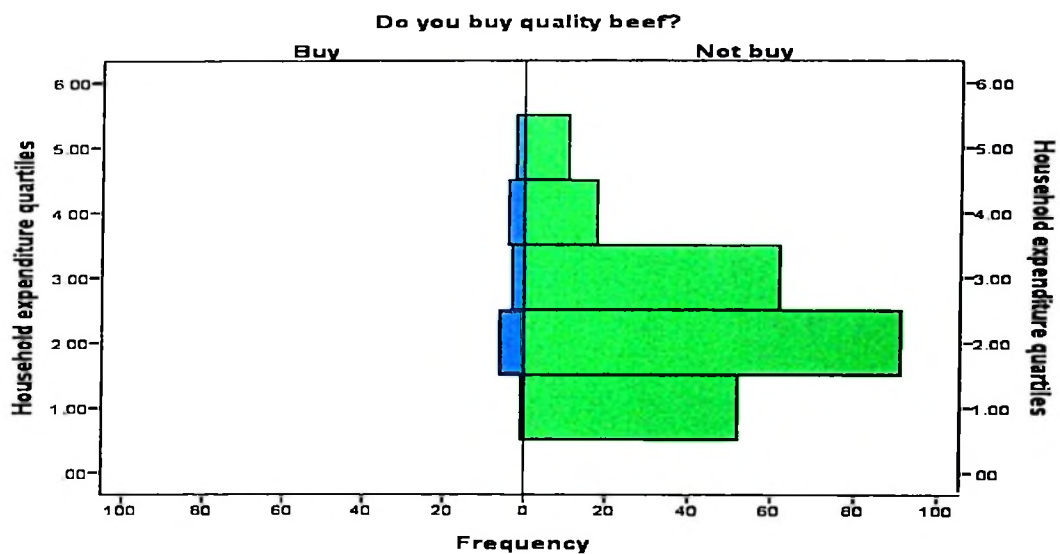


Figure 10: Quality beef consumption by household expenditure quartiles

Household budgets share spent on quality beef was found to be 0.0208 which is smaller than that of conventional beef (0.0333) (Table 39). This might be explained by high incomes earned by households consuming the quality beef. Moreover, conventional beef and fish had the largest budget shares compared to other protein sources reflecting their huge frequency of consumption among sampled households (Table 39).

Fish was cheaper than beef (Table 39); therefore, fish was consumed more frequently than conventional beef, since the former was affordable among low income earning households. Legumes budget share was next to beef and fish due to its affordability, which led to its higher frequency of consumption among respondents than other protein food in the study area. In fact, legumes were the cheapest (Table 39) and the most consumed protein food in the study area. Pork and chicken budget shares were low probably due to the fact that they were expensive (Table 39).

Table 39: Prices, expenditure and food budget shares for protein food consumed in the study area

Parameter	n	Mean	Std
Nominal prices of quality beef and its substitutes			
Conventional beef (Tsh/kg)	252	5 597.22	736.11
Quality beef (Tsh/kg)	25	14 205.31	2 507.19
Shoats (Tsh/kg)	87	5 181.61	1 817.07
Chicken (Tsh/kg)	230	8 785.65	2 928.72
Pork (Tsh/kg)	46	6 604.35	1 436.81
Legumes (Tsh/kg)	244	1 855.74	257.89
Fish (Tsh/kg)	248	4 711.29	2 229.11
Total household expenditure budget shares for			
Conventional beef	244	0.033	0.025
Quality beef	25	0.021	0.010
Shoat	253	0.021	0.081
Chicken	253	0.014	0.019
Pork	253	0.015	0.070
Legumes	253	0.019	0.189
Fish	242	0.033	0.027
Total meat	245	0.053	0.036
Food expenditure budget shares for			
Conventional beef	253	0.073	0.049
Quality beef	25	0.092	0.035
Shoats	253	0.045	0.155
Chicken	253	0.034	0.040
Pork	253	0.040	0.149
Legumes	253	0.040	0.331
Fish	253	0.070	0.057
Total meat	253	0.119	0.075

4.4.1.2 Consumption of different beef types

Figure 11 shows frequency of consumption for different types of beef. Conventional beef appears to be consumed most frequently than any other types of beef. The figure indicates that 80% of the sampled households consumed conventional beef most often (at least once per week) than other types of beef. Majority (57%) of the sampled beef consumers never bought quality beef. Those who consumed quality beef sometimes (once-twice a month) or rarely (less than once a month) bought it. Gastro Intestinal Tract component (GIT) was often and sometimes bought by about 1% and 15% respectively of the interviewed consumers. High frequency of conventional beef consumption was due to the fact that conventional beef was sold in butchers' that are found throughout the country and accessible to most households. Small proportion of households buying and consuming quality beef as indicated in Figure 11 suggests that quality beef consumers were financially capable to buy other protein sources. Moreover, high cost of quality beef might explain why few consumers bought and consumed quality beef. In general, quality beef was found to be the most expensive protein food source in the study area (Table 37).

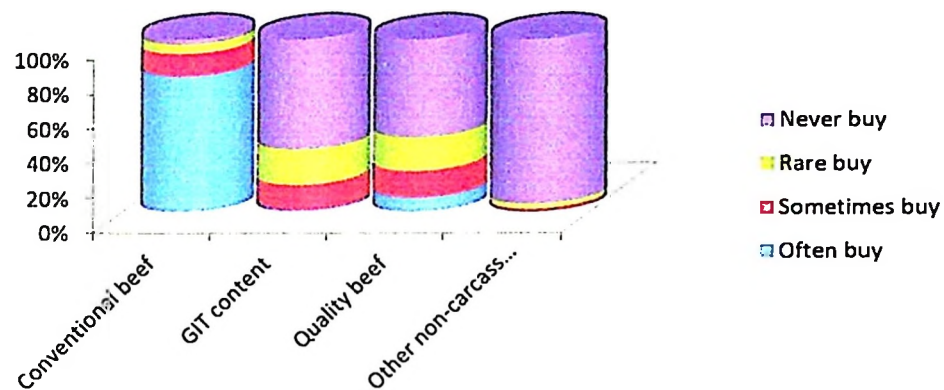


Figure 11: Distribution of sample consumers buying different types of beef in the study area

4.4.1.3 Factors influencing household consumption of quality beef

AIDS model was used to analyze factors influencing quality beef consumption. The results show poor fit of model as measured by R^2 (13.2%) which is common when the model uses cross sectional data.

Household expenditure levels were shown to have a significant influence on the consumption of quality beef. A unit increase of household expenditure was associated with a 1.3% less budget share spent on quality beef (Table 40), implying that the product has been considered as a necessary good. Expenditure elasticity of quality beef 0.375 implies that beef is a normal good and is inelastic. These findings are in contrast to the expectation which held that beef would be considered luxury. The reason behind the expected luxury nature of quality beef is that; the beef is an expensive source of protein and there are other cheaper substitutes such as pulses and sardines. The finding on the inelastic nature of quality beef relates to findings of

areas of Tanzania; and Bett *et al.* (2012) who found that beef, mutton and chicken are necessities in urban and rural areas of Kenya. Conversely, the finding contrasts to the findings of some authors who revealed that meat is an expensive source of protein and hence, its demand varies inversely proportional with incomes (Mafuru and Marsh, 2003; Kaliba, 2008).

Table 40: Factors influencing consumption of quality beef

Model parameter	B	Std. Error	T	Sig.
Constant	.263	.067	3.938	.000
Lnexpenditure***	.013	.004	-3.313	.001
Sex of respondent **	-.013	.005	-2.315	.021
Education levels				
Primary	-.005	.007	-.844	.399
Secondary	-.001	.007	-.144	.886
Informal **	-.038	.013	-3.042	.003
Marital status				
Single	-.008	.013	-.614	.540
Widow	.010	.009	1.186	.237
Separated	.004	.010	.404	.687
Occupation				
Self employed	.006	.006	1.076	.283
Retired	-.012	.014	-.895	.371
Farming	-.006	.014	-.400	.690
Remittances dependants	.020	.015	1.361	.175
Family size				
Large household size	.000	.005	-.091	.928

*** Statistical significant at 99% confidence interval; ** statistical significant at 95% confidence interval

Furthermore, the finding on positive relationship between income and quality beef consumption is consistent with the findings by Zheng and Henneberry (2011) who reported that meat, aquatic products and dairy products exert substantial growth potential in demand for the mentioned products from low income to high income households in Chinese Urban Province. It is also in line with the findings by Teklu (1996) who found that; food occupies a major share of households' total consumption expenditures especially in low income countries; and food demand is

responsive to changes in income and prices in Sub Saharan Africa. When doing cross country analysis of food consumption patterns among nations of different wealth categories Regimi *et al.* (2000) also found similar pattern whereby for all food groups poorer countries exhibited a greater responsiveness to changes in income levels than wealthier countries.

Coefficient relating to household size indicates that small households with less than six members spent budget shares of their expenditure on quality beef similar to households with large family size of more than six members (Table 40). This pattern was not expected because an increase in household size was expected to increase dependence ratio such that the household expenditure was expected to be budgeted for other basic needs such as carbohydrate foods which are relatively cheaper sources of calories as noted by (Mafuru and Marsh, 2003). This finding contrasts the findings of other studies such as Yeong-Sheng *et al.* (2008); Bamiro (2011) and Bett *et al.* (2012) in Malaysia, Nigeria and Kenya respectively, who found that household size had a negative relationship with expenditure shares on meat.

Female headed households (FHH) were revealed to allocate 1.3% less proportionate share of the increased unit income to quality beef than male headed households (MHH) when their income increases by a unit (Table 40). This observation is similar to finding by Idalinya *et al.* (2009) who reported that FHH spend less proportionate shares of their income to food than MHH. However, this observation differs from the findings by Teklebrhan (2012) who found that in Nigeria gender had no influence on meat consumption. Less expenditure share of FHH on quality beef might be explained by low income levels of women, low education levels and

limited access to employment and credit facilities. Waheeda (2012) notes that women earn less than men despite their having similar education levels to men. Moreover, FAO and SD (1996) note that women comprised only 15% of the total membership of formal rural savings and credit associations in developing countries. Likewise, Cagatay, *et al.* (1995) revealed that women have limited access to means of production such as land and support services such as credit.

Education levels had a significant influence on the consumption of quality beef in the study area. Heads of households with informal, primary and secondary school education levels spent 3.8%, 0.5% and 0.1% less proportional shares respectively of their expenditures on quality beef when their income increases by a unit compared to heads of households with tertiary education (Table 40). This might be attributed by the fact that, education levels are associated with income levels and expenditure thereby respondents with high levels of education secure high paying jobs that allow increased expenditure and likelihood for consumption of quality beef. The finding on low budget shares of quality beef among household heads with less education levels observed in this study differs from the findings by Bamiro (2011) in Nigeria who observed that years of schooling had a negative relationship with the budget spent on animal protein foods. However, this finding supports finding by Bett *et al.* (2012) in Kenya who found a positive relationship between education levels and indigenous chicken meat consumption.

Occupation of the household head (self employed, retired officers, farming and wage employment) was observed to influence the household budget share on quality beef (Table 40). Households whose heads were self employed spent more proportionate shares (0.6%) of their expenditure on quality beef than households whose heads were salaried employed when their incomes increases by a unit. Higher budget share on quality beef spent by self employed as opposed to employed staff can be associated with higher frequency of getting cash among self employed. Employees normally receive salary once per month while self employed can receive cash daily as long as business is in operation. In addition, retired officers, farmers and respondents who depend on remittances spent less proportionate expenditure shares on quality beef at 0.1% and 0.6% and 0.2% respectively than employed household heads. This observation might be explained by relatively low incomes received by retired officers since they are out of the monthly wages payment system; and experience shocks of living without regular payment as they were used to during their employment period. Moreover, farmers do not only earn little, but also their earnings are seasonal and uncertain. Therefore, there is a possibility of saving their earnings to meet only basic needs and to cater for unforeseen expenditures. The fact that respondents depending on remittance spent less on quality beef than employed respondents can be explained by the fact that such respondents are usually old people who are out of formal payment system after retirement. Not only that, they get less income than employed staff, but also their remittances are uncertain since those who provide remittances do not necessarily provide remittances on regular basis. The finding on having small expenditure share on quality beef observed among non employed heads of households compared to salaried employed

household heads is similar to the finding by Mujtahidah (2011). The author found occupation of household heads to have a significant impact on meat consumption among agriculturalists and non-agriculturists in urban and rural areas of Java, Indonesia. Generally, various studies have shown that demographic and socio economic variables have an influence on the consumption of food in different localities: Cranifield *et al.* (2010) in Toronto and Vancouver, Alviola and Capps (2010) in United States and Barcellos *et al.* (2011) in Brazil.

4.5 Household Consumers' Preferences for Beef

A sample of beef consumers were asked to rank different quality attributes taken into consideration when buying beef. Figure 12 displays consumers' ranking of quality attributes according to their order of importance. 'Freshness' attribute scored the highest rank of being 'strongly important' as it was considered by consumers when purchasing beef. This finding supports the finding by Becker *et al.* (2000) who found that freshness was among quality attributes preferred by consumers of beef in Germany. The 'less fat content' quality attribute was ranked second to 'freshness' among sampled household beef consumers in the study area (Figure 12). This finding supports the finding by Teklebrhan (2012) who found that beef consumers in Ethiopia preferred lean and red meat color than fat and white meat.

Cleanliness of retailing outlet facilities attribute ranked third after 'freshness' and 'less fat content' attributes. The sampled household beef consumers relied on cleanliness of retailing outlet facilities as a safety measure of the beef they bought. This is because interviewed consumers had no alternative mechanism of measuring

beef safety. Few beef consumers looked at municipal stamps which could act as a safety measure for the consumers. This finding supports the finding by Nandonde *et al.* (2012) who found hygiene among retailing outlet facilities as the most important valued attribute among beef consumers in the southern highlands of Tanzania.

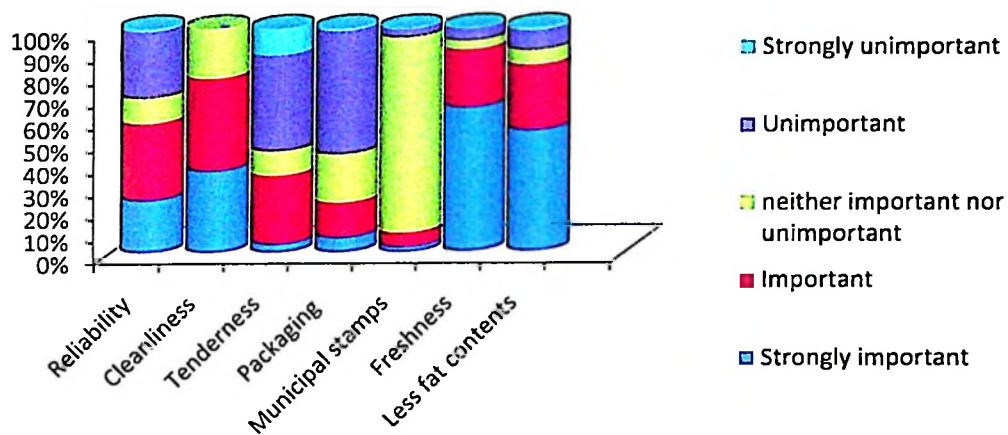


Figure 12: Importance of beef quality attributes among consumers

Table 41 shows that respondents in Dar-es-Salaam preferred to consume beef with less fat content as opposed to Arusha beef consumers who preferred beef with relatively higher fat content. Cold weather condition might be the reason behind Arusha consumers' preference of beef with relatively higher fat content than their counter parts in Dar-es-Salaam. Teklebrhan (2012) reported similar findings in Ethiopia whereby lean meat (red in color) was most preferred among meat consumers. Freshness was identified by most (61.8%) of Arusha beef consumers as a very important quality attribute as opposed to only 36.1% of Dar-es-Salaam beef consumers (Table 41). The proportion of beef consumers who preferred fresh beef in the study area is smaller than that reported by CIRAD (2011) who found that 92% of beef consumers in India preferred fresh beef. However, this proportion is higher than

the finding by Becker *et al.* (2000) who found that 58% of beef consumers in Germany preferred fresh beef.

Table 41: Preference attributes of beef consumers in Arusha and Dar-es-Salaam

Arusha	N	% Very important	% Important	% Un important
Cleanliness of retailing outlets	135	28.9	61.5	9.6
Tenderness	134	1.5	29.9	68.7
Packaging	133	3.0	6.0	91.0
Less fat content	135	28.1	34.8	37.0
Reliability	124	48.4	33.1	18.5
Freshness	123	61.8	26.0	12.2
Dar-es-Salaam				
Cleanliness of retailing outlets	134	68.7	27.6	3.7
Tenderness	130	5.4	45.4	49.2
Packaging	134	11.9	26.1	61.9
Less fat content	134	51.5	21.6	26.9
Reliability	133	45.1	29.3	25.6
Freshness	133	36.1	50.4	13.5

Beef preference clustering was based on the most preferred beef quality attributes through Principal Component Analysis (PCA) and Wards Method of Hierarchy. The results of the analysis are summarized in Table 42. According to the results in table 42, freshness and less fat content variables accounted for 70.5% of the variance of beef consumers' preference for quality attributes. Freshness alone accounted for 38.7% of variation reflecting beef consumers' mindset that lack of freshness is a sign of meat deterioration while 'less fat content' attribute accounted for 31.72% of variance in the preference variation among sampled beef consumers. Fat content attribute is related to color of the meat whereby pale red reflected higher content of fat in the beef.

Table 42: Principal component analysis of beef quality attributes

Component	Initial Eigen values			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.550	38.748	38.748	1.550	38.748	38.748
2	1.269	31.725	70.474	1.269	31.725	70.474
3	.672	16.803	87.277			
4	.509	12.723	100.000			

Extraction Method: Principal Component Analysis.

NB: Components 1, 2, 3, and 4 are freshness, less fat content, cleanliness of retailing outlets and tenderness quality attributes

Four consumer groups were obtained based on freshness and fat content quality attributes through Wards' method of hierarchical cluster analysis (Table 43). The first group comprised of consumers who preferred less fat beef. This group accounts for almost 25% of the sampled households. This category of consumers is mainly composed of second and third lower quartiles of income clusters with household monthly expenditures ranging from 500 000 to 2 000 000Tsh. Household size in this group ranged from one to six members per household while heads of household in this group were mainly self-employed with primary and tertiary education levels (Table 43).

The second group comprised of consumers who preferred beef with both freshness and less fat content quality attributes. However, they were more sensitive to freshness than to fat contents. This group accounted for 22% of the sampled consumers. Household heads in this group were relatively highly educated and had high incomes. This group can be termed as 'safety scares consumers' because most of them were of the opinion that fresh beef was preferred to avoid eating deteriorated beef. Moreover, they were of the opinion that eating meat with large amount of fats causes health problems. However, consumers were unaware that meat

quality could be maintained through post-slaughtering processes such as aging/chilling of meat.

Table 43: Beef consumers' segmentation

Consumers' characteristics	Group 1	Group 2	Group 3	Group 4
Education level				
Primary education	25(36.68)	14(26.92)	42(50.60)	28(50.00)
Secondary education	15(23.80)	10(19.23)	12(14.46)	15(26.79)
Tertiary education	22(34.92)	27(51.92)	20(24.09)	13(23.21)
Informal education	1(1.59)	1(1.92)	9(10.84)	0(0.00)
Total	63(100.00)	52(100.00)	83(100.00)	56(100.00)
Marital status				
Married	47(74.60)	41(78.85)	60(72.83)	51(91.07)
Single	2(3.17)	4(7.70)	4(4.82)	2(3.37)
Widow	7(11.11)	6(11.54)	12(14.46)	2(3.37)
Separated	7(11.11)	1(1.92)	7(8.43)	1(1.79)
Total	63(100.00)	52(100.00)	83(100.00)	56(100.00)
Occupation				
Salaried employment	13(20.63)	24(46.15)	18(21.69)	15(26.79)
Self employed	45(71.43)	22(42.31)	58(69.88)	36(64.29)
Retired officers	0(0.00)	2(3.84)	3(3.61)	2(3.57)
Farming	1(1.58)	1(1.92)	4(4.82)	23.57)
Remittance dependence	4(6.34)	3(5.71)	0(0.00)	1(1.79)
Total	63(100.00)	52(100.00)	83(100.00)	56(100.00)
Household size				
Small family size (1 – 4 members)	24(38.09)	21(40.38)	35(42.16)	18(32.15)
Middle family size (5 -6 members)	27(42.85)	18(34.61)	26(31.33)	24(42.86)
Large family size (> 6 members)	12(19.04)	13(25.00)	22(26.51)	14(25.00)
Total	63(100.00)	52(100.00)	83(100.00)	56(100.00)
Expenditure (Tsh/month)				
Below 500 000	14(22.22)	10(20.41)	23(28.40)	6(10.91)
500 000 < X ≤ 1 000 000	20(31.75)	11(22.45)	38(46.91)	28(50.91)
1 000 000 < X ≤ 2 000 000	26(41.27)	16(32.65)	13(16.05)	21(38.18)
2 000 000 < X ≤ 3 000 000	7(11.11)	9(18.37)	3(3.70)	0(0.00)
Above 3 000 000	6(9.52)	3(6.12)	4(4.94)	0(0.00)
Total	63(100.00)	49(100.00)	81(100.00)	55(100.00)

NB: Numbers in parenthesis are percentages.

The third group comprised of consumers who considered freshness as the most important quality attribute. It is the largest group that accounted for almost 33% of the sampled consumers. This group can be termed as 'fresh beef consumers'. About 42% of this group had family size of between 1 and 4 household members; and the group was dominated by self employed household heads (58%) with primary school education levels (Table 43). Their opinion on freshness was similar to that of the

second group which associated freshness with safety and non deterioration of meat. They were also unaware of post slaughtering handling practices of meat such as chilling it in cold rooms to prevent deterioration.

The fourth group comprised of beef consumers who were concerned with neither 'freshness' nor 'less fat content' of beef. It accounted for 22% of the sampled households. They were influenced by other factors especially the price of beef in making decision to buy beef. This group can be termed as 'price conscious beef consumers'. Members of this group were low income earning households with low frequency of beef consumption. Heads of households in this group were young and had small household sizes.

4.6 Willingness to Pay for Quality Beef

Table 44 shows the proportion of sampled consumers who were willing to pay for quality beef at different prices. At the price of 14 205 Tsh/kg, only 9.35% of the sampled household respondents bought and consumed quality beef (Table 44). Questions on higher bids of quality beef were set to determine WTP for the beef at higher price premiums. With an increase in price by a premium of 33% of the prevailing price, the proportion of respondents who were willing to pay for quality beef dropped to 5.75%, at 66% premium price only 5% of the sampled respondents were ready to pay for quality beef and at 100% price premium only 1.08% were willing to buy and consume quality beef (Table 44). The decline in the proportion of respondents who were willing to pay for quality beef explains why there is low consumption of quality beef among interviewed respondents. The price of quality

beef of 14 205 Tsh/kg was more than 3 times the price of conventional beef of 4 270 Tsh/kg (Table 23). The findings that consumers of quality beef decrease as the premium price increase support the findings by other studies such as that of Lin *et al.* (2006) in China; Carpio and Isingildina (2009) in South Carolina and Lee *et al.* (2011) in Korea.

Table 44: Distribution of respondents who are willing to pay at various price levels

Price level (Tsh/kg)	Respondents who indicated willingness to pay		
	% Increase	Frequency	Percentage
14 205	-	26	9.35
19 205	33	16	5.75
24 205	66	13	5.00
28 410	100	3	1.08

Apart from high price (expensiveness) of quality beef, sampled consumers stated other reasons behind low consumption of quality beef as indicated in Figure 13. Unfreshness and chemical composition attributes were found to be other major reasons scaring beef consumers from eating quality beef. About 51% of consumers rated unfreshness as a ‘strongly important’ and ‘important’ quality attribute’ scaring them from consuming quality beef. This is because most consumers had experienced deterioration of conventional beef which is normally sold warm in butchers whereby meat deterioration increases as time elapses. Loss of some natural flavours in meat which increases with an increase of time the meat stays in the shelves before being consumed after slaughtering and lack of information on chilling procedures of quality beef leads to low WTP for quality beef.

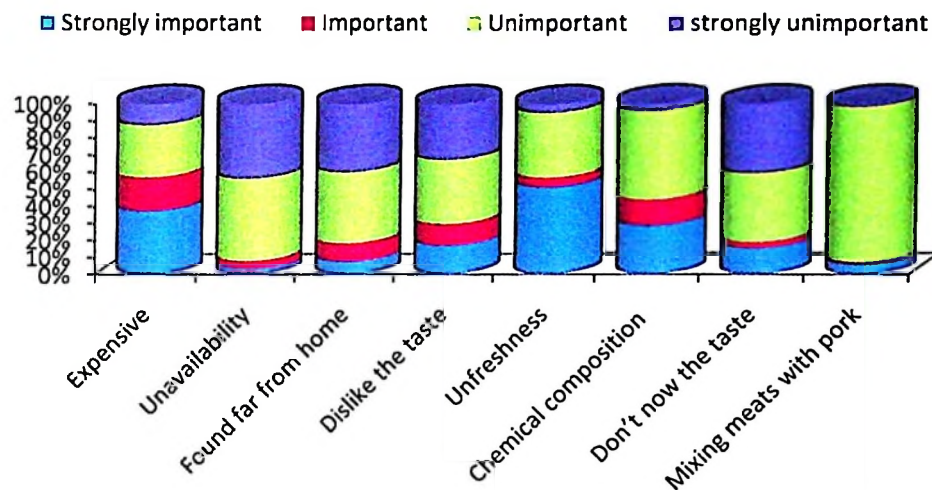


Figure 13: Reasons behind low consumption of quality beef

High cost attribute was rated as 'strongly important' by about 56% of the sampled household beef consumers. The high cost of quality beef reflects the fact that high price and low income were reasons limiting the consumption of quality beef. When asked as to whether they could consume quality beef if their income rose, or if the price for quality beef decreased, 43.86% reported that, they would consume quality beef if their income rose. This indicates that, with the expansion of middle income class in developing countries including Tanzania as projected by various authors (Delgado, 2003; Pica-Ciammara *et al.*, 2013; SAGCOT, 2013) is likely to lead to an increase of the consumption of quality beef. Other two major reasons restricting respondents from consuming quality beef (unfreshness and chemical composition) relates to lack of awareness among consumers regarding quality attributes found in quality beef. Awareness has been noted by various authors as a major influencing factor in making purchasing decisions (Khan, 2006; Bashir and Malik, 2009; Hassan *et al.*, 2010; Krystallis and Chrysochou, 2012).

Chemical composition was also rated high among respondents as the reason behind non consumption of quality beef (Figure 13). These people also were unaware that chilling preserves beef and increases its tenderness. If awareness on the benefits of chilling beef could be created, consumers who were skeptical to consume quality beef believing that the beef is preserved with chemicals could be potential consumers of quality beef. The finding on skepticism of consuming quality beef on the belief that the beef is preserved with chemicals is more or less similar to the findings of study by Alphonse and Alfenes (2012) who found that Tanzanian consumers are willing to pay for safety inspected and organically produced tomatoes. Inspection and organic produced tomatoes cater for safety attribute which consumers looked for, which is similar to skepticism of consuming quality beef, for consumers who harbours the sentiments that chemicals are used in preserving the beef.

Selling of different types of meat particularly pork in the same retailing outlet (supermarkets and modern butchers) was found to limit the consumption of quality beef by 7% of Muslims included in the sample households. Muslims were of the opinion that selling of different meat types including pork in the same retailing outlet (though in different containers) might make quality beef loses its halaal status if it comes in contact with pork, something which is unacceptable in Islam.

Table 45 displays summary statistics of variables used in WTP analytical model. The model for estimated parameters was able to describe 91% variation for factors influencing WTP for quality beef and was found to be significant with $X^2 = 46.91$ and desirable Fadden pseudo $R^2 = 0.2037$ (Table 45). Expenditure and sex

coefficients were significant within 95% confidence interval. From model coefficients, it was revealed that, females had a likelihood of 0.23 times higher for WTP for quality beef than was the case with males. This observation supports the finding by Nandonde *et al.* (2013_a) who found that, women had high probability of buying tender chilled beef than men in southern highlands of Tanzania.

Table 45: Estimates of factors influencing WTP for quality beef

Variable	Coefficient	Std error	Z	p> z	95% conf. interval	
					Lower	Upper
Sex	.2368458	.4190803	-0.57	0.572	-1.058228	.5845364
Age	.0062292	.0161115	0.39	0.699	-.0253487	.0378071
Family size	-.0976704	.095629	-1.02	0.307	-.2850999	.089759
Expenditure	1.05e-07	1.70e-08	6.18	0.000	7.15e-08	1.38e-07
Constant	-2.631568	1.156952	-2.27	0.023	-4.899153	-.3639838

Log likelihood, 91.679432, Prob > chi2 = 0.0000, LR chi2 (4) = 46.91, Pseudo R2 = 0.2037

Expenditure levels of households had a positive influence on WTP for quality beef (Table 45). This observation conforms to the Engel's model whereby increased expenditure levels relate to increased consumption of goods.

4.7 Consumption of Quality Beef away from Home

Consumption of beef away from home refers to consumption of cooked roasted, fried or barbecue beef in hotels, restaurants and in fast food business enterprises. Beef consumed away from home in different forms accounted for 15% of the total beef consumed in the study area. The rest (85%) was consumed by household consumers. This study looked at consumption of quality beef in tourist hotels.

4.7.1 Quality beef consumption pattern in tourist hotels

Table 46 shows different types of meat served in sampled tourist hotels. The table shows that beef was the most consumed meat in tourist hotels. All of the sampled tourist hotels admitted that they were involved in selling beef. High consumption of beef is not astonishing due to the fact that, cattle production accounts for 82% of livestock in the country (Covarrubias, *et al.*, 2012); and meat importation in niche market amounted to 326 827 tons and 35 000 cattle heads in 2010 (UNIDO, 2011). Income growth and expansion of middle class income earners in most of the developing countries including Tanzania as projected by Delgado (2003) might be another factor contributing to the consumption of quality beef in tourist hotels. On the other hand, mutton was the least consumed meat in tourist hotels (Table 46). Low consumption of mutton in tourist hotels might be due to inadequate information since most of the consumers' in tourist hotels were unfamiliar with the meat.

Table 46: Proportion (%) of sampled tourist hotels cooking and selling meats

Meat types	n	Frequency	% of tourist hotels
Beef	34	34	100.00
Goat meat	34	22	64.70
Mutton	34	19	55.90
Poultry meat	34	31	91.20
Pork	34	25	73.50

Because of fluctuation in quality beef consumption, monthly sales of beef reported by sampled hotels varied from 90 kg to 1 600 kg with an average monthly sale of 449.11kg (Table 47). Mean price of quality beef was 25 608 Tsh/kg in the study area. Big price range between minimum and maximum price of quality beef in tourist hotels can be associated with the fact that, tourist hotels sell locally produced quality beef and imported beef. Imported beef was more expensive than locally

produced beef because of freight costs and import charges which could be reflected in price of quality beef paid by final consumers in tourist hotels.

Table 47: Monthly beef consumption at tourist hotels and their respective prices

	n	Minimum	Maximum	Mean
Beef cuts (kg)	24	90	1 600	449.11
Price (Tsh/kg)	24	15 750	40 000	25 608.33

NB: Price of quality beef was estimated as at 2/3 of the whole meal served. The 1/3 caters for other food stuff served with beef.

The consumption of quality beef and its products in tourist hotels fluctuates within the year. Tourist hotel operators described the consumption pattern to be in three seasons: peak season, high season and low season. Peak season was said to start from December to February; high season was reported to occur from June to October and finally low season was said to occur from March to May. The reasons behind fluctuations were said to be festival periods and fluctuation in the number of tourists (Table 48). During peak season, there was high influx of tourists that lead to high consumption of quality beef. On the other hand, during festivals, consumption of food away from home by middle class rises; while tourists go back to their home countries.

Table 48: Reasons for fluctuation of sales of quality beef in tourist hotels

Reason for sales fluctuation	n	%Very Important	%Important	%Unimportant
Fluctuations of tourist arrivals	34	67.65	29.41	2.94
Presence of festival periods	34	35.29	55.88	8.82

Two major strategies were used by sampled tourist hotels to attract and maintain customers: good courtesy and advertisement. Table 49 shows that good courtesy was

the dominant strategy used by most hotels (52.9%) to attract customers. Domination of good courtesy reflects quality of services provided by hotels. Therefore, it is easy for customers to come back due to good courtesy he/she receives during the visit to a particular hotel.

Advertisement through mass media was used by 14.7% of the sampled tourist hotels to attract customers while 32.4% of the hotels combined good courtesy and advertisement (Table 49). Mass media used included news papers, radios and billboards. The finding on the use of advertisement by hotels to attract customers in the study area is similar to the findings reported by Bashir and Malik (2009) who revealed that advertisement had a positive influence on consumption of 'fast moving consuming goods' among Sargodha University students.

Table 49: Strategies used by tourist hotels to attract customers

	n	Frequency	% proportion
Advertisement	34	5	14.7
Good courtesy	34	18	52.9
Advertisement and good courtesy	34	11	32.4

4.7.2 Preference attributes considered by tourist hotels in buying quality beef

Apart from consumption pattern of quality beef in tourist hotels, hotel managers were asked on what they take into consideration when buying beef. All managers of the sampled tourist hotels reported to have considered quality and the price of beef in making decisions to purchase beef. Quality attributes considered by hotels when buying beef and beef products are presented in Table 50. Cleanliness and safety was reported by most (97%) of the sampled tourist hotels as a very important aspect considered when buying beef. This was followed by tenderness, good packaging in

polythene bags and leanness which were reported by 59%, 56% and 50% respectively of the sampled tourist hotels as factors taken into account when buying the beef. Thus these four major quality attributes need to be considered if someone wishes to venture in quality beef production and trading. The rating of quality attributes considered by tourist hotels when purchasing beef is summarized in Figure 14.

Table 50: Quality attributes considered by hotels in purchasing quality beef and beef products

Quality attribute	n	%Very Important	%Important	%Unimportant
Tenderness	34	58.82	32.35	8.82
Packing in polythene bags	34	55.88	32.35	11.76
Electric saw usage	34	61.76	26.47	11.76
Chilliness	34	38.24	47.06	14.71
Freshness	33	39.39	39.39	21.21
Frozen	12	0.00	66.67	33.33
Cleanliness	33	96.97	3.03	0.00
Safety	29	96.55	3.45	0.00
Leanness	28	50.00	50.00	0.00

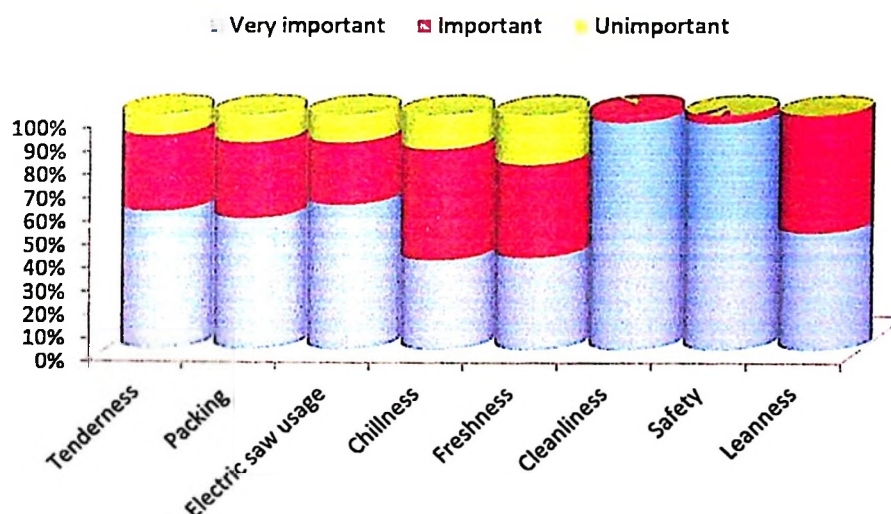


Figure 14: Quality attributes considered by tourist hotels when buying beef

When asked about their major customers, managers of the sampled tourist hotels indicated that their customers comprised of people of different categories including tourists, high and middle income Tanzanians, high ranking government officials, companies and institutions. Table 51 and Figure 15 show frequency of purchasing beef by different categories of customers. Most (82%) of the interviewed hotel managers reported that tourists often buy quality beef in their hotels.

Table 51: Distribution of tourist hotel customers by their frequency of buying quality beef

Customers	n	%Often buy	%Sometimes buy	%Rarely buy	%Never buy
Tourists	34	82.35	14.71	2.94	0.00
High income earners	34	52.94	41.18	2.94	2.94
Middle income earners	32	12.50	34.38	25.00	28.13
VIP (national leaders)	34	50.00	29.41	17.65	2.94
Companies and institutions	28	17.86	21.43	57.14	3.57

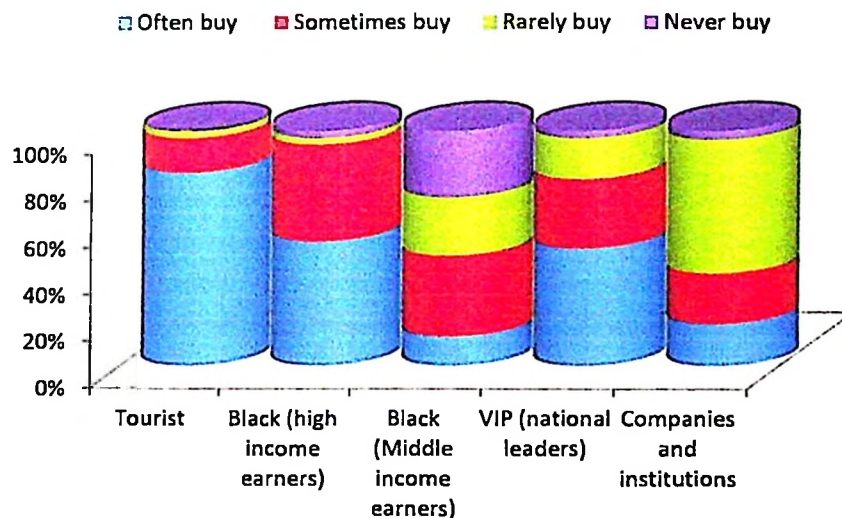


Figure 15: Frequency of buying quality beef among tourist hotels' customers

CHAPTER FIVE

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This study was done to examine efficiency along quality beef supply chain and consumption of quality beef in Tanzania in order to contribute to improvement of the meat industry in the country. Specifically, the study was done to: (i) analyze efficiency in production, processing and distribution of quality beef (ii) examine consumption pattern for quality beef, (iii) determine consumers' preferences of quality beef and (iv) examine willingness to pay for quality beef among beef consumers in the study area.

Efficiency along quality beef supply chain was examined using cost ratios from input orientation and returns per unit from output orientation at each node of the supply chain. A Linear Approximated Almost Ideal Demand System (LA/AIDS) model was employed to examine factors influencing quality beef consumption while principal component analysis and Wards method of hierarchical analysis were used to assess preferences of beef consumers in the study area. Finally, Willingness to Pay (WTP) for quality beef was examined using stated preference technique and analyzed with contingent valuation method. This chapter summarizes major findings of the study and presents conclusions and recommendation emanating from major findings of the study.

5.1 Summary and Conclusions

5.1.1 Efficiency of quality beef production, processing and distribution in the study area

Beef supply chain in the study area consists of two beef supply channels namely conventional and quality beef supply channels. Most of the beef passed through conventional beef supply channel and only a small proportion passed through quality beef supply channel. In quality beef supply channel, most of the beef was supplied to tourist hotels. Added cost/kg at processing node accounted for a larger proportion of added costs incurred in quality beef supply channel compared to added cost/kg at the production and retailing nodes. The major cost item at the processing node was electrical energy used in slaughtering of cattle and chilling of beef.

Overall costs of producing, processing and distributing quality beef in the study area were significantly higher than the costs of producing, processing and distributing conventional beef. High cost/kg incurred in producing, processing and distributing quality beef suggests that overall efficiency along quality beef supply channel is lower than the overall efficiency in conventional beef supply channel. Despite these high costs, returns per shilling invested at production and processing nodes were reasonably high although lower than in the conventional beef supply channel. However, the returns at retailing node in the quality beef supply channel were significantly higher than the returns at the retailing node in the conventional beef supply channel. This suggests that retailers of beef in the quality beef supply channel obtain significantly higher profit margins compared to their counterparts in the

conventional beef supply channel. Reduction of this profit margin would make quality beef cheaper and affordable to many consumers.

5.1.2 Consumption of quality beef in the study area

5.1.2.1 Quality beef consumption pattern

Beef was the major meat type consumed in the study area. However, most of the beef consumers consumed conventional beef. Annual per capita consumption of quality beef was found to be relatively high with lower budget share than annual per capita consumption of conventional beef but with high household expenditure budget share. Household size, sex, education level and occupation of heads of households were found to be major socio-economic factors that significantly influenced the consumption of quality beef.

With regard to pattern of beef consumption away from home, monthly consumption of quality beef in tourist hotels was found to vary widely by season with the highest consumption being in peak season from December to February due to high influx of tourists in the country.

5.1.2.2 Preferences for quality beef

‘Less fat content’ and ‘freshness’ attributes were found to be major drivers of household beef consumption since both attributes accounted for most of the variation on preferences in principal component analysis. However, household consumers in Dar es Salaam and Arusha had contrasting opinions as to the importance of freshness and less fat attributes. Dar es Salaam had a higher

proportion of consumers who considered both attributes to be important as opposed to the proportion of Arusha consumers who considered both attributes to be important. This suggests that some beef consumers in Arusha did not mind consuming beef with high fat content as well as beef which was not fresh, probably due to the cold weather condition. Preference of 'Less fat content' by some consumers of quality beef could be associated with health consciousness among household consumers and probably their past experience with the rift valley fever incidence in the late 2000s in urban areas where information on the effect of the disease was disseminated widely than in rural areas. 'The freshness' attribute could be associated with selling of unchilled conventional beef that is likely to deteriorate as time elapses due to bacterial infection. Deterioration of beef which is not chilled is likely to be faster in Dar es Salaam with warm weather condition than in Arusha with cold weather condition.

Regarding the consumption of quality beef away from home in tourist hotels, quality and price were major considerations in making decisions to purchase beef. Cleanliness and safety followed by tenderness were most important quality attributes considered when purchasing beef. This suggests that customers of tourist hotels prefer the consumption of hygienically prepared tender beef.

5.1.2.3 Willingness to Pay for quality beef

Very few consumers indicated willingness to pay for quality beef at prevailing market prices. Willingness to pay was found to decrease with an increase in price premiums. The decline in the proportion of respondents who were willing to pay for quality beef explains why there is low consumption of quality beef among the

respondents. During the study period, the prevailing price of quality beef was significantly higher than the price of conventional beef. Other major factors limiting quality beef consumption include lack of freshness and the notion that chemicals are used to preserve quality beef to increase its shelf life. Moreover, WTP for quality beef was significantly influenced by expenditure levels and sex of household heads.

5.2 Recommendations

5.2.1 Investment in cheap energy sources

The cost of electricity had a significant effect on the costs associated with quality beef processing and distribution, implying that efforts to reduce electrical energy cost would lead to the reduction of overall cost associated with quality beef supply. Although there are prospects of generating cheap electricity from natural gas and coal in the near future, quality beef production, processing and distribution firms need to invest in low cost alternative energy sources such as biogas and solar power. Biogas plants for generating electricity can use animal waste from cattle fattening sheds and slaughtered animals at beef slaughtering and processing plants.

5.2.2 Promoting consumption of quality beef

The Tanzania Dairy Board of milk has promotion week every year to increase the consumption of milk in the country. Similar exercise could be done by the Tanzania Meat Board to promote the consumption of quality beef. Important issues to consider in the promotion should include creation of awareness with the aim of doing away with the misconception among consumers that quality beef is not fresh because of the process of chilling/aging. The promotion week should be

complemented with advertisements in mass media, provision of training in schools as part of curriculum and participation in trade fairs.

5.2.3 Promoting local production and processing of quality beef

The production and processing of quality beef were found to be profitable. However, very few firms were engaged in quality beef production and processing. Most of quality beef consumed in the country was imported. Efforts should be made to promote local production and processing of quality beef. This could be achieved through reduction of electrical energy charges that make investment in quality beef processing prohibitive. This should go together with proper taxation of imported beef to make locally produced quality beef more competitive in the market.

5.2.4 Linking quality beef producers to buyers

Most of quality beef in the study area was traded through niche markets such as tourist hotels and supermarkets which are currently importing quality beef. Efforts should be made to link these niche markets with local producers of quality beef through facilitating establishment of contractual arrangements between the two parties. Terms of agreement between the two parties should include quantities to be supplied, price and frequency of supply.

5. 2. 5 Areas of further research

This study found that most of the beef consumed in the country's niche markets was sourced from conventional beef supply channel and there were more than ten types of beef cuts consumed in niche markets. Thus further study needs to be done in this area to understand which type of cuts are most preferred by consumers in niche markets and different means of tenderising beef.

Furthermore, research needs to be done on the cost efficiency in processing and retailing quality beef using alternative sources of energy.

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APPENDICES

Appendix 1: Household Food Expenditure Questionnaire

Dear respondent, I am requesting you to respond to the questions below. The information you give is very useful for me to accomplish my study. The study report is an important tool for policy makers, NGOs, government institutions and international institutions for interventions in the development issues. I assure you that the information you give will be used for analyses purposes of the study and will be kept confidential

PART I: BACKGROUND INFORMATIONS

1. Date of interview _____ Name of enumerator _____
2. Name of respondent (Household head) _____ Village/street _____
 Ward _____ Division _____ District _____
 Region _____ mob. Phone _____
 post address _____ email _____ Fax _____
3. Distance of respondent's home from shopping centre 1: 0 - 0.5 km, 2: – 0.5 – 5 km, 3: over 5 km, 4:- Others (specify)
4. Sex of respondent: 1 – Male 2 – Female
5. Role in the household: 1 – Head of household 2 – Spouse 3 – son/daughter of the household 4 – Relative of the household 5 – others (specify)
6. Tribe _____ Nationality _____
7. Religion of the respondent : 1- Christian, 2 – Muslim, 3 – Hindu, 4 – Others (specify)
8. Highest level of education attained by respondent: 1 Primary school 2 – Secondary school 3 – tertiary education 4 – no formal education, 5 - Others (specify)
9. Age of respondent _____ (years)
10. Marital status: 1 – Married, 2 – Single, 3 – Widow, 4 – Separated, 5 – Others (specify)
11. Primary occupation: _____ 1 – Civil servant, 2 – Business person, 3 – Retired officer, 4 – Self employed, 5 – Salaried employment, 6 – Farming, 7- Others (specify)
12. Secondary occupation: _____ 1 – Civil servant, 2 – Business person, 3 – Retired officer, 4 – Self employed, 5 – Salaried employment, 6 – Farming, 7- Others (specify)

13. Indicate nature of your job please: 1 – Full time employed, 2 – Part time employed, 3 – Others (specify)

14. How many family members reside in your household?

15. Please indicate the age and sex of birth for your household members

Years										
Females										
Males										

16. What is the highest education level attained by the spouse in the household.
1- Primary school, 2 – Secondary school, 3 – tertiary education, 4 – no formal education, 5 - Others (specify)

PART II: HOUSEHOLD EXPENDITURES ON MEAT AND MEAT PRODUCTS

17. Indicate sources of the following types of meat you buy

Type of meat	Sources	Distance to the market (km)	Means of transport	Price per unit (Tsh) (specify)	Transport costs (Tsh)
Beef					
Shoats					
Chicken					
Pork					
Legumes					
Fish					
Other (specify)					

Means of transport: 1- Dala dala, 2 – Bicycle, 3 – taxi, 4 – Own vehicle, 5 – on foot, 6 – others (specify)

Sources of meat: 1 – supermarket, 2 – butchery, 3 – open market, 4 – Others (specify)

18. If you buy beef, what parts of beef do you buy?

Parts/types of beef bought	Frequency of purchase			
	Often buy	Sometimes buy	Rare buy	Never buy
Rumen contents				
Mixture				
Fillet/ steak				
Heads				
Legs				
Others (Specify)				

19. Do you buy meat from the same source? 1 – Yes, 2 – No

20. If you buy beef from the same source rank the importance of purchasing criterion from a certain source

Beef sourcing criterion	Very important	Important	unimportant
Reliability			
Cleanliness			
Proximity to homestead			
Tenderness			
Packaging			
Rapport relations with dealers			
Others (specify)			

21. Please state the frequency of purchasing meat for your households

	Frequency of consumption	Preferred nutritional quality attributes	Quantity consumed (Kg)/month	Price (Tsh/kg)
Beef				
Pork				
Chicken				
Shoats				
Legumes				
Fish				
Others (specify)				

Frequency of consumption: 1. - once/week; 2. - twice a week; 3. - Twice/ month, 4. - others (specify)

Preference attributes: 1. - Level of fat content; 2. - Tenderness attribute, 3. - Colors of meat; 4. - freshness of meat, 5. - others (specify)

22. Please indicate the frequency of purchasing different beef and beef products by filling the table below

Beef product	Often buy	Sometimes buy	Rare buy	Never buy
Fresh				
Chilled				
Frozen				
Bacon				
Sausage				
Others (specify)				

23. Please tick on the frequency of beef purchase from different market outlets

Market outlet	Frequency of purchase			
	Often buy	Sometimes buy	Rarely buy	Never buy
Conventional Butcher				
Special butcher				
Supermarket				
Open market				
Others (specify)				

24. What is the purchasing criterion of beef and beef products? 1 – price; 2 quality; 3 – others (specify)

25. If quality, tick the quality attributes required to purchase beef

Beef quality attribute	Very important	Important	unimportant
Safety			
Freshness			
Aroma			
Taste			
Tenderness			
Marbling			
Other (specify)			

26. Do you buy quality beef? 1 – Yes, 2 – no

27. If, you buy quality beef what is the price for quality beef? _____
Tsh/kg

28. What was the price of quality beef March last year? _____ Tsh/kg

29. If yes in question 26, state the frequency of buying conventional and quality beef

	Often buy	Sometimes buy	rare buy	Never buy
Quality beef				
Conventional beef				

30. If no, in question 26, rank the reasons restricting you from buying quality beef by ticking the proper answer in the table below

Reasons for not buying quality beef	Very important	Important	Unimportant	Very unimportant
It is expensive				
It is not available				
My income is small				
Its source is far from home				
Don't like the taste				
Difficult to cook				
Others (specify)				

31. If income is small for you to buy quality beef, what if income rise would you buy quality beef? 1 – yes, 2 – no

32. If it is expensive, what if the price of quality beef decrease, would you buy it? 1 – Yes, 2 – no

33. Would you buy quality beef if its price increase by 10,000/= a kilo? 1 – Yes; 2 – No.

34. If yes to question 33, would you still buy quality beef, if its price increase by 15,000/= per kilo?
35. If no to question 33; would do you buy quality beef, if its price increase by 5,000/= per kilo? 1 – Yes, 2 – no.
36. What is the highest price would you pay for a quality beef? _____ Tsh/kg.
37. What would you do if the price was too high? 1 – switch to quality beef substitutes; 2 – stop consumption of quality beef; 3 – others (specify)

PART III: INCOME AND GENERAL EXPENDITURE

38. Where is your income fall in the following ranges? 1 – less than 500 000/= 2 – greater than 500 000 but less than 1 000 000/=, 3 – more than 1 000 000/=.
- Per month

39. Please indicate your weekly expenditure on the following food categories (Tsh)

	Household consumption	Donated to friends & relatives
Flours: sembe, millet, sorghum, lishe, wheat		
Rice: rice		
Grains: maize, wheat,		
Roots and tubers: cassava, potatoes, yams,		
Pulses and nuts: beans, peas, groundnuts, coconut		
Fish: dried, fresh, sardines		
Dairy: milk, yoghurt, eggs		
Meat: shoats, pork, poultry, wild		
Beef: chilled, fresh, frozen, canned		
Vegetables: onions, tomatoes, green vegetable, carrots		
Fruits: banana, oranges, mangoes, apples, pineapples		
Others: cooking oil, kerosene, bread, biscuits, cakes, jams, jellies, honey, beer, soda, water,		
Others (specify)		

40. Please fill in the table below regarding the expense your household incurs per month (Tsh).

Item	Household expenditure (Tsh)	Given as gift, loan (Tsh)
Telephone bills and voucher charges		
Utilities: electricity, water charges,		
Fuel wood, charcoal, gas		
Personal care: perfume, soaps, lotion, hair cuts, hair dressing		
Food and beverages consumed outside home		
Transportation		
Newspapers and/or magazines, cigarette		
Motor vehicle oil/petrol		
Entertainments		

41. Please indicate your annual household expenditures on the following items:

Item	Household expenditure (Tsh)	Given as gift, loan (Tsh)
Repairs: machine and appliances, houses, vehicles		
Purchase: Watches, jewels, toys & games, mobile phones		
Purchase: Bicycles, motor cycles, radio, refrigerators, vehicles, houses, Solar power equipments,		
Insurances: vehicles, houses, health,		
Donation: relatives and friends, churches, mosques, ceremonies, clubs, organizations		
Medics: hospital services,		
Clothing: shoes, dresses, curtains, carpets		
Family equipments: pots, dishes, glasses, kitchen (charcoal, gas, electrical)		
Fees: School fees, transport fees		
Home services: cooking & cleaning, insecticides		
Taxes: Government taxes/licenses		
Purchase of furniture: tables, chairs, beds,		

Thanks for your cooperation

Appendix 2: Questionnaire for Hotels

Dear respondent, I am requesting you to respond to the questions below. The information you give is very useful for me to accomplish my study. The study report is an important tool for policy makers, NGOs, government institutions and international institutions for interventions in the livestock sector development issues. I assure you that the information you give will be used for analyses purposes of the study and will be kept confidential.

Date of interview _____ Name of enumerator _____
 Name of the hotel _____ Village/street _____
 Ward _____ Division _____ District _____ Region _____
 Email address _____ Postal address _____ Phone: _____
 Mobile _____ Land line: _____

PART I: SUPPLY ISSUES

1. Circle the type of meat sold in your hotel. 1 – beef, 2 – goat meat, 3 – mutton, 4 – poultry meat, 5 – pork, 6 – all of the above, 7 –others

2. What is the source of beef and beef products sold?

Source of beef	Very important	Important	Unimportant
Local quality beef producers (specify)			
Importers (specify)			
Sellers of conventional beef (specify)			
Others (specify)			

3. If you sell the locally produced beef, do you face any problem regarding supply?
 1 – yes, 2 – no

4. If yes in question 3, rank the problem you face.

Problems with local beef suppliers	Often occur	Sometimes occur	Rarely occurred	Never occur
Inconsistence supply				
No quality beef locally produced				
Inadequate supply of quality beef				
Others (Specify)				

5. If the source of beef sold is not local, what is the country of origin for the imported beef?

Country of origin	Strongly important	Important	Unimportant	Strongly unimportant
Kenya				
South Africa				
Brazil				
Denmark				
Others (specify)				

6. If you sell imported beef, why?

Reasons for selling imported beef	Very important	Important	unimportant
Customers' prefer imported beef			
Lack of traceability in the country			
Lack of quality meat			
Inconsistent in beef quality supplied			
Others (Specify)			

7. What is the nature of relationship between you and your supplier? 1 – formal business relations, 2 – informal business relations, 3 – friends, 4 – relatives, 5 neighbors, 6 – others (specify)
8. For how long have you established the marketing relationship with your customers? _____ years
9. Do you have any agreement with your suppliers? 1 – yes, 2 – no
10. If yes in question 7 above, what are the major terms and conditions of your agreement

Terms and conditions	Very important	Important	Unimportant
Specific time intervals to supply a specific orders			
Quantity supplied			
Quality attributes specified			
Specified price of products			
Others (specify)			

11. Please, describe the mode of delivery for your beef and beef products. 1- The hotel collect beef from suppliers, 2 – the supplier deliver beef and beef products to the hotels 3 – others (specify).
12. Do you buy beef from the same supplier? 1 – yes, 2 – No

13. How do you find the trend of prices for beef and beef products? 1 – increasing, 2 – decreasing, 3 – constant, 4 – others (specify)

PART II: CUSTOMER RELATED ISSUES

14. What beef products do you sell? 1 – beef cuts, 2 - sausages, 3 – stew of mixed beef, , 5 - others (specify)

15. What purchasing criteria overrides the other “quality vs. price” _____

16. If quality, what attributes do you consider to regard beef as of good quality

Quality attribute	Very important	Important	Un important
Tenderness			
Packed in polythene bags			
Cut by electrical saw			
Chillness			
Others (Others)			

17. Please indicate the characteristics of customers buying quality beef in your hotel

Individual characteristics	Frequency of purchasing beef and beef products			
	Often buy	Sometimes buy	Rare buy	Never buy
Tourists (whites)				
Black (high income earners)				
VIPs (top national leaders)				
Others (specify)				

18. What are the peak and low seasons of quality beef sales? _____

19. What are reasons behind the sales fluctuations

Reasons for sales fluctuations	Very important	Important	Unimportant
Fluctuations of tourist arrivals			
Rise of sales during festivals			
Others (Specify)			

20. Do you have any problem with a market, for the quality beef products?

1 – yes, 2 – no.

21. In average, how much beef and beef products do you sell a month?

Product sold	Quantity (specify units)	Price per unit (Tsh)

22. What mechanism do you use to attract customers? 1 – advertisement in public and private media, 2 – good courtesy when customer visit, 3 – others (specify)

Thanks for Your Cooperation

Appendix 3: Questionnaire for Supermarkets

Dear respondent, I am requesting you to respond to the questions below. The information you give is very useful for me to accomplish my study. The study report is an important tool for policy makers, NGOs, government institutions and international institutions for interventions in the livestock sector development issues. I assure you that the information you give will be used for analyses purposes of the study and will be kept confidential.

Date of interview _____ Name of enumerator _____
 Name of the supermarket _____ Street _____
 Division _____ District _____ Region _____
 Email address _____ Postal address _____ Phone: _____

23. Circle the types of meat sold in your supermarket? 1 – beef, 2 – goat meat, 3 – mutton, 4 – poultry meat, 5 – pork, 6 – all of the above, 7 – others (specify)
24. If beef is sold, tick the types of beef sold? 1 – fresh/warm, 2 – chilled, 3 – frozen, 4 – bacon, 5 – all of the above, 6 – others (specify)
25. What beef products do you sell? 1 – beef cuts, 2 - sausages, 3 - mixed, 4 - rumen contents, 5 - others (specify)
26. What is the source of your beef and beef product? 1 – local quality beef producers, 2 – importers, 3 – both, 4 – others (specify)

27. On average; what was the quantity supplied from each source per month in 2011

Source/supplier of beef and beef products	Types of products	Quantity supplied/ month	Price/unit in 2011

Types of beef & beef products: 1 – fresh, 2 – chilled, 3 – frozen, 4 – bacon, 5 – beef cuts, 6 – sausages, 7 – canned beef, 8 – others (specify)

28. If you sell locally produced beef, do you face any problem with supply? 1 – yes, 2 – no

29. If yes in question 4 above, rank the problems you face

Problems with local beef supply	Often occur	Sometimes occur	Rarely occurred	Never occur
Inconsistence in supply				
No quality beef locally produced				
Inadequate supply of quality beef				
Inconsistence in quality				
Others (specify)				

30. If you sell imported beef, why?

Reasons for selling imported beef	Very important	Important	unimportant
Customers prefer imported beef			
Lack of traceability in the country			
Inadequate supply of quality beef			
Inconsistence in supply locally			
Inconsistence in quality			
Price of locally produced quality beef is high			
Others (Specify)			

31. Please, describe the mode of delivery for your beef and beef products. 1- The supplier deliver beef to the supermarket, 1 – the supermarket collect beef from suppliers' premises, 3 – others (specify).

32. Do you buy beef from the same supplier? 1 – yes, 2 – No

33. If yes in question 9, what is the nature of relationship with the supplier? 1 – formal business relationship, 2 – informal business relationship, 3 – friendship, 4 – relative, 5 – others (specify)

34. If you have formal business relations, what are the major terms and conditions of your agreement

Terms and conditions	Very important	Important	Unimportant	Very unimportant
Specify time intervals to supply specific orders				
Quality attributes specified				
Specify quantity to be supplied				
Specify price of products				
Others (specify)				

35. How do you find the trend of prices for beef and beef products? 1 – increasing, 2 – decreasing, 3 – constant, 4 – others (specify)

PART II: CUSTOMER RELATED ISSUES

36. What are prices of beef and products sold in your supermarket?

Beef product/type	Quantity sold/week (kg)	Selling price (Tsh/kg)
Fresh/		
Chilled		
Frozen		
Bacon		
Beef cuts		
Sausages		
Canned beef		
Others (specify)		

37. What purchasing criteria overrides the other “quality vs. price” _____

38. If quality, what attributes do you consider to regard beef as of good quality

Quality attribute	Very important	Important	Unimportant
Tenderness			
Packed in polythene bags			
Cut by electrical saw			
Chillness			
Others (specify)			

39. Who are your major customers of beef and beef products? 1- Households, 2 – institutions, 3 – others (specify)

40. Please identify the characteristics of households buying the quality beef products

Household characteristics	Frequency of purchasing beef and beef products			
	Often buy	Sometimes buy	Rarely buy	Never buy
High income households				
Middle income households				
Low income households				
Others (specify)				

41. Please indicate the type of beef and beef products bought by households of different household categories

Household characteristics	High income	Middle income	Low income
Types of beef sold			

Type of beef sold: 1 – conventional beef, 2 – locally produced quality beef, 3 – imported beef, 4 – others (specify)

42. Do you face any problem with a market for the quality beef? 1 – Yes, 2 – no.

43. If yes in question 19, what are the major problems?

Marketing problem	Very important	Important	Unimportant
Products' price fluctuations			
Some products remain unsold			
Hesitation of customers to pay premium for quality beef			
Unclear differences of conventional and quality beef among customers			
Others (Specify)			

44. What mechanism do you use to attract customers? 1 – advertisement in public and private media, 2 – good courtesy when customer visit, 3 – others (specify)

Thanks for Your Cooperation

Appendix 4: Questionnaire for Fatteners

Dear respondent, I am requesting you to respond to the questions below. The information you give is very useful for me to accomplish my study. The study report is important tool to policy makers, NGOs, government institutions and international institutions for interventions in the livestock sector development issues. I assure you that the information you give will be used for analyses purposes of the study and will be kept confidential.

Date of interview _____ Name of enumerator _____
 Name of the fatteners _____ Street _____
 Division _____ District _____ Region _____
 Email address _____ Postal address _____ Phone: _____

1. What are the average fattening period cattle stays in your feedlot? _____ days
2. What is the average fattening herd size? _____ heads of cattle
3. Please, indicate the herd size in 2009 _____ 2010 _____; 2011 _____
4. Please indicate the mode of acquiring cattle for fattening; 1 – buy mature cattle and fatten for some time, 2 – buy calves/young animals for fattening, 3 - produce cattle from own farm for fattening, 4 – others (specify)

5. Please fill the following table

	Quantity (heads)	Purchase price/ head (Tsh)	Sources of cattle supply	Average period stayed in feedlot (days)
Bulls				
Cows				
Steers				
Heifers				
Others				

Source of cattle: 1 – livestock keepers, 2 – ranches, 3 – cattle traders, 4 – own farm, 5 imports, 6 – others (specify)

6. What are the costs of producing tender beef per batch?

Id	Cost item	Quantity	Unit price	Total cost
1	Collection and transport costs /head			
2	Feeds costs			
3	Labour costs/month			
4	Concentrates			
5	Veterinary			
6	Utilities			
7	Renting			
8	Stationary			
9	Fees and taxes			
10	Others (specify)			

7. What is the average daily gain (g)? _____ g
8. Do you sell live animals or carcass? 1 – live animal; 2 – carcass; 3 – others (specify)
9. If you sell animal, what is the average selling price per head of cattle? _____ (Tsh)
10. If you sell live animals, are you able to sell all fattened cattle that have reached the selling age? 1 – yes, 2 – no
11. If you sell beef, what is the average price per kg? _____ (Tsh/kg)
12. If you sell beef, are able to sell all of the carcass, without problem? 1 – yes, 2 – no
13. Who are your customers?

Customers	Local traders	Ranch	Exporters	Processors/slaughter house	House holds	Butcher shops
Frequency of buy/month						
Quantity bought						

Frequency of buy: 1 – once/month, 2 – twice/per month; 3 – thrice/month; 4 – others (specify)

14. What is the mode of delivery? 1 – deliver cattle to customers, 2 – customers collect cattle from farm, 3 – others (specify)
15. If you send cattle to the customers, how do you know that customers need cattle and/or beef products?

Means of knowing customer requirements	Strongly important	Important	Unimportant	Strongly unimportant
Customer orders				
Asking the customers				
By listening the news				
Others				

16. If customers come to collect cattle from your farm, how do you attract customers? 1 – advertising, 2 – politeness of workers towards customers, 3 – others (specify)
17. What is the nature of affiliation with your customers? 1 – Permanent, 2 – spot market, 3 – others (specify)
18. What is the nature of relationship between you and your customer? 1 – formal business relations, 2 – informal business relations, 3 – friends, 4 – relatives, 5 – others

19. For how long have you established the marketing relationship with your customers? _____ years
20. Do you have any agreement with your customers? 1 – yes, 2 – no
21. If yes in question 20, what is the nature of agreement? 1 – informal agreement based on trust, 2 – formal written agreement, 3 – Others (specify)
22. What are major terms of agreement?

Terms and conditions	Very important	Important	Unimportant	Very unimportant
Specific time intervals to supply a specific orders				
Quality attributes specified				
Determined price of products				
Others				

23. Do you have any marketing problem? 1 - yes, 2 – no
24. If yes in question 23, what are the marketing problems?

Marketing problem	Very important	Important	Unimportant	Very unimportant
Products price fluctuations				
Some products remain unsold				
Hesitation of customers to pay premium for tender beef				
Unclear differences of conventional and tender beef among customers				
Others				

25. If yes in question 23, how much of your supply is unsold in the market?
_____ cattle per month

Thanks for your cooperation

Appendix 5: Butchers' Questionnaire

Name of the butcher _____ Region _____
 District _____ Contacts: Email address _____
 Post address _____ Phone: Mobile _____
 Land line: _____ Fax _____

PART I: BACKGROUND INFORMATION

- 1 What is the nature of ownership of your business? 1 - sole proprietorship, 2 – partnership, 3 - private corporation, 4 – parastatal, 5 - others (specify)
- 2 Rank of the interviewee in the business entity. 1 – Owner, 2 - Spouse, 3 – manager, 4 – employee, 5 - others (specify)
- 3 What is the age of respondent? _____ years
- 4 Marital status: 1 – married, 2 – single, 3 – widowed, 4 – separated, 5 – others
- 5 Education level of respondent 1 – informal education, 2 – primary education, 3 – secondary information, 4 – tertiary education, 5 – others (specify)
- 6 Sex of respondent: 1 – Male 2 – Female
- 7 Nationality _____
- 8 Religion of the household head: 1- Christian, 2 – Muslim, 3 – Hindu, 4 – Others (specify)
- 9 Other income generating activities. 1 – farming, 2 – salaried employee, 3 – other business enterprises, 4 - others (specify)
- 10 What is the main income generating activity among the above stated activities?

PART II: THE BUTCHERING TRADE

- 11 .How long have you been in the butchering business?

- 12 Do you slaughter cattle yourself and supply it to your own butchers or you buy beef at wholesale price and resale it in your butcher? 1 – I

slaughter cattle and distribute beef in my own butchers; 2 – I buy beef at wholesale price and resale it in my butchers; 3 – I sometimes slaughter cattle and distribute beef into my butchers and buy beef for resale in my butchers

13 Who supply the beef in your butcher? (Please specify names and origin of your suppliers) 1 – Cattle slaughterers, 2 - Beef traders 3 – Others (specify)

14 If you slaughter cattle, what is the purchase cost of cattle? _____

15 What is the average live weight of cattle purchased for slaughtering? _____ Kg.

16 Please state the associated costs involved until you get the beef at butcher.

Cost item	Quantity	Unit cost	Total cost
Slaughter costs			
Transportation of cattle			
Labour			
Beef transports			
Others (specify)			

17 What is the dressing percentage of cattle? _____

18 What are other costs you incur in doing the butcher business?

Cost items	Quantity	Unit costs	Total cost
Transport			
License			
Labor			
Packaging materials			
Cleanliness			
Butcher renting			
Taxes and fees			
Others (specify)			

19 Please state the selling prices of other products made during the cause of slaughtering

Product item	Quantity (kg)	Unit selling price (Tsh)	Total revenue (Tsh)
Carcass			
Non carcass component			
Head			
Skins			

Rumen contents			
Tails			
Subcutaneous fat			
Others			

20 In average what is the quantity of beef sold per month in 2011?

	Quantity (kg)	Purchase price (Tsh/kg)	Selling price (Tsh/kg)
Beef carcass			

21 Who are your major customers? 1 – households, 2 – hotels, 3 – nyamachoma operators, 4 – others (specify)

22 Please rank your customers and their respective % composition in the market share

Customers	Volume traded (tones/month)	Proportional composition (%)
Households		
Hotels and restaurants		
Nyama choma kiosks		
Institutions		
Supermarkets		

23 What is the nature of relationship between you and your supplier? 1) formal contract, 2 – informal contract.

24 What are basic terms and conditions of your contract between you and your supplier?

25 Have you ever been in non compliance of terms agreed with your supplier? 1 – Yes, 2 – No.

26 If yes in question 25, how did you resolve such problem?

27 If No in question 25, what strategies do you use so that you don't encounter problems of non compliance to terms and conditions of the contract?

28 What attributes do you consider to categorize beef as of good quality?

29 What are ranges of selling price of kilogram of quality beef? ____Tsh/kg

30 Is there any variation in beef trading? 1- Yes, 2 – no.

31 If yes, state the peak and low seasons of the beef availability and the reasons behind these variations

32 What are rules and regulations required to fulfill for a butcher business?

33 What challenges do you face in doing your businesses?

34 What should be done for better beef trading environment?

Appendix 6: Nyamachoma Business Questionnaire

Name of the hotel/ nyama choma center _____
 Name of enumerator _____ Date of interview _____
 Street _____ Ward _____
 District _____ Region _____
 Contacts: Email address _____ Post address _____
 Phone: Mobile _____ Land line: _____ Fax _____

PART I: BACKGROUND INFORMATION

45. Name of respondent _____
46. What is the nature of ownership of your business? 1 - sole proprietorship, 2 – partnership, 3 - private corporation, 4 – parastatal, 5 - others (specify)
47. Rank of the interviewee in the business entity. 1 – Owner, 2 - Spouse, 3 – manager, 4 – employee, 5 - others (specify)
48. What is the age of respondent? _____ years
49. Marital status: 1 – married, 2 – single, 3 – widowed, 4 – separated, 5 – others
50. Education level of respondent 1 – informal education, 2 – primary education, 3 – secondary information, 4 – tertiary education, 5 – others (specify)
51. Sex of respondent: 1 – Male 2 – Female
52. Nationality _____
53. Religion of the household head: 1- Christian, 2 – Muslim, 3 – Hindu, 4 – Others (specify)
54. Other income generating activities. 1 – farming, 2 – salaried employee, 3 – other business engagements, 4 - others (specify)
55. What is the major income generating activity among the above stated activities

PART II: THE BUTCHERING TRADE

56. How long have you been in the nyamachoma business?
- _____
- _____

57. Where do you source beef for your business? (State supplier and location)
- _____
- _____
- _____

58. What means of transport do you use to bring beef at your working place?

59. What is the storage facilities do you use; if at all your product has remained to ensure the safety of beef?

60. What other costs do you incur in preparation of beef ready for customer consumption?

Cost item	Amount (Tsh/month)
Renting	
Labour	
spices : tomato, Gallic, salt,	
Cooking oil	
Transport	
Charcoal	
Packaging material s	
Utilities	
Security guards	
Others (specify)	

61. What other products you prepare in line with the nyama choma business?

62. Please cluster your customers percentage proportionate in terms of age, sex, income and occupational status

Customer category	Age	Sex

Age: 1 – youth, 2 – adults, 3 – elders, 4 – others (specify)

Sex: 1 – gents, 2 – ladies

63. In average how kg of beef did you trade per day as barbeque in 2011?

	Quantities sold/day (kg)	Selling price (Tsh/barbeque)
Barbeque		

64. In average, how many barbeques can you have in a kilo of beef?

65. Is there any variability of availability for 'nyamachoma' trade? 1- Yes, 2 – no.

66. If yes, state the peak and low seasons of the beef availability and the reasons behind these variations

PART III: NATURE OF RELATION AMONG TRADING PARTINERS

67. What is the nature of relationship between you and your supplier? 1) formal contract, 2 – informal contract.

68. What are basic terms and conditions of your contract between you and your supplier?

69. Have you ever been in non compliance of terms agreed with your supplier? 1 – Yes, 2 – No.

70. If yes in question 25, how did you resolve such problem?

71. If No in question 27, what strategies do you use so that you don't encounter problems of non compliance to terms and conditions of the contract?

72. What attributes do you consider to categorize beef as of good quality?

73. How do you find the consistency and reliability of your supplier in providing the service?

74. Mention and quantify fees and taxes you pay to operate your business.

75. What are rules and regulations required to fulfill for a 'nyamachoma' business?

76. What challenges do you face in doing your businesses?

77. What should be done for better beef trading environment?

Thank you for your cooperation

Appendix 7: Checklist for Various Beef Stakeholders

1. Cattle keepers

- Profile of producers - size of cattle herds (small /medium/ large scale), beef production/cattle keeping systems
- Beef cattle breeds
- How availability and cost of these inputs has changed (increased, decreased or remained the same) during the last five years
- Sales of animals and how they have changed during the last five years
- Categories of animals normally sold (Age and sex)
- Prices of animals of different categories (heifers, steers, bulls, mature cows) and how they have changed during the last five years
- Producers groups – the extent, to which they exist, the roles they play and their perspectives on current and future marketing of cattle.
- Cattle markets and means of transporting animals to markets
- Access to markets for cattle and how access has changed during the last five years
- Constraints/bottlenecks and challenges

2. Cattle traders

- Profile of traders (wholesalers & retail traders)
- Buyers of cattle and their quality requirements
- Traders associations/organization- the extent to which they exist and the roles they play
- Contractual agreements (formal and/or informal) with suppliers/buyers
- Fees and other charges by central and local government
- Constraints/bottleneck/challenges

3. Cattle fatteners

- Average fattening period
- Size of herd per batch
- Sources of cattle
- Mode of delivery to the fattening premises
- Availability of cattle for fattening
- Costs involved in cattle fattening: feeds, labour, concentrates, veterinary, utilities, rent, fees and taxes etc
- Form of cattle and cattle products sold
- Nature and types of customers for cattle and cattle products
- Relationship between fatteners, suppliers and customers
- Means of customer attractions
- Problems faced in the course of marketing cattle and cattle products

3. Processors (processing plants and abattoirs)

- Profile of processors-scale of processing units (small, medium, large)
- Ownership of processing units (Sole, partnership)
- Products being processed

- Prices of processed products and their trends in the past five years
- Processors groups/associations- the extent to which they exist and the roles they play
- Fees and other charges by central and local government
- Constraining factors and how they might be addressed through investment and/or regulation.

4. Meat Board, LGAs, TBS and TFDA

- List of livestock groups and associations of cattle chain actors
- List of processors, fatteners, traders etc
- Meat and meat product distributors
- Regulations of operations to the chain actors
- Meat shows in Tanzania if any
- Rules and conducts governing the chain
- Rights and responsibilities of members of stakeholders' associations

Appendix 8: Sampling Frames

A: Sampling frames for hotels

A.1: Dar-es-Salaam hotels

1. Durban Hotel
2. DoubleTree by Hilton Dar es Salaam - Oyster Bay
3. Eaivad Hotel – sinza
4. Hotel Bahari Beach
5. Hotel Kempinski Kilimanjaro – Kivukoni Street
6. Karibu
7. New Africa
8. Protea
9. New Africa Hotel & Casino –Azikiwe Street
10. Golden Tulip
11. Protea Amani Beach
12. Sea Cliff
13. African Travel Blog – Kijitonyama
14. Econo Lodge – Libya street
15. Kilimanjaro Hotel Kempinski – Kivukoni street
16. Palm Beach Hotel– Ali Hassan Mwinyi Road
17. Palace Hotel Ltd – Sikukuu Street
18. Sleep Inn Hotel – Mahiwa Street
19. The Courtyard
20. Heritage Motel – Bridge Street
21. Mbezi Garden Hotel – Makonde Mbezi Beach
22. Oysterbay Hotel – Toure Drive
23. Oysterbay Executive Inn Ltd - Ali Bin Said Rd
24. Saadani Safari Lodge – Old Bagamoyo Road
25. Safari Inn Limited – Band Street
26. Sophia House-hotel & Apartments – Bibi Titi Mohamed Road
27. Embassy
28. African Sky Hotel Seas & Resorts
29. Africana Inn De Jardin
30. Akana Lodge
31. Al Uruba Hotel
32. Al Wah Hotel
33. Amani Beach Club
34. Ambassador Plaza
35. Aroma Hotel
36. Arwah Hotel
37. Arya Suka Shantihindu Lodge
38. Auto Inn Ltd
39. Bowling At Sea Cliff Hotel – Toure Drive
40. Concord Hotel
41. Coral Beach Club – Msasani Street
42. Courtyard Hotel (langi-langi) – Ocean Road
43. Eclipse Sea Breeze Resort Ltd
44. Evening Star Inn

45. Florida Inn Ltd
46. Foxtreks Ltd
47. Foxes Highland Fishing Lodge
48. Front Line Hotel
49. Golden Tulip Hotel – Toure Drive
50. Green Insitute Of Hotel Catering
51. Gulf Hotel
52. Harbour View Suites
53. Hill Techincal Resort
54. Hotels Keepers' Association Of Tanzania (hkat)
55. Hotel Whitesands & Resort
56. Hotel Travertine
57. Hotel Skyway Ltd
58. Hotel Sayari
59. Hotel Mawenzi
60. Hotel Karibu – Haile Selassie Road
61. Hotel Embassy
62. Hotel Crystal Palace
63. Hotel Continental
64. Hotel Agip
65. Hotel & Tours Managment Ltd
66. Huruma Guests House
67. Imasco Inn
68. Indian Ocean Hotels Ltd
69. Jambo Inn – Libya Street
70. Janwani Seabreeze Lodge & Hotel
71. Jangwani Sea Breeze Resort – Africana Road
72. Karibu Hotel - Haile Selassie Road
73. Keys Hotels Travel & Tours
74. Kibodya Hotel – Nkurumah Street
75. Kigoma Hilltop Hotel Ltd
76. Kilimanjaro Institute Of Hotel & Tourism
77. Kili Hotels Ltd
78. Kinasi Limited
79. Kipepeo Village Resort
80. Kiruruma Luxury Tented Lodge
81. Land Mark Hotel Ltd
82. Legho Hotel
83. Lion Hotel
84. Livingstone Hotel Ltd
85. Malapa Inn
86. Manyoni Inn
87. Meditteranneo Hotel & Restaurant
88. Mikumi Wildlife Camp
89. Millenium Towers Hotel – Ali Hassani Mwinyi Road
90. Milotel Ltd
91. Mount Usambara Hotels
92. Move N Pick Royal Palm Hotel

93. Msasani Peninsula Hotels Ltd
94. Msasani Penhotel Ltd
95. Msimbazi Hotel
96. Mss Family Resort
97. Naiman Hotel
98. Namnani Hotel
99. New Hombus Hotel
100. New Happy Hotel Ltd
101. New Gulf Hotel
102. New Bondeni Hotel
103. New Africa Hotel
104. Nyota Group Hotel
105. Office Hotels Ltd
106. Polepole Resort
107. Pop Inn Hotel
108. Portea Hotel Amani Beach Resort
109. Premium Institute For Hotel
110. Protea Hotel Apartments
111. Protea Hotel
112. Queen Of Sheeba Hotel
113. Ram Lodge
114. Ras Kutani Beach Resort
115. Rhino Tours
116. Riki Hill Hotel
117. Rombo One More Inn
118. Royal Mirage Hotel
119. Ruaha River Lodge
120. Rufiji Selous Wildlife Resort Ltd
121. Rungwe Ocean Hotels Ltd
122. Saba Saba Hotel
123. Sable Mountain Lodge
124. Salama Inn
125. Sanent Hotel
126. Sea Veiw Hotel
127. Sea Cliff Hotel
128. Serena Hotels
129. Silver Sands Hotel
130. Simple Motel
131. Skyway Hotel Ltd
132. SkylinStarlight Hotel
133. Starlight Hotel
134. Star White Hotels
135. Steak Inn
136. Swiss Garden Hotel Ltd
137. Tamarine Guest Hotel
138. Tanzania Hotel Training School
139. Tananalive Hotel School
140. Tanzania Institute Of Catering & Hotel Management

141. Tanzania Tourist Hotels
142. Tanzania Hotel Investments Ltd (tahi)
143. Tanganyika Tourist Hotel
144. Tembo Safari Camp
145. Terminal Hotel, The
146. The City Ambassador Hotel
147. The Beachcomber Hotel
148. Three Way Inn Ltd
149. Tip Top Hotel Ltd
150. Tourism & Hotel Consultants
151. Transit Motel Ltd
152. Valley View Hotel
153. Vatican City Hotel Ltd
154. Velly View Hotel
155. Vision Hotel & Tourism College Co. Ltd
156. Wellworth Hotels & Lodges Ltd
157. White Sands Hotel & Resort
158. Zimbwini Hotel Ltd

A.2: ARUSHA HOTELS

1. Nature Bound Africa Ltd – Thembi Hill
2. Gorilla Safaris Rwanda – East Africa Road
3. Novotel Mt Meru
4. Kia Lodge – Kilimanjaro Airport
5. Moivaro Coffee Plantation Lodge & Estate
6. Hotels & Lodges (t) Limited
7. Serena
8. Arusha Crown Hotel
9. Ndutu Safari Lodge - Haile Selassie Road
10. Ngare Sero Mountain Lodge
11. Tarangire Safari Lodge
12. Alton Inn Hotel
13. Arusha Resort Centre
14. Arusha Naz Hotel
15. Arusha Backpackers Hotel
16. Arusha Tourist Inn
17. Arumeru River Lodge
18. Bamakambi Safari Lodge
19. Casamblanka Mini Lodge
20. Center Tourist Hotel Ltd
21. City Link Pentagon Hotel
22. Colobus Mountain Lodge & Campsite
23. Consolidated Tourist & Hotel Investment
24. Eland Motel – Mianzini, Nairobi road
25. Elewana Africa Lodges
26. Ethiopian Spices And Herbs Hotel Restaurant
27. E Unoto Retreat
28. German Tanzania Hotel

29. Gibb's Farm - Ngorongoro Safari Lodge
30. Golden Rose Hotel
31. Golden Rose Travel & Tours
32. Hageisa Hotel
33. Halcyon Tanzania Ltd
34. Hatari Lodge
35. Hotel Seven Eleven
36. Hotel Schoo
37. Hotel Manor Tanzania Ltd
38. Hotel Ford Des Moines & Safaris
39. Iiboru Safari Lodge
40. Impala Hotel
41. Karama Lodge Tanzania
42. Kibo Palace Hotel
43. Kigongoni Lodge
44. Kiria Hotel & Lodging
45. Klub Africo Hotel
46. Kusini Lodge Serengeti
47. Lake Manyara Serena Safari
48. Le Jacaranda Hotel-bar-restaurant
49. Lobo Wildlife Lodge
50. Lukuba Island Lodge
51. Mali Hai Club Tanzania
52. Mashado Hotel
53. Mayfair Hotels & Avest House
54. Meru View Lodge
55. Meru Simba Lodge Ltd
56. Mezza Luna Hotel & Restaurant
57. Miami Beach Hotel & Guest House
58. Momella Lodge
59. Motel 2000
60. Mount Meru Hotel Savings & Credit Co-operative Socceity
61. Mount Meru Game Lodge & Sanctuary
62. Naaz Hotel
63. Nameera Ngurdoto Lodge, Ltd
64. New Stanely Hotel
65. New Safari Hotel Ltd
66. New Silent Inn
67. New Florida Inn 2000
68. New Continental Lodge
69. Ngorongoro Wildlife Lodge
70. Ngorongoro Sopa Lodge
71. Ngorongoro Serena Lodge
72. Ngorongoro Safari Lodge Ltd
73. Ngorongoro Crater Lodge
74. Ngurdoto Mountain Lodge
75. Ngurdoto Lodge
76. Outpost Hotel

77. Out Post Lodge
78. Pallson`s Hotel
79. Palm Court Inn
80. Plantation Lodge & Safaris
81. Rivertrees Country Inn
82. Sanctuary Lodges & Camps
83. Serena Manyara Hotel
84. Serena Lodge & Hotels
85. Seronera Wildlife Lodge
86. Serengeti Sopa Lodge
87. Serengeti Serena Lodge
88. Serengeti Safari Lodge
89. Splendid Hotel
90. Swala Lodge Tarangire
91. Tanzania Hotels Investment Ltd
92. Tanzanite Lodge
93. The Arusha Hotel
94. Tourism Managment Services Co. Ltd
95. Tropical Center Of Commerce & Hotel
96. Twiga Campsite & Lodge
97. Victoria House
98. Windsor International Hotel Ltd

B: SAMPLING FRAMES OF SUPERMARKETS

B.1: DAR – ES- SALAAM SUPERMARKETS

1. Zahor supermarkets – Msasani
2. Kawe supermarket
3. Boko supermarket
4. T/A UFISHI supermarket – Sinza Moro
5. Shayo supermarket – Makaburini
6. Omary supermarket – Msasani
7. Salum Ally Supermarket – Mbezi Beach
8. Mikocheni supermarket
9. Old trafor mini supermarket – Manzese Tip Top
10. Munis supermarket – Msasani
11. Mikumi supermarket
12. Giant supermarket Ltd - Mikocheni
13. Lagos supermarket Ltd – Kisutu
14. Samsan mini supermarket – Kinondoni
15. Mmari mini supermarket - Temboni
16. Mshami shopping center – Kimara Matangini
17. Shrijee`s Supermarket (Slipway)
18. City Supermarket
19. Village Supermarket (Sea Cliff Village)
20. Imalaseko Supermarket
21. Uchumi Supermarket
22. Shoppers` Plaza (Mikocheni)
23. Slipway Shopping Malls

24. Mlimani City Shopping Mall
25. Italian Supermarket (Namanga)
26. Shoprite supermarket (Kamata/ Pugu road)
27. Shoprite Holdings

B.2: Arusha supermarkets

1. Mafuru min-supermarket
2. Kimandolo min-supermarket
3. Ngarenaro min-supermarket
4. Sakina supermarket
5. Zaramo min supermarket
6. Arpina investment min supermarket
7. Essack supermarket
8. Issa supermarket
9. Shoo supermarket
10. Malya supermarket
11. Mollel supermarket
12. Njiro supermarket
13. Kikuyu mini supermarket
14. Usariver supermarket
15. Silayo supermarket
16. Kashai shopping center
17. Mbauda supermarket
18. Kira supermarket

C: SAMPLING FRAMES FOR MEAT PROCESSING COMPANIES

C.1: DAR – ES – SALAAM MEAT PROCESSING COMPANIES

1. Tanzania Meat Processing Limited (2002)

C.2: ARUSHA MEAT PROCESSING COMPANIES

1. Arusha Meat Company Ltd
2. Meat King Ltd
3. Jabe Investment Ltd
4. Happy Sausage Ltd
5. Orpul Co. Ltd

D: SAMPLING FRAMES OF MEAT IMPORTERS IN ARUSHA AND DAR-ES-SALAAM

1. Bright Choice Ltd - Dar-es-Salaam
2. Food Dell Ltd - Dar-es-Salaam
3. Shoprite Chicken Ltd - Dar-es-Salaam
4. Fine Foods Ltd - Dar-es-Salaam
5. Nizar FoodsTNA Dixick - Dar-es-Salaam
6. Dowrele Intron Ltd - Dar-es-Salaam
7. Alpha Knust - Dar-es-Salaam
8. Frostan Ltd - Dar-es-Salaam
9. Anquen Picknyald - Dar-es-Salaam
10. East Africa Food Services – Arusha

E: SAMPLING FRAME OF CATTLE FATTENERS IN ARUSHA

1. Manyara Ranching Company Ltd
2. Ormot Tukutta Conservation Ltd

F: SAMPLING FRAME OF CATTLE FATTENERS

1. Ormoti Co. Ltd
2. Manyara Ranch

G: SAMPLING FRAME OF MEAT TRADERS IN ARUSHA AND DARESALAAM

- 1 Aidary Abdallah
- 2 William Makonelo
- 3 Hadson Mkomochi
- 4 Kedimon Mamudi
- 5 Juma Mgunda
- 6 Mshamu Ngaumbe
- 7 Ramadhani Kesembo
- 8 Faidhi Irabit
- 9 Elisondi Msengi
- 10 Ramadhani Matimbwa
- 11 Malela Andrea
- 12 Zakari Mchanga
- 13 Robet Mombo
- 14 Julius Lahusa
- 15 Aseli Mruma
- 16 Juma Chogwe
- 17 Michael Timbo
- 18 Lameck Mwalimu
- 19 Bahat Ndahari
- 20 Amosi Ndahari
- 21 Jelemia Karunga
- 22 Mussa Makali
- 23 Jackson Milawi
- 24 Hadson Msambazi
- 25 Peter Madege
- 26 George Bendera
- 27 Onesmo Masimo
- 28 William Kwanga
- 29 Chiswagumbi Mamba
- 30 Daniel Ndajilo
- 31 Maneno Malisa
- 32 Vani Masuka
- 33 Dani Mkunda
- 34 Msudani Mgendi
- 35 Junamme K. Mrisho
- 36 Juma Magalu
- 37 Paulo Pasko

- 38 Athumani Ramadhani
- 39 Yakobo Kitugo
- 40 Mgendi Mgunya
- 41 Ngandi Ubeleje
- 42 Magwe Matiku
- 43 Johnas Matiku
- 44 Ramadhani Kitindi
- 45 Mazengi Hilingitya
- 46 Lizege Zaga
- 47 Maka Ally
- 48 Neli Mhanga
- 49 Mango Frank Mhipa
- 50 Alfonse J. Mkota
- 51 Johnas Nkoi
- 52 Baraka Molis
- 53 Anathori Lubeli
- 54 Antoni Adolph
- 55 Raymond Raphael
- 56 Joel Meshack
- 57 Sila Ngonda Mazengo
- 58 Juma Ngonda Mazengo
- 59 Jeorge Mpuya
- 60 Anord Chinyanya
- 61 Tano Sanyaji
- 62 Boniphance saimoni
- 63 Mwaluko Kamando
- 64 Noel Makula
- 65 Tano Masimba
- 66 Amosi Ramali
- 67 Ramadhani Mpinga
- 68 Amos M. Ghaulilo
- 69 Razalo Daudi
- 70 Emanuel Daudi
- 71 Mashaka Luka
- 72 Amosi Ching'ole
- 73 Emanuel Nollo
- 74 John Mazengo
- 75 Bahati Mwanuko
- 76 Amoni Mabumo
- 77 Maiko Mpali
- 78 Mohamed Said
- 79 Magomba Mbole
- 80 Taifa Tolokoko
- 81 Kibiki Christian

- 82 Athumani Mwinga
- 83 Mashaka Mahembe
- 84 Jumane Masaka
- 85 Julius Magaga
- 86 George Mlewa
- 87 Amosi Jumanne
- 88 John Damiani Madeja
- 89 Amosi Elisha
- 90 Bakari Issa
- 91 Amisi Rupia
- 92 Makuya Baya
- 93 Selevester Chisewe
- 94 Mlewa Isaka
- 95 Raphael P. Ilanda
- 96 Thomasi Pauli
- 97 Ndaluhidongoji
- 98 Pascali Salama
- 99 Salama H. Njamasi
- 100 Nyamwala Mkolongo
- 101 Chalres julias
- 102 Mushi Pastory
- 103 Elasto mushi
- 104 Geoge Luhanga
- 105 Mzalam Kiza
- 106 Victor Mtuya
- 107 Isuzu Lusinde
- 108 Tungu Ripha
- 109 Doto Omary
- 110 Seif Mashella
- 111 Elias Msambuli
- 112 Gaitan Alex
- 113 Meya Wana
- 114 Madeje Mbuguni
- 115 Richard S. Seganje
- 116 Naice Wasi
- 117 Gilibart Halodi
- 118 Makaeda Mbaruku
- 119 Lusinde M. Fundi
- 120 Pangalasi Lubeli
- 121 Said Kaframi
- 122 Given Gonda
- 123 Felix Chilumate
- 124 Naneno Abdul
- 125 Revoga Josephu

- 126 Everyjistus Anthoni
- 127 Ghalrel Chalula
- 128 Zakalia Chipanta
- 129 Majuto Andelea
- 130 Mengi Nollo
- 131 Augustino Mwiloko
- 132 Norubert Ilamba
- 133 Masumbuko Makandi
- 134 Manene Abdul
- 135 Andrea Bwile
- 136 Samanii Mazengo
- 137 Pangalas Ndahani
- 138 Said Uhode
- 139 Rister Kenesi
- 140 Kelician Ntonji
- 141 Nestory Netto
- 142 Wabaya S. Msuwa
- 143 Boniphance W. Pombe
- 144 Silvester L. Joseph
- 145 Mlalo Zakalia
- 146 Msele Mkwawi
- 147 Aloyce Makuni
- 148 Mdede Mwaluko
- 149 Emanuel M. Nollo
- 150 Mavunde Lungwa
- 151 Sila John
- 152 Malugu Isaya
- 153 Jeremia Mgogoro
- 154 Maneno Hosea
- 155 Mhindi Mabwayi
- 156 Juma Mazengo
- 157 Juhudi Wambula
- 158 Ngoi Samamba
- 159 Andrea Sonyo
- 160 Cleda Mohamed
- 161 Gaspar Mlakula
- 162 Kusila Mzinzi
- 163 Hamadi Salumu
- 164 Habibu Mustapha
- 165 Faustini Magembe
- 166 Caterina Antoni
- 167 Jolo Challos
- 168 Emmanuel Devid
- 169 Masumbuko Aloyce

- 170 Matonya Aloyce
- 171 Mgogoro Semeni
- 172 Said Salumu Mwinyigoha
- 173 Magawa Nolla
- 174 Mpela Ntinde
- 175 Matonya Mzazi
- 176 Subiri Chipali
- 177 Emanuel Ndama
- 178 Meshack Jonas
- 179 Jairosi Sanga
- 180 Ndahani Mayala
- 181 Sagafu Abinael
- 182 Masinziga Bujiku
- 183 Mawazo Mdogo
- 184 Peter Donalt
- 185 Peter Lubeni
- 186 Andrea Ngongwiyi
- 187 Kijiko Ally
- 188 Yaled Tabora
- 189 Dicksoni Chinyele
- 190 Ndugai Emanuel
- 191 Robart Donalt
- 192 Patrick Sumbali
- 193 Frenk Matonya
- 194 Bernad Samweli
- 195 Frenk Mianga
- 196 Julius Lymo
- 197 Ndonu Daniel
- 198 Sebastian Logani
- 199 Mika Mazoya
- 200 Zakaria Lusiji
- 201 Joseph Mwituzi
- 202 Reonald Mgube
- 203 Samsoni N. Mnyaliver
- 204 Jobu Paulo
- 205 Lista Damian
- 206 Mangati Yohana
- 207 Festo Mazengo
- 208 Gelevance Bathelomeo
- 209 Omari Magalamile
- 210 Dani Paulo
- 211 Cesilia Mtua
- 212 Mama Frenk
- 213 Mama Eger

- 214 Haberi Elisha
- 215 Cobra Nollo
- 216 Alex Peter
- 217 Widoni Sendamwa
- 218 Mbole Mgwabi
- 219 Adamu Magwalu
- 220 Gabulyeli
- 221 Moshi Msafiri
- 222 Erika Msuya
- 223 Januari Jonasi
- 224 Yahaya Kafurami
- 225 Kusila
- 226 Malogo Chiboni
- 227 Henery samweli
- 228 Iddy Uchungu
- 229 Gabriel Makuya
- 230 Juma Malugu
- 231 Sauda Idd

H: SAMPLING FRAME OF CATTLE FARMERS

Cattle farmers – Many (Arusha)

I: SAMPLING FRAME OF BEEF CONSUMERS

Beef consumers – Many (Arusha and Dar es Salaam)