

THE ROLE OF KONGWA RANCH TO LINK SMALLHOLDER BEEF PRODUCERS TO PROFITABLE MARKETS



A research report submitted to Van Hall Larenstein University of Applied Sciences in partial fulfilment of the requirements for the degree of Master of Agricultural Production Chain Management specialising in Livestock Chains

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SEPTEMBER-2013

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Acknowledgements

All the praises and thanks are to ALLAH, the LORD of mankind and all that exists. I thank ALLAH for giving me and my family good health throughout my studies.

This work has been completed through a number of contributions from different organisations and individuals, just to mention few includes;

The Royal Dutch Government through the Netherlands Fellowship Programme (NFP) for granting scholarship for my studies in Master of Agricultural Production Chain Management specialising in Livestock chains. Without this support, I wouldn't undertake this valuable master degree.

My sincere thanks go to my supervisor Mr. Frans Verweij for his tireless support, valuable inputs, encouragement and timely feedback. His efforts enlighten the success of this research.

I appreciate the inputs of Mr. Marco Verschuur, our course coordinator for his continuous support from the beginning of my studies. These achievements would be difficult without his support.

My special thanks go to all staffs and Lecturers of Van Hall Larenstein University of Applied Sciences for their support throughout my studies.

I am very grateful to my organisation; Kongwa district council for giving me a study leave to undertake my studies.

The inputs and positive cooperation from Mr. Heslon Kashalankoro manager of NARCO-Kongwa ranch, smallholder beef producers of Mautya, Machenje and Kongwa villages, village executive officers and extension workers of these villages, traders and input suppliers are highly appreciated.

Dedication

This work is dedicated to my lovely wife Fatuma Kaniki for encouragement, patience and for taking a good care of our son Adil during my absence and to my entire family especially my lovely mother, brothers and sisters.

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EQUIVALENTS

1 Euro = 2,100 Tsh. (17th August 2013)

ABBREVIATIONS

CAHW	Community Animal Health Worker
FAO	Food and Agriculture Organisation
IFAD	International Fund for Agricultural Development
IIRR	International Institute of Rural Reconstruction
KDC	Kongwa District Council
KIT	<i>Koninklijk Instituut voor de Tropen</i> (Royal Tropical Institute)
KU	<i>Kilimo na Ufugaji</i> (Crop and Livestock production)
LARRRI	Land Rights Research and Resources Institute
LIDA	Livestock and Development Authority
LMUs	Livestock Multiplication Units
M4P	Making market work For the Poor
MAC	Ministry of Agriculture and Cooperatives
MLD	Ministry of Livestock Development
NACO	National Agricultural Company
NARCO	National Ranching Company
NBS	National Bureau of Statistics
NGOs	Non-Governmental Organisations
NMB	National Microfinance Bank
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SPSS	Statistical Package for Social Sciences
TAC	Tanganyika Agricultural Corporation
TADs	Trans-boundary Animal Diseases
TIB	Tanzania Investment Bank
Tsh	Tanzanian shilling
TSZ	Tanzania Short horned Zebu
UBM	Universal Business Model
UNIDO	United Nations Industry Development Organisations
URT	United Republic of Tanzania
VS	Value Share
ZAMBEEF	Zambian Beef

SUMMARY

Linking smallholder beef producers to profitable markets that pay better prices at regional, national and international level was the major theme of this study. The study was conducted in three villages of Mautya, Kongwa and Machenje in Kongwa district, Dodoma- Tanzania from July 17 to August 18, 2013.

The study had two main objectives; to investigate the competitiveness of smallholder beef producers and to assess the business performance of the National Ranching Company (NARCO)-Kongwa in order to come up with recommendations on the best options to link smallholder beef producers to profitable markets through the ranch.

The results were achieved by using different analytical tools. The main tools used in this study include; value chain, Porter's diamond model for competitive advantage of nations and the Universal Business Model.

The study was composed of a case study, field observations and a survey. Checklists of interview questions were prepared to gather information from the case study; field survey was conducted among smallholders who were divided into two clusters based on their herd sizes. Field observations were conducted in order to complement the information provided. The information collected was intended to give a highlight of the present situation of the beef subsector in the district and the ability of NARCO to meet smallholder beef producers' market access challenges.

Findings from this study show that; the beef subsector in Kongwa district is composed of mainly two chains; a large informal chain dominated by smallholders and a smaller formal chain dominated by NARCO and their major roles are to produce, raise and sell beef cattle to traders. Other actors include livestock traders, input suppliers and consumers in the district, regional, national and international level. The study further show that; among the actors involved in the beef chains, producers gets relatively large value share as compared to other actors in the chains.

From the survey and field observations it was found that; beef quality control measures are not practiced by majority of actors in the chain, especially the informal one.

The study shows that; smallholders are faced with various challenges including; inadequate feed and water for their animals, inadequate market information, low price paid by traders, inadequate extension services, difficulty access to credit, low knowledge on animal production and inadequate market infrastructures. High interest rates paid to financial institutions, multiple taxes paid to the government and low quality of beef are among the challenges facing traders. Challenges facing NARCO includes; animal diseases, encroachment of bush and bush fires and high quality standards demanded by the international markets. Extension workers as supporters of the beef subsector have no transport facilities to reach large number of beef producers in the district.

The study further shows that; herd size has impact on market participation among smallholders. Market information is not readily available among smallholders; however at NARCO; television and radio stations, newspapers, brochures and internet websites are used as sources of market information. The only beef production technologies practiced at NARCO are artificial insemination and nutrition. Production in smallholders is affected by recurrent drought which is common in this region.

From the survey study; criteria were set to select competitive smallholders that can be linked to NARCO. Farmers from cluster 2 were regarded as competitive and they can be linked to NARCO based on different types of market linkages.

From these findings it is therefore concluded that; the beef subsector in the district is dominated by smallholders and NARCO as the main producers and other actors are traders, input suppliers and consumers. Producers get a relatively higher value share as compared to other actors and there is no beef quality control measures practiced in the informal chain. The study further reveal that; actors and supporters of the beef subsector are faced by different challenges and the major one for smallholders are inadequate feed and market information. Herd size, has seen as an important factor in determining market participation among smallholders.

From the findings of this study it was found that; NARCO as the lead producer, processor and exporter of beef in the district has the capacity to accommodate smallholders' market access challenges and therefore it is recommended that for better linkage; extension workers have to organise farmers into formal groups and trains them on beef quality control measures. For the department of livestock development in the district; it is recommended to make market information readily available to farmers, conduct mass vaccinations against trans-boundary animal diseases, to reduce taxes and to improve market infrastructures. And for the Tanzania meat board is to search for more international markets in order to create more demand.

1.0 INTRODUCTION

1.1 Background

“The poorest people in the world are farmers with low market participation and low agricultural productivity. Increasing either one could help to improve the other and both could boost living standards: higher market participation could drive productivity by providing incentives, information and cash flow for working capital; while higher productivity could drive market participation” (Rios, Masters and Shively, 2008, p.1)

“The question of how to expand the market participation of smallholder livestock producers is a major challenge facing many governments and Non-governmental organisations (NGOs) in developing countries” (Holloway and Ehuis, 2002, p.1)

Livestock sector plays an important role in the economy of agricultural households in Tanzania. It generates a significant amount of cash income and determines the smallholder economic and social status in many rural communities (NBS, 2012). The country is estimated to have 21 million cattle and over 90% of this population is kept by smallholder producers at an average herd size of 13 per household. Despite of the large number of cattle available in the country, livestock industry contribution to the national economy is low. Reports show that in 2010, the industry contributed 3.8% to national gross domestic (United Republic of Tanzania (URT) economic survey, 2010).

The current emphasis in the country is to commercialize beef production for the sector to contribute more effectively to household food security and income as well as to the nation's economy (MLD, 2011). Efforts are undertaken to promote commercial production of high quality beef in intensive and extensive (ranching, pastoral and agro-pastoral) systems and strengthening the National Ranching Company. NARCO is the largest commercial beef producer in the country and it is owned by the government (MLD, 2011). The company produces its own animals, fattening, slaughtering and sell live animals and meat to national and export markets. Due to the increase of meat demand in the country and the global in general, the capacity of NARCO to meet the demand is uncertain. Kongwa and Ruvu ranches are declared as disease free ranches in the country (MLD, 2011) and because of this; buying animals from the local markets or from farmers in the district it is considered as risk of introducing diseases in the ranch.

Marketing of livestock in the country is carried out in three livestock levels that include primary, secondary and border markets. Smallholder beef producers sell their animals in primary markets where pricing is through negotiation; grading and weighing is normally based on visual estimation (UNIDO, 2012). According to Holloway and Ehuis (2002), the major constraint to improving the living standards of smallholders is their inability to access profitable markets. They further explain that; among of the most difficulty development challenges is to increase the capability of poor smallholder farmers to access profitable markets and actively engage in them.

1.2 Research problem

Smallholder beef producers face difficulties in accessing formal markets at regional, national and global level that pay better prices than the local informal markets in the district. As a result incentives remain weak, investments remain low and so does the productivity ending up getting low income leading into a low level equilibrium poverty trap.

1.3 Problem owner

Smallholder beef producers and the government

1.4 Justification of the study

Tanzania's meat production is dominated by smallholder producers who own over 90% of all livestock (SAGCOT, 2012). Despite owning the meat industry in Tanzania; smallholder beef producers are still very poor. Though there is National Ranching Company – Kongwa in the district that have access to region, national and international profitable markets yet the role of this ranch to link smallholders to these markets is not yet realised creating a need for this research. Linking smallholder farmers to more profitable markets is considered as a milestone towards promoting economic growth and poverty reduction (Barret and Swallow, 2006; FAO, 2011; Adegbedi, 2012).

1.5 Research objectives

- To investigate the competitiveness of smallholder beef producers in the informal beef chain.
- To assess business performance of NARCO-Kongwa in order to come up with best options to link smallholder beef producers to profitable markets.

1.6 Research questions

1. What is the present situation of the beef subsector in Kongwa district?
2. What is the ability of NARCO- Kongwa to meet smallholder beef producers' market access challenges?

Sub-questions

- 1.1 What are roles of the actors involved in the beef chains?
 - 1.2 What is the relative share of each actor in the chains?
 - 1.3 What quality control measures exist in the beef chains?
 - 1.4 What challenges face smallholder beef producers, NARCO-Kongwa, traders and supporters of the beef chains?
 - 1.5 What is the impact of herd size and structure on market participation among smallholder farmers?
 - 1.6 What methods are used by smallholder beef producers to access market information?
-
- 2.1 What is the production capacity of NARCO-Kongwa?
 - 2.2 What beef production technologies are practised by NARCO-Kongwa?
 - 2.3 What is the capacity of NARCO-Kongwa to meet demand requirements of its customers?
 - 2.4 What methods are used by NARCO-Kongwa to access market information?

1.7 Conceptual framework

The framework of this research is based on value chain analysis; however Porter's diamond model for countries competitiveness was adapted to capture concepts of the study.

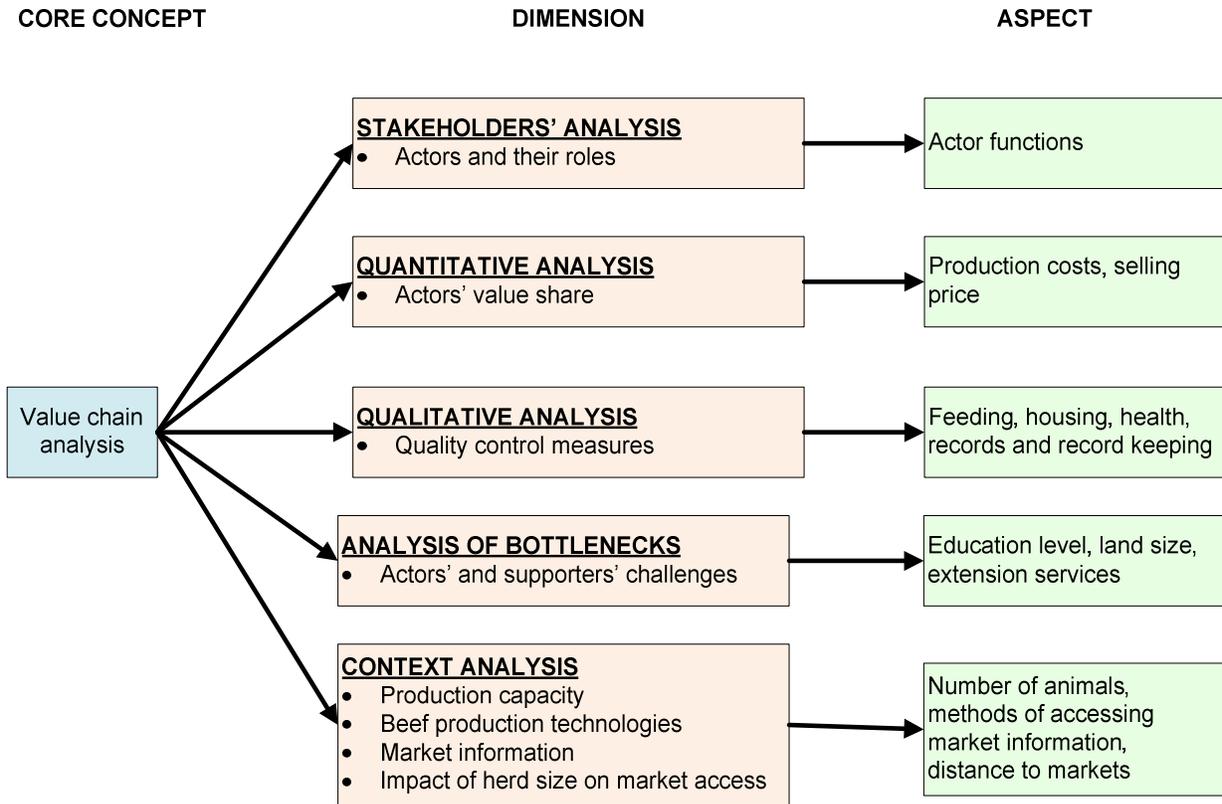


Figure 1: Research framework

1.8 Definition of concepts

National Ranching Company (NARCO) – Is a parastatal organization with the responsibility of producing beef cattle for domestic and export markets.

Smallholder beef producers – Beef cattle farmers with an average herd size of 13 heads

Primary markets – Livestock markets operated by local governments where producers meet with livestock traders.

Secondary markets – Regional integrated livestock markets where traders from different regions meet with other livestock traders.

Border markets – National markets where traders from different regions meet with export traders.

Profitable markets – Formal markets at regional, national and international levels that pay better prices than the local informal markets

Market – An actual or nominal place where forces of demand and supply operate, and where buyers and sellers interact to trade goods, services, or contracts or instruments, for money or barter (Business dictionary, 2013).

Market access: – Openness of a country's markets to foreign goods and services. Market access reflects the government's economic policies regarding import substitution and free competition.

Stakeholders – People who are directly involved in the beef chain in Kongwa district. These include actors, chain supporters and chain influencers.

The concept of value chain

Value chain refers to the full range of activities which are required to bring a product or service from conception, through the different stages of production, collection, processing, delivery to final consumers, and final disposal after use (Kaplinsky and Morris, 2001). In a broad sense a value chain can further be defined as the complex range of activities implemented by various stakeholders (Input suppliers, primary producers, traders, processors, service providers, influencers and consumers). A value chain exists when all actors in the chain are willing to invest in the chain by adding more value in the product or service (M4P, 2008).

Value chain analysis requires a thorough investigation of what is happening between actors in the chain, what keeps these actors together, what type of information is exchanged between actors, what type of governance exists in the chain, power relation and how the relationship between actors in the chain is evolving (M4P, 2008). In order to come with this analysis; mapping of the value chain is of crucial importance.

Sustainability and gender in beef chains

In beef chains sustainability refers to the replacement and renewal of exhausted natural resources and ecosystems in a way that ensure the wellbeing of current and future generations (Lankester, 2013). Sustainability includes three dimensions; social responsibility (People), ecological viability (Planet) and economic viability (Profit). Only if the three dimensions are fulfilled, an agricultural system can be called sustainable. According to Lankester (2013), achieving sustainability in extensive grazing animal management systems involves the adoption of best practices to address social, ecological and economic problems, but also deep and underlying changes in the approach to land use.

Porter's diamond model of competitive advantage of nations

Porter explains in his 1990 competitive advantage of nations that; for better competitiveness of the local economy, a country needs four determinants. These determinants are; (1) factor conditions, (2) demand conditions, (3) related and supporting industries and (4) firm strategy, structure and rivalry. Government and chance are factors that influence the four determinants but are not determinants themselves. This model was adapted, modified and used as a guiding framework to point out the beef production situation and markets accessibility and competitiveness among smallholder beef producers in the district.

The Universal Business Model

The universal business model (UBM) provides a single method for analysing and evaluating an organisation and its internal departments. The model has three layer structures, which are **Aspects:** that includes structure, participants, culture, deliverables and performance. **Elements:** The “aspects” are composed of different elements and the third layer is **Issues** to be considered during evaluation. This model was adapted and used to assess the business performance of NARCO - Kongwa.

2.0 LINKING SMALLHOLDER BEEF PRODUCERS TO MARKETS

2.1 Types of market linkages

Access to formal and guaranteed markets is one of the main challenges for smallholder producers in many developing countries. Smallholders participate mostly in local markets, however; these markets have characteristics of volatility. Regional, national and global markets are relatively more stable, but; they are inaccessible among smallholders without specific links (Al-Hassan, Sarpong and Bonsu, 2006). Market access plays a very important role as they ensure better income and wealth for smallholder producers; they also create purchasing power which increases demand for farmers' produce (Rios *et al*, 2008). Linking smallholders to formal markets includes a range of activities, from the very small, informal and localised to the very large, formal and globalised markets (FAO, 2007).

There are different approaches that can be used by different experts to link smallholders to formal and profitable markets. According to Delgado (1999) and FAO (2007) linking of producers to markets can be categorised in different ways including;

- Linking producers to domestic trader,
- Linking producers to a retailer,
- Linking producers to an exporter,
- Linking producers through agro-processor,
- Linking through contract farming,
- Linkages through a leading producer,
- Linkages through cooperatives.

Each linkage has its advantages and disadvantages.

According to FAO (2007) linking producers direct to traders involves individual producers that act on individual basis or may work in informal or formal groups to reduce costs. Advantages of this type of linkage include; long term sustainability due to trust between the members, formal producer organisations are usually not required and traders may provide services like training in production and produce handling. Difficulty access to better markets and short term different payment are among disadvantages on the side of the producer.

Linking direct between producers and retailers may require formal group formation and especially when buyer does not want to work with individual producers. According to FAO (2007) this type of market linkage has the advantage of market reliability at agreed price. However a number of disadvantages are associated with this type of market linkage including delayed payment, producers have to meet quality and safety specifications and they must be able to supply the agreed volumes at all times. This may place producers in conflict with social obligations.

Linking producers to exporters involves grouping of producers on which external technical assistance may be required. This type of market linkage has prospective returns if quality can be achieved, input and technical assistance may be provided on credit and sometimes exporters provide transport. The disadvantages of this type of market link are that producers need to meet complex standards that might be difficult even with technical assistance and high risks associated with the export market (FAO, 2007).

The direct link between producers and agro-processors requires producers to be in formal or informal groups in order to bulk their produce and to facilitate supply of inputs and provision of technical assistance. The advantages of this market linkage includes secured market at the

arranged price, inputs and technical assistance may be provided on credit, processor often provide transport and potential for producers to sell large volumes. However; this linkage has disadvantages in such a way that there may be inadequate market for the processed products thus risking sustainability, high quality and safety specifications, market price might be higher than that arranged with the processor and risk of delayed payments (FAO, 2007).

According to FAO (2007), another type of linkage is through contract farming. In this linkage a company may prefer to group producers, formally or informally, for input and output marketing and extension services, however; external assistance may be needed to support producer groups. The advantages of this market linkage include; provision of input and technical services by the firm and usually marketing is organised by the firm that is buying from the producers. This linkage has disadvantages of requiring external agency such as banks to finance credit provision, mistrust between producers and the firm and if contracted price is lower than the market price there is a risk of side selling.

Linkage through a leading producer is another type of market linkage whereby producers function as informal groups coordinated by one or few leading producers. The advantages of this market linkage are that producers have output and sometimes input marketing taken care of by the lead producer and have better negotiation power with large volumes. However the leading producer may pull out of the venture and delayed payment might happen if buyers delay payment to the lead producer.

The last market link type suggested by FAO (2007) is through cooperatives whereby producers may link directly with the cooperative on individual basis or in groups. This type of linkage has advantages that producers have potential of selling larger quantities, marketing is organised by the cooperative and supply of inputs and technical assistance. However; the cooperative often depend on subsidies and external managerial assistance leading to collapse of commercial activities if subsidies and assistance run out.

2.2 Beef production in Tanzania

2.2.1 Demand conditions, beef marketing and marketing information

The livestock sector has expanded rapidly in recent years and demand of livestock and livestock products is expected to continue growing strongly by the middle of this century, this is driven by population growth, increased income and urbanisation (FAO, 2009). According to SAGCOT (2012) per capita consumption of meat in Asia and Africa, Tanzania included; is expected to double in the next few years. With growing middle class and demand from tourists and international investors, Tanzania's meat demand is growing firmly (SAGCOT, 2012). The country currently has a population of about 44.9 million people (NBS, 2013) which offers a sufficient market for agricultural products and in particular livestock and livestock products (MLD, 2011). In addition to the domestic market, the East African Community comprising of Kenya, Uganda, Rwanda and Burundi offers more markets for livestock and livestock products (MLD, 2011). Many Tanzania cattle are sold in Kenyan markets as live animals. Kenyan market attracts Tanzanian traders due to better prices offered (SAGCOT, 2012). Apart from live animals export to Kenya, Tanzania also export live animals to Comoro, Burundi and Uganda. Dressed carcasses are exported to Oman, Kuwait, United Arab Emirates, Muscat and Democratic Republic of Congo.

Table 1: Export trend of live and meat products Tanzania 2002-2007

Live animals					Red meat/Carcass				
Year	Cattle	Goats	Sheep	Destination	Year	Beef	Goat	Mutton	Destination
2002	382	140		Kenya	2002				
2003	1,714	411	2	Comoro	2003				
2004	5,263	1,199	2	Burundi	2004	1,080			Dubai
2005	4,075	2,177		Zanzibar	2005	600			UAE
2006	6,231	2,753	11	Uganda	2006	163	16,774	20,335	Muscat
2007	3,849	736			2007	10,737	25,345	76,592	DRC

Source: Ministry of livestock and fisheries development 2010.

As the number of urban middle classes are continuing to grow and with meat be a common food for the urban households the demand is expected to grow (SAGCOT, 2012). The other fast growing beef market in Tanzania is the food service and tourism industry. Tourism has been growing very fast and specialised hotels and restaurants are increasing annually.

Table 2: Livestock demand projections

Market demand		2015	2030
Local demand ('000 tons)	Tanzania demand	290	480
Consumption ('000 tons)	Global consumption	77,000	125,000
	EU demand	10,000	15,000

Source: FAO, 2009

Smallholders sell their animals to primary markets that are located close to their villages. Primary markets are established and managed by the local government authorities. Secondary markets are established and managed by the ministry of livestock and fisheries development close to towns and major cities (UNIDO, 2012). In primary markets the major players are producers and local traders and in secondary markets mainly trading is between traders. There are about 300 to 400 primary markets and 12 secondary markets in the country. In addition to the primary and secondary markets, there are about 10 border markets that are also established and managed by the ministry of livestock and fisheries development. These facilitate livestock trading to bordering countries (UNIDO, 2012).

Usually, animals in the markets, whether primary, secondary or border markets were supposed to be weighed, graded and auctioned on site to ensure transparency in pricing, however; the situation is different in primary and secondary markets in the country. The primary and secondary markets in the country lacks the necessary infrastructures such as weighing balances, loading and offloading ramps, animal pens and fences (UNIDO, 2012). Generally in these markets, price is determined through direct negotiation between the buyer and the seller. The buyer examines the quality and weight of the animal by visual observation, often this practice is a disadvantage to the side of the smallholder producer (UNIDO, 2012).

The government has initiated and set up a livestock marketing information system to assist producers and traders with information that could help them to make good decision in trading. The information is provided through local newspapers as well as platforms provided by mobile phone companies and websites. The information provided is related to volume of produce, grades and price of animals. In order to access the required information users are required to know the market codes, however; under the livestock information and knowledge system of the

Tanzania Ministry of trade website: <http://www.lmistz.net> information about livestock markets and marketing is provided (UNIDO, 2012).

2.2.2 Market access challenges

Most of smallholder beef producers in Tanzania practice either subsistence or operates more often in local markets due to lack of connectivity to more profitable markets to regional, national or global levels (IFAD, 2011). According to KIT and IIRR (2008) and IFAD (2011) two instruments are very important to help smallholders to access and participate in profitable markets; the first is physical infrastructure such as information technology, roads and ports that connects smallholder producers to markets and the second is the role of accompanying institutions that can reduce the marketing risks and transaction costs in the process of trading between producers and consumers. Due to their small volumes of surplus of production; smallholders are exposed to higher risks and transaction costs (KIT and IIRR, 2008; IFAD, 2011).

According to IFAD (2011); smallholder producers within countries and sometimes within localities differs significantly between those who are competitive in world markets classified as rural world 1, those who are engaged in primary local and national markets, classified as rural world 2 and those who are marginalised even from their local economy, classified as rural world 3. Suggestion given by IFAD (2011) is to continuously increasing the efforts of integrating smallholder farmers into these markets.

IFAD (2011) defines subsistence producers as the ones where the true access gap is more evident as compared to the local market oriented producers where they experience the market efficiency gap. The market gap does not exist among globally competitive market oriented producers. The role of the public and the private sector is to create market infrastructures and institutions that are needed to lower transaction costs in order to improve the link between the three types of producers.

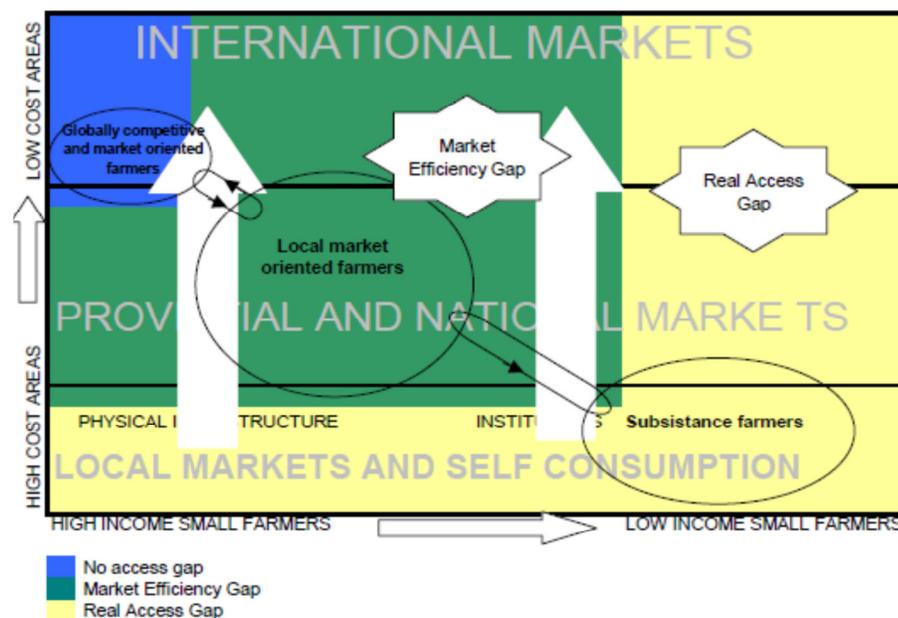


Figure 2: Integrating farmers to access the global markets
Source: IFAD, 2011 page 12.

Several factors are associated with difficulty access to markets among smallholder farmers, among of those is remoteness of where the farming activities is taking place. Remoteness results in low farm-gate price, low returns to labour and capital and increased input costs. This in turn demotivates farmers to participate in economic transactions, making them being reluctant to invest in their farming activities resulting into subsistence rather than market-oriented production systems (Holloway and Ehuis 2002; UNIDO, 2012).

Sparsely populated rural areas, remoteness from towns, lack of assets, inadequate training, high transport costs, inadequate market information, insufficient negotiation skills and poor collective organisation are considered as barriers to markets access (Holloway and Ehuis, 2002; KIT and IIRR, 2008).

2.2.3 Beef production systems

Livestock production systems in many developing countries are varied, ranging from extensive pastoral systems dominated by smallholders and semi-subsistence production to large scale commercially oriented industrial production systems (McDermott, Staal, Freeman, Herrero and Van de Steeg, 2010). In Tanzania livestock farming is conducted in form of traditional production systems while commercial production is limited to ranches and feedlots (MLD, 2011; UNIDO, 2012). Smallholders practice pastoralism and agro-pastoralism production systems. Pastoralism is a traditional production system practiced by about 1% of the rural households in Tanzania. In this system large herds of livestock are kept and most of these are of the indigenous breed known as Tanzania Short horned Zebu (TSZ) that are well adapted to the harsh climatic conditions and they are resistant to common local diseases (UNIDO, 2012). In this system producers rely on traditional knowledge to adapt to climatic conditions including; flexibility to natural resource use, mobility and diversification of herds to reduce risks from droughts and disease outbreak. Pastoralists depend on communal grazing lands and thus due to seasonal changes they are forced to migrate in search of water and pasture for their animals (UNIDO, 2012).

Agro-pastoralism is a system practiced by about 40% of rural households in Tanzania contributing to about 80% of the beef produced in the country making it to be the most important livestock production system for the country's beef sector (UNIDO, 2012). This is a mixed system whereby livestock and crop production are practiced together and depends on each other. While livestock are grazed in harvested fields, animal manure is applied on crops (NBS, 2012). In comparison to the pastoralism whereby producers are in constant search of pasture and water, agro-pastoralists face additional challenges from land pressure and limited pasture for their animals. In addition to that; insufficient attention is paid to adequate livestock management, animal husbandry techniques, feeding and disease control. In some rare cases, agro-pastoralists practice animal feed conservation in form of hay and crop residues. In this respect they most keep indigenous breed which have very limited potential for commercialisation (UNIDO, 2012).

About 80% of the pastures used by livestock producers for grazing their animals are communally owned rangelands, limiting the potential for feeding livestock from improved pastures. The incentives for households, villages or producer groups to invest in improving pastures are low when others are free to use the available pastures. Some agro-pastoral communities have started practicing leasehold ownership of land based on allocations made under the village land act of 1999. However incentives to improve range management are very low due to the high costs of investment (UNIDO, 2012).

2.2.4 Herd size, structure and dynamics

Herd size and structure are important indicators for understanding the characteristics of livestock systems (Covarrubias, Nsiima and Zezza, 2012). The average herd size per cattle holding in the smallholder sector in Tanzania is 13 heads (NBS, 2012). The roles of livestock and the potential of their commercialisation are largely determined by ownership patterns and herd sizes at household level (Negassa, Rashid and Gebremedhin, 2011). Livestock producers need to have surplus live animals or livestock products that can be tapped through changing market incentives and opportunities. Generally, pastoralists have larger herd sizes than smallholder agro-pastoralists (Negassa *et al*, 2011).

The structure of a cattle herd can be defined and described basing on sex, weight, breed or age groups. In pastoral communities the ratio between new-born male and female calves in a herd is approximately one to one. However; among the mature animals, the ratio is generally much biased in favour of female animals. Male calves are slaughtered or sold at their young ages (Nyariki, Mwang'ombe and Thompson, 2009). According to Nyariki *et al* (2009) more than half of pastoral herds composed of female animals with very low proportion of calves.

Cattle herds are dynamic due to inflows and outflows of animals in a given time. Understanding the dynamic of the herd helps to see to what extent the herd structure is stable over a given year (Negassa and Jabbar, 2008). There are different factors that are associated with cattle inflows and outflows among smallholder producers and pastoralists (Negassa and Jabbar, 2008). The inflows of cattle among the majority of smallholder producers and pastoralists are through births from the current herd and purchases from the local markets (Negassa and Jabbar, 2008). In smallholder producers and pastoralists birth is more important in animal inflows than market purchase in building and maintaining herd size (Negassa and Jabbar, 2008). According to Barret, Osterloh, Little and McPeak (2004) markets are not commonly used by larger pastoralists for restocking however; poor pastoral households rely more on market purchases for restocking. Livestock outflows from a herd can be explained basing on four components namely deaths, sales, slaughter, gifts and theft (Negassa *et al*, 2011). Sales and deaths are the major components of herd outflows among smallholder producers and pastoralists, while on farm slaughter, gifts and theft are very minimal (Negassa and Jabbar, 2008).

2.2.5 Related and supporting industries

Rapid changes in the social and economic environments are creating challenges to smallholders to supply their produce to the markets and their ability to improve household's livelihoods. One of the major changes is the reduced government support for and intervention in agriculture and especially in rural areas (World Bank, 2004; KIT, Faida MaLi and IIRR, 2006). Governments in developing countries including Tanzania have significantly reduced support to farming communities due to structural adjustment programmes. This can be well observed on the decline of investment in rural infrastructures such as roads, electricity and telecommunications, input subsidies, marketing schemes and research and extension services (World Bank, 2004; KIT, Faida MaLi and IIRR, 2006).

In the country; low level of access to inputs and financial credit, high incidence of livestock diseases and poor dissemination and uptake of knowledge on improved management practices among smallholder livestock producers are recognised as constraints to the development of the Tanzania smallholder livestock sector (Njombe and Msanga, 2005; MLD, 2006). The use of inputs among smallholder livestock producers in Tanzania is very minimal. Studies conducted

by Covarrubias *et al* (2012) shows that only 6% of surveyed smallholder livestock producers hired labour for work in livestock related activities and 15% purchased fodder for their animals.

Access to adequate and timely financial services for all actors in the chain is considered as a key element for success. As for large producers and traders, smallholder producers also need access to appropriate financial services to make optimal use of value addition and income generation, however; such support is not always available for smallholder producers (KIT and IIRR, 2010). Most of the financial institutions are avoiding rural finance since they perceive it as risky and costly with cash flow requirements that are irregular and difficult to manage. Most of the financial institutions avoid high transaction costs associated with working with individual smallholder producers and the risks of livestock diseases (KIT and IIRR, 2010). In addition; the lack of physical collateral among smallholder producers is a restriction and the risk of political interference that can damage the payment behaviour among smallholder producers is high (KIT and IIRR, 2010). According to Covarrubias *et al* (2012) access to credit for rural households is extremely limited and the value of loans received varies according to land size. In their study; Covarrubias *et al* (2012) found that 6% of the surveyed population of smallholder livestock producers received credit and 5% reported to have membership in a credit or savings group.

Access to extension services among smallholder livestock producers is also limited. Few smallholder livestock producers access these services, usually the services received includes advises on the production practices or prevention of livestock diseases, however; access is positively related to herd size and wealth (Covarrubias *et al*, 2012). The government of Tanzania has a major function of providing extension services, and these services still remains entirely financed by the government (Rutatora and Mattee, 2001). For many years there has been government dominance in the provision of extension services with decline of resources, while coordination with the private sector and Non-Governmental Organizations (NGOs) has been very minimal (Rutatora and Mattee, 2001). NGOs and farmer-led initiatives have over time supplemented the government extension delivery with cost sharing, but their efforts have neither been formally integrated in the extension system nor has their potential to reduce public expenditure and improve quality of extension services been taken care of (MAC, 2000).

2.2.6 Government regulations

There is increased Tanzania government interest to make the livestock sector more vibrant and expand production and productivity on a sustainable basis. The government is undergoing a rapid pace of policy change. A number of institutional changes have been taking place within few years, to name a few includes; vision 2025, the National Growth and Reduction of Poverty, the Rural Development Strategy and Livestock policy (Mattee and Shem, 2006). There are several policies and laws that are specific to the livestock sector including the Veterinary Act No. 16 of 2003, Animal disease Act No. 17 of 2003, livestock policy of 2006, Meat industry act number 10 of 2006, Hides and Skin Act No. 18 of 2008, Animal welfare Act No. 19 of 2008, Livestock Identification, Registration and Traceability Act No. 12 of 2010 and Grazing land and Animal Feed Resources Act No. 13 of 2010. In addition; there are policies and laws that are dealing with access to pastoral resources like the land and village land acts of 1999 (MLD, 2011).

The Veterinary Act is focusing on the use of para-veterinarians and community animal health workers (CAHW) in providing extension services in rural areas. However; many pastoral communities have not yet realised the provisions of the law. The law also facilitates the possibility for training and using para-veterinarians as a strategy to increase and improve availability of livestock extension services in remote areas (SNV, 2012). The establishment of the meat board and other stakeholder organisations is under the Meat Industry Act which

promotes production, processing and marketing of quality meat and meat products. On the other hand; the grazing land and animal feed resources Act promotes the supply of good quality animal feed and controls the use of grazing land for the interest of livestock producers and sustainable natural resource use (MLD, 2011). The animal disease Act makes the provision for the surveillance, control and prevention of animal diseases and assurance of safety and quality of livestock products. Establishment of the national livestock identification, registration and traceability system for animal disease control, market accessibility, theft control and food safety are under the Livestock Identification, Registration and Traceability Act. Humane care of animals and incidental matters are taken care by the Animal welfare Act (MLD, 2011).

According to the land and village land acts, all land is government property, and the president of Tanzania is the trustee for that land. Village land is defined into plots and certificates of rights of occupancy and is distributed, however; it is difficult for smallholders to get (Schrock, Anderson and Gugerty, 2011). According to Schrock *et al* (2011), one of the biggest challenge surrounding land rights in Tanzania is the issue of conflict between reserve land rights and land rights for pastoral and agro-pastoral communities. Most smallholder producers have not yet realised the full potential benefits of the new land laws in terms of increased access to land or improved management of communal land.

2.2.7 Chance: Drought and diseases

Different disasters have similar consequence on the health and welfare of livestock. A number of geographical disasters can cause reduction of production efficiency and deaths. Disasters with high impact can negatively affect long term stability of livestock farmers' economies, the environments and social structures (Heath, Kenyon and Zebedia-Sein, 1999). The major causes of livestock disasters in developing countries are geophysical events like floods, drought and livestock diseases and the frequency and impact of disasters in these countries is much higher (Heath *et al*, 1999). The economic impact of livestock disasters to smallholder producers is much higher since livestock are kept as repository for wealth and an important means for draught power for cultivation and transportation. Disasters that affect livestock can therefore affect the welfare of smallholder livestock producers (Heath *et al*, 1999).

Dodoma is a semi-arid region; drought is a recurrent feature of most semi-arid regions of Southern Africa (Mogotsi, Nyangito and Nyariki, 2013). Due to its characteristics of inadequate moisture, the soil during drought cannot support arable crop farming or natural pastures for livestock. Drought interfere many agro-pastoral systems and may lead to food insecure among many smallholder livestock producers (Mogotsi *et al*, 2013). According to Lesnoff, Corniaux and Hiernaux (2012) dynamics of cattle populations in arid and semi-arid tropical Africa are highly influenced by drought, which can create dramatic drop in herd sizes as well as disturbances in sex and age structures. Animal diseases are among the factors that negatively affect livestock production among smallholder producers in the country. Controlling animal diseases plays an important role in improving the livelihood of smallholder livestock producers (MLD, 2011). Drought has a serious impact on livestock market, for example the serious drought that occurred in Tanzania in 2007 affected the export of live animals (Table 1, section 2.2.1) due to lower quality and dramatically decreased the price of meat and the situation of civil war in Democratic Republic of Congo at that time lead to the increase of export of lower quality meat at low price.

2.3 Beef ranching

Barber and Wood (1976) defined a ranch in East Africa, Tanzania included; as a large farm extensively managed, usually over 2,000 hectares in a marginal rainfall zone which is not

suitable for arable farming. They further explain a marginal rainfall as that with an average below 750mm annually. There are several zones that are suitable for various livestock ranching and each zone is suitable for a certain breed of cattle (Barber and Wood, 1976). According to Barber and Wood (1976), the behaviour of cattle under different conditions gives a clue to their needs and forms an on-going part of a livestock farmer's daily activities. They further explain that; some animals within each breed are more adaptable than others and therefore the first task of the farmer is to find the right breed for his environment. In East Africa, including Tanzania; areas have been divided in 6 different ecological zones and suggestions has been given on the cattle breed suitable for each ecological zone.

Table 3: Ecological zones suitable for livestock ranching

Ecological zone	Approximate metres above sea level	Suitable breeds
1. Very high altitude, High potential	2,500 and over	Galloway
2. High altitude, High potential	2,100 to 2,500	Exotic dairy breeds
3. As above but lower potential	2,100 to 2,500	Exotic dual purpose
4. Medium altitude, Medium potential	1,500 to 2,100	Dairy ranching, Cross breeding with Zebu
5. Low altitude, Low potential	900 to 1,500	Boran and Sahiwal
6. Very low altitude and potential	Down to sea level	Local Zebu

Source: *Livestock Management for East Africa, 1976*

2.3.1 Ranch Management process

Ranch management involves a number of processes. Barber and Wood (1976) suggest; policy, stocking plan, budget, organisation, supervision and information as processes that are necessary for ranch management.

Policy: These include the aims and objectives of the ranch which must first be decided before starting the ranching operation. It is necessary to decide whether the ranch will rare beef calves to maturity, type of breed and breeding policy to be used and approximately the amount of income expected from these activities (Barber and Wood, 1976). Other policies suggested by Barber and Wood (1976) include; location of the ranch, type of grazing and marketing facilities.

Stocking plan: Barber and Wood (1976) suggests that; a stocking plan have to be completed before budgeting, because conclusions on the possible income and expenditure can be drawn when the projected purchases, births and sales of cattle have been calculated.

Budget: This cover all financial aspects including expected income from cattle and other sales, expenditure in animal purchases, workers' wages, fuel for running various ranch machinery, machinery operation, fencing and water installation. The major aim of having budget is to check whether the policy and stocking plan are likely to succeed financially. It also helps as a guide during the year for all aspects of ranch administration (Barber and Wood, 1976).

Organisation: According to Barber and Wood (1976), ranch manager has a responsibility to organise a programme for the cattle including daily times of moving to grazing and water, grazing paddock for each herd, daily herd counts, weekly dipping, service of cows, heifers, and

calves branding. They further suggest that; the manager should ensure that, whilst asking the best from the employees in terms of work and service, they should also make sure that workers are getting better services such as housing, regular payment of wages, arranging leave periods and most important acknowledging the best work done by their employees so as to achieve the best in terms of good relations and co-operation.

Supervision: As the ranch becomes larger it is necessary to give responsibility to others. Therefore headmen are needed to oversee herd counts, dipping and day-to-day management of beef breeding herds. Supervision of the work is partly conducted by the headmen whose duty is to report to the ranch manager on a regular basis (Barber and Wood, 1976).

Information: Information from the ranch records is very important to keep the policy and the management practices relevant. Barber and Wood (1976) suggests that; by comparing the information obtained from the records with the budget and stocking plan, the manager can, at the end of the year assess what changes should be made in the management practices and any necessary policy changes for the coming year.

2.3.2 The National Ranching Company (NARCO)

NARCO is government owned company established in 1975 under the company ordinance with the support from World Bank loan under the low cost investment strategy that aimed at establishment of basic ranching infrastructure such as dam construction, roads-firebreaks, and other basic livestock structures including dips and cattle handling yards.

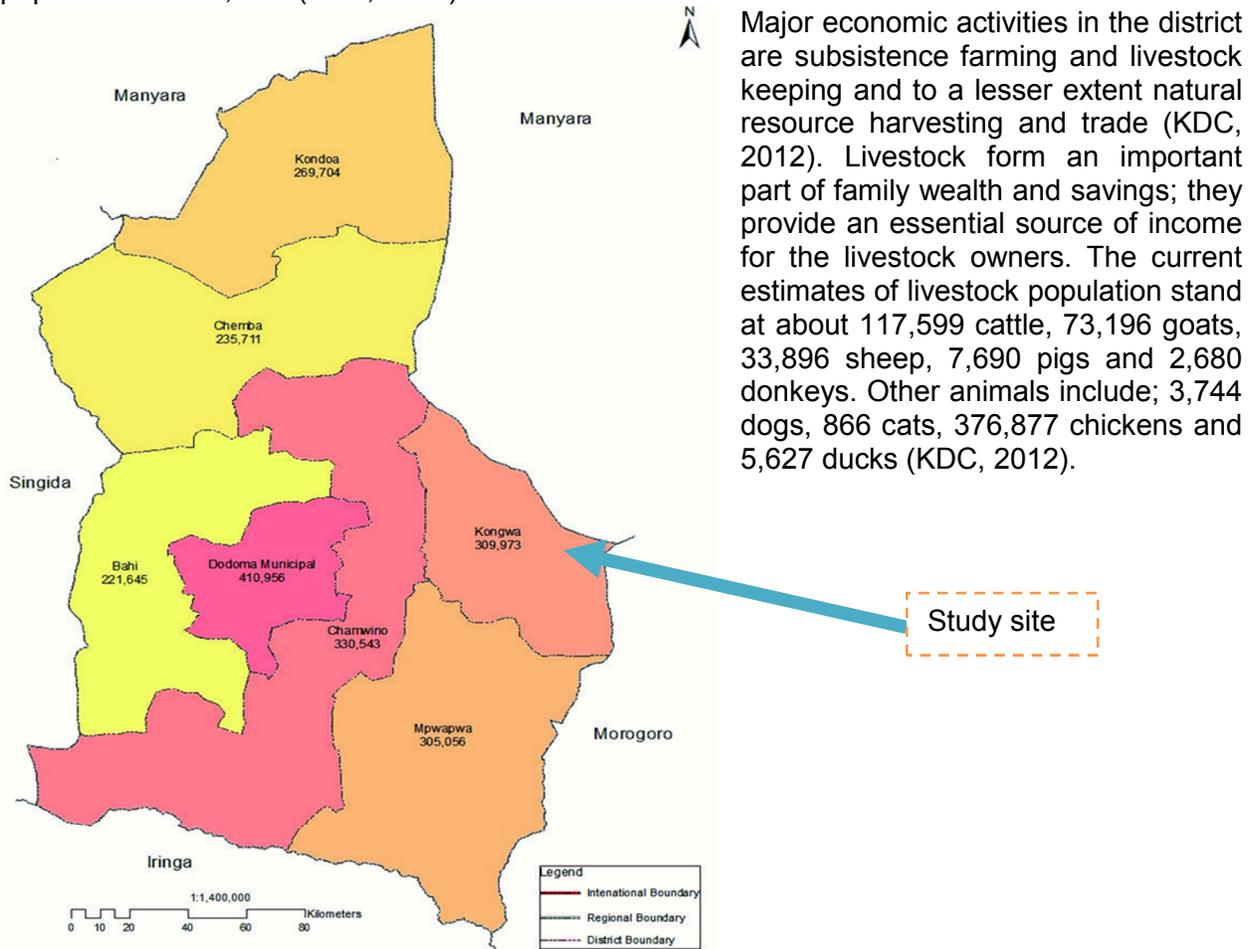
Before the establishment of NARCO, some of the ranches were under different authorities. Large scale ranching of livestock started in 1947 when groundnuts producing farms of Kongwa and Nachingwea were introduced by then known as the Overseas Food Cooperation in order to supply beef to workers in the groundnut schemes (LARRRI, 2009). According to LARRRI (2009), livestock production was transferred to Tanganyika Agricultural Corporation (TAC) in 1954. In 1967, Tanzania introduced what called Arusha declaration from which efforts were undertaken to nationalise these ranches in order to maximise production of beef for domestic and export markets. Following this nationalisation, all ranches in 1968 were kept under the control of the then National Agricultural Company (NACO). Six years later in 1974, the government established a specific parastatal organisation which was responsible for supervising all livestock development in the country known as Tanzania Livestock and Development Authority (LIDA). However this parastatal organisation existed for only one year and in 1975 the government established the National Ranching Company (NARCO) to replace LIDA (LARRRI, 2009). The main activity of NARCO is ranching of beef cattle, goats and sheep.

3.0 METHODOLOGY

The research has quantitative and qualitative approach and it was based on empirical data and literature. Information was collected through desk research on available literature on the topic, field surveys, observations and personal interviews.

3.1 Study site

The study was conducted in Kongwa district Dodoma, Tanzania. The district is located about 86km on the eastern part of Dodoma, the capital city of Tanzania. It is among the seven districts of Dodoma region. The district has an area of 4041km² with 3 divisions, 22 wards, 74 villages and 332 sub-villages. Kongwa borders Chamwino district on the west, Kiteto district (Manyara region) on the North, Kilosa district (Morogoro region) on the East and Mpwapwa district on the south. According to the national population and household census of 2012, the district has a population of 309, 973 (NBS, 2012).



Major economic activities in the district are subsistence farming and livestock keeping and to a lesser extent natural resource harvesting and trade (KDC, 2012). Livestock form an important part of family wealth and savings; they provide an essential source of income for the livestock owners. The current estimates of livestock population stand at about 117,599 cattle, 73,196 goats, 33,896 sheep, 7,690 pigs and 2,680 donkeys. Other animals include; 3,744 dogs, 866 cats, 376,877 chickens and 5,627 ducks (KDC, 2012).

Figure 3: Dodoma region map

Source: National bureau of statistics: <http://www.nbs.go.tz/>

3.2 Research design

In order to have a clear understanding of the situation of the beef chain in Kongwa district, a research framework was designed and presented on the following figure;

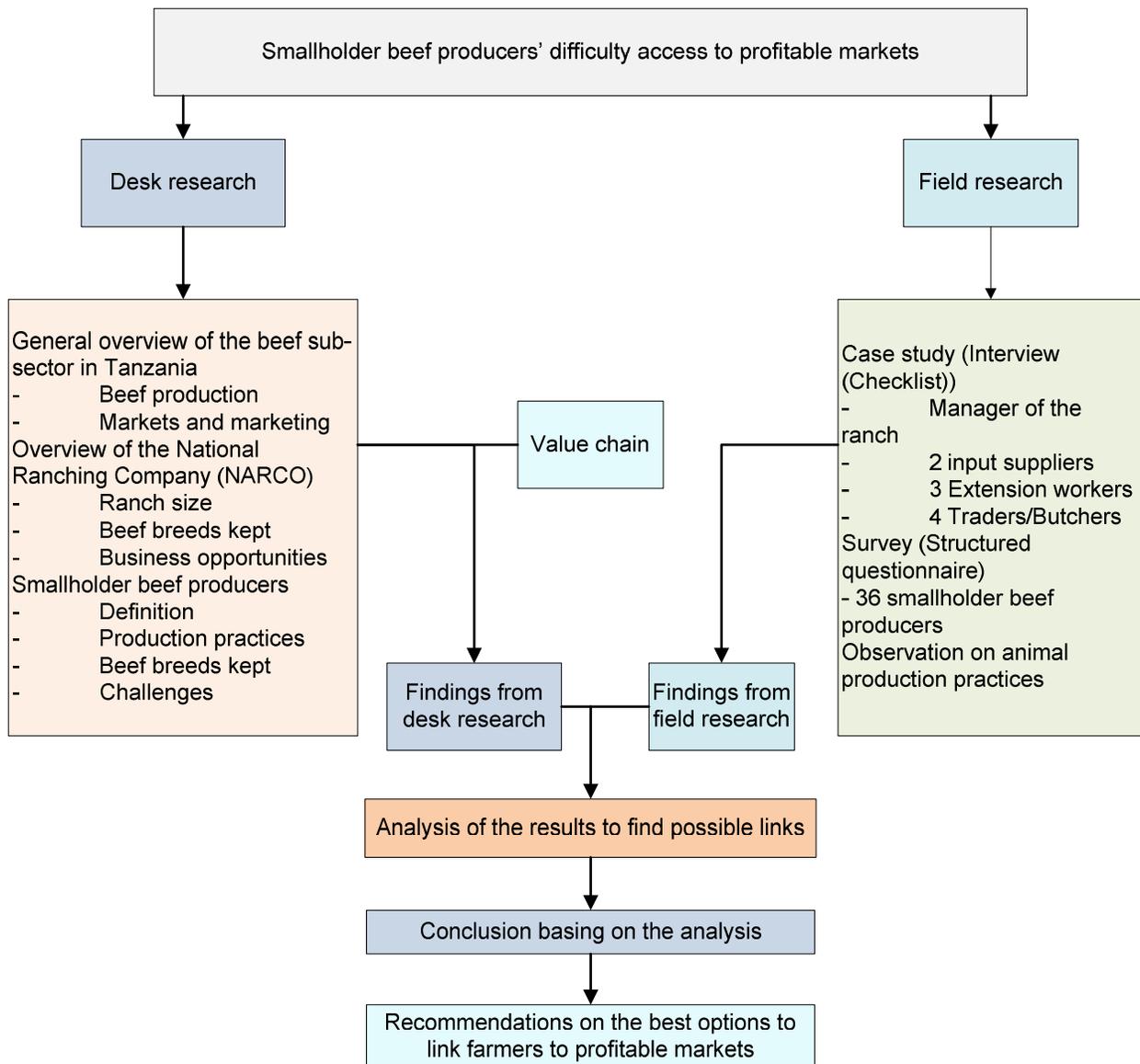


Figure 4: Research design

3.2.1 Desk research

Desk research was conducted to collect primary, secondary and some tertiary literature. Relevant theories, concepts and information were gathered to better understand the research context and prepare for field works. Available relevant documents from websites of the ministry of livestock development and fisheries, ministry of industry, trade and marketing, national bureau of statistics, Kongwa district council, Tanzania meat board and the National Ranching Company were reviewed.

3.2.2 Case study

This method involved interviews with 10 stakeholders actively involved in the beef subsector in Kongwa district. The interviews were conducted in face to face process by using checklists questions (attached in Annex 1, 2, 3 and 4). A combination of individual interview, observation and content analysis were used to gather in depth information from different sources, a research technique described by Verschuren and Doorewaard (2010) as triangulation of sources.

I) Interview with Input suppliers

Interviews focused mainly on the challenges faced by input suppliers on the beef subsector. 2 input suppliers were purposively selected for the interview.

II) Interview with Traders/Butchers

Checklists of questions on the challenges faced by the 4 traders (Purposively selected) in the district were used to collect information. Their views towards linking the two chains were also collected. Recordings and interview transcripts were prepared based on the interview questions.

III) Interview with Extension workers

Checklists of questions focusing mainly on the challenges facing extension workers in the 3 villages towards supporting the beef chain were prepared to collect information. Their views towards linking the two chains were gathered. Extension workers were recorded and transcripts of the interviews were prepared.

IV) Interview with the Manager of NARCO-Kongwa

Checklist of questions that prepared based on the Universal Business Model (UBM) was used to collect information about NARCO-Kongwa. Information on the capacity of the ranch to address challenges of smallholder beef producers especially the challenge of profitable market access were collected. Views of the ranch management towards working with smallholder farmers were also gathered. Recording and interview transcript were prepared based on the interview questions.

3.2.3 Observations

This method of data collection based on what observed during the data collection during interview with smallholder beef producers and manager of NARCO Kongwa in relation to production practices and quality control measures applied in the chain.

3.2.4 Survey

A survey was conducted in three villages in the district purposively selected from three wards among the 22 wards of the district to collect primary data by structured questionnaires. Farmers were grouped into two clusters based on their herd size. Cluster 1; involved farmers with herd size ranging from 1 to 25 heads of cattle and cluster 2 involved farmers with herd size ranging from 26 to 50 heads of cattle. The livestock extension officers for each village assisted in data collection by using random sampling to choose 12 smallholder beef producers from each village. Interview of farmers was done individually at their premises to be sure the farmers' answers are not affecting each other and to give opportunity for the researcher to conduct observational studies. The questionnaire focused on general production practices and marketing. The questionnaire is presented in Annex 5.

Sampling method

The method of sampling selected by the researcher was purposive sampling to select villages that keep beef cattle, however random sampling was used to select smallholder beef producers

for interview within the selected villages. Depending on the time and amount of resources available; 4 traders, 2 input suppliers, 3 extension officers and manager of NARCO Kongwa were purposively selected to gather in-depth information.

Sample size

The following formula was used to calculate the required sample size;

$$N = \frac{t^2 \times p(1-p)}{m^2}$$

Where;

N = required sample size

t = confidence level at 95% (standard normal deviate set at 1.96)

p = proportion of the smallholder beef producers in the target population; if not known use 50%,

m = margin of error at 5% (standard value of 0.05)

Source: (IFAD, 2013) at http://www.ifad.org/gender/tools/hfs/anthropometry/ant_3.htm

Therefore

$$N = \frac{1.96^2 \times 0.5(1 - 0.5)}{0.05^2}$$

N = 384 smallholder beef producers

Therefore sample size calculated was 384. However, the planned sample size was only 36 smallholders and this is the main limitation of this research. In addition; 4 beef traders operating in the district, 2 registered input suppliers operating within the district, 3 extension officers working with farmers in the selected villages and manager of NARCO Kongwa making a total sample size of 46 were interviewed.

3.3 Data processing

Microsoft office and Excel 2010 were used to make inventory of the information collected. Different analytical tools were used to analyse data. Data collected from case study (interview with manager of NARCO Kongwa) were analysed by using universal business model. Data from interview with input suppliers, traders, extension officers and producers were analysed by using value chain. Information collected from the survey study, some were analysed by using Microsoft excel 2010 and some were coded and analysed by using Statistical Package for Social Sciences (SPSS version 16) whereby comparison of responses such as age, herd size, access to market information and distance to market were analysed by using descriptive statistics. Cross tabulation and Chi square were used to compare market accessibility between the two clusters.

Table 4: Summary of information collected and sources

sub-question	Data/parameters	Source	Tool of data collection
1.1	Actors and their roles in the beef chains	- Desk research - Manager of NARCO Kongwa - Traders - Input suppliers - Beef producers	- Internet search - Case study (interview) - Survey (Questionnaire)
1.2	Relative value share of each actor in the chain	- Desk research - Manager of NARCO Kongwa - Traders - Beef producers	- Internet search - Case study (Interview) - Survey (Questionnaire)
1.3	Quality control measures existing in the beef chains	- Desk research - Manager of NARCO Kongwa - Traders - Beef producers	- Internet search - Case study (Interview) Survey (Questionnaire)
1.4	Challenges facing smallholder beef producers, traders and NARCO Kongwa	- Desk research - Manager of NARCO Kongwa - Traders - Beef producers	- Internet search - Case study (Interview) - Survey (Questionnaire)
1.5	Impact of herd size on market accessibility among smallholder beef producers	- Smallholder Beef producers	- Desk research - Survey (Questionnaire) - Observation
1.6	Methods used by smallholder beef producers to access market information	- Smallholder beef producers	- Survey (Questionnaire)

sub-question	Data/parameters	Source	Tool of data collection
2.1	Production capacity of NARCO Kongwa	- Manager of NARCO Kongwa	Case study (Interview)
2.2	Beef production technologies practiced by NARCO Kongwa	- Manager of NARCO Kongwa	- Case study (Interview)
2.3	Capacity of NARCO Kongwa to meet demand of its customers	- Manager of NARCO Kongwa	- Case study (Interview)
2.4	Methods used by NARCO Kongwa to access market information	- Manager of NARCO Kongwa	Case study (Interview)

4.0 RESULTS

The beef subsector in Kongwa district is composed of two chains; one unorganised (informal) and organised one (formal). This chapter summarises the findings from the case study, observations and survey study. The findings are presented in two parts; the first part include results from the case study and mainly from interview of stakeholders involved in the beef subsector and actors in the informal and formal beef value chains in Kongwa district. The second part presents the findings from the field survey which included response from smallholder beef producers from the three villages surveyed and observations.

4.1 Results from the case study:

This section presents the results of the case study which involved input suppliers, traders, extension workers and the Manager of NARCO-Kongwa.

I) Interview with input suppliers:

These were conducted individually at their working areas. Before the interview, the researcher introduced the purpose of the interview and requested for recording the interview process. One of the input suppliers Mr Mwiswa agreed to be recorded however; he preferred to use Swahili as the language of communication. The interview took about twenty minutes with some few discussions in between. The major challenges facing the input suppliers include transport costs, low knowledge among workers in their shops, inadequate market for their inputs as farmers do rarely use inputs and higher prices of inputs from their sources.

II) Interview with traders

Two traders, Mr Rukasho and Mr Simley were interviewed at the local market and two, Mr Ngonyani and Mr Azaria at the slaughterhouse. It was difficulty to have enough time to interview traders at the local market as they were very busy with the business. So the researcher has to wait till they finish. Recording at this place was not conducted as it was very noisy and sometimes the interviews were stopped to try to serve the researcher and interviewee lives' from animals with abnormal behaviours. The main challenges identified were multiple taxes including market fee, road blockades, movement permit, abattoir fee, butcher fee and business licence.

Other challenge mentioned by Mr Ngonyani was high interest rates; he said they are getting profit but they take all the profit to the bank as interest. Other challenges mentioned by traders include low quality animals especially during the drought season leading to higher carcass and organ condemnation. Their views towards linking smallholders to NARCO were collected and Mr Ngonyani said; *"It is good if it will benefit all of us"*.



Photo 1: Interview with Mr Rukasho at the local market

III) Interview with extension workers

Extension workers were interviewed at their working stations. The interviews took about 25 to 30 minutes. Their main challenges include low knowledge among smallholders. Another challenge mentioned by Ms Mgongolwa and Mr Godfrey was emerging livestock diseases. They said there are new livestock diseases which they didn't come across before making them difficult to diagnose and treat. They further mentioned that; without having transport facilities like motorcycles it is difficult for them to reach more farmers as they are walking on foot.

IV) Interview with the Manager of NARCO-Kongwa

Interview with the manager of NARCO-Kongwa was conducted at the ranch offices in Kongwa district on 22 and 23 July 2013 after getting a written permission from the ranch headquarters in Dar es Salaam. The interview was conducted for one hour in the first day and another hour in the second day due to the availability of the Manager. Detailed information about NARCO-Kongwa is in the analysis report based on the UBM model at annex 8.

From the interview, the ranch has an area of 38,000 hectares of land with a capacity of keeping 14,000 herds of cattle but currently the ranch has only 8,000 herds of cattle. Apart from land, the ranch also has a mini abattoir and two chilling rooms with a capacity of handling 100 carcasses per day but currently animals are sold live and only about 5 animals are slaughtered at the abattoir. Generally the ranch has conception rate of 90 %, calving rate 85%, mortality rate 1.5%, weaning rate, 75% and off take rate of 25%. The average production cost per animal is 50,220/= Tsh. Sales and marketing costs averages 11, 270/=Tsh. per animal. NARCO sales about 2000 beef cattle per year with a turnover of about 1.2 Billion Tanzanian shillings

The interview with the Manager also revealed that; the ranch uses few modern production technologies and mainly includes artificial insemination and animal feedlot. The semen used for artificial insemination is imported from the Netherlands through one of the government institute in Tanga region known as Buhuri training institute. There are two feedlot areas currently present at the ranch, one with a capacity of holding 2000 herds of cattle at a time and another one with a capacity of 100 heads of cattle.



Photo 2: Beef feedlot (right) and butcher (left) at NARCO-Kongwa
Source: Field observation by the researcher.

The Manager further explains that; currently the ranch has a number of customers with different requirements. The ranch tries to meet the requirements though constant supply especially on the export market is still a challenge. The main products produced at the ranch include different

beef cuts and live animals. The beef cuts produced at NARCO are Kongwa beef, different types of stakes, ox-liver, ox-heart, ox-kidney, ox- tail, beef fat, ox-head, red offal, beef intestines and pet food (Photo 3).



Photo 3: Beef cuts and their prices at NARCO-Kongwa
 Source: Field observation by the researcher.

The interview further reveals that; NARCO has different sources of market information and all workers are responsible for searching market information. The major sources of information at the ranch include; television stations, local and international newspapers, brochures, local and international radio stations and different internet websites.

The major constraints facing the ranch and interferes its production include; animal diseases that sometimes interferes with the meat export business, high quality standards that set by the international markets which are difficulty to meet, animals from neighbouring villages grazing on the ranch creating difficulties in controlling animal diseases, bush fires that burn animal pasture in the ranch and absence of weighing balances at local markets creating difficulties for the ranch to buy animals at local markets in the district.

4.1.1 Actors and their roles in the beef chains

The actors identified through interviews were input suppliers, smallholders and NARCO-Kongwa as producers of beef cattle, traders who are also owners of butchers and consumers. Their roles in the informal and formal beef chains were identified and presented in table 5. Apart from actors, supporters of the beef chains were also identified including extension workers, Kongwa district council, Ministry of livestock and fisheries development, Tanzania meat board and Sokoine University of Agriculture. Roles of these supporters are presented in table 6.

Table 5: Actors and their roles in the beef chain

Actor	Informal chain	Formal chain	Roles
Input suppliers	KU Farming, Kongwa Farmer Care, Duka la pembejeo za kilimo na mifugo Kongwa.	Farmers' centre, Anicrop, Baytrade, Farmbase, MLD, LMUs.	Sourcing and selling animal inputs like drugs, chemicals, equipment, concentrates, calves and vaccines. Providing advice to farmers on the proper use of the inputs.
Producers	Smallholder beef producers.		Producing beef cattle, raising and selling them to local traders in the district
		NARCO-Kongwa.	Producing animals, slaughtering, processing and selling live and processed meat to local, regional and global markets.
Traders	-Kongwa catering services. -Azaria. -Rukasho. -Simley.		Buying animals from farmers and the local markets. Slaughtering animals and selling at local butchers.
Processors		NARCO-Kongwa.	Processing beef into different beef cuts for selling to customers
Retailers	-Kongwa Catering Services. -Azaria. -Rukasho. -Simley.	NARCO Kongwa at the ranch and one butcher at the district.	Selling warm beef to customers in the district.
Consumers	-Institutional consumers in the district. -Individual consumers in the district.	Individual consumers in the district and in urban areas in Dodoma and Dar es Salaam, Institutional consumers in Dodoma and Dar es Salaam.	Buying warm beef from butchers within the district.

Table 6: Supporters of the beef subsector in Kongwa district

Supporter	Roles in the informal chain	Roles in the formal chain
Kongwa district council	<ul style="list-style-type: none"> -Provision of extension services to smallholder beef producers through village extension workers. -Business registration and provision of business licences to traders. -Meat inspection at slaughterhouses and slaughter slabs in the district. 	<ul style="list-style-type: none"> -Setting bylaws that govern proper operations of ranching activities in the district. -Provision of movement permit for sold live animals.
Ministry of Livestock and Fisheries Development	<ul style="list-style-type: none"> Provision of vaccines for trans-boundary animal diseases to smallholder beef producers. Setting policies that governs beef production among smallholder beef producers in the country. 	<ul style="list-style-type: none"> Provision of vaccines for trans-boundary animal diseases to the National Ranching Company. Setting policies that govern ranching activities.
Tanzania meat board	<ul style="list-style-type: none"> -Organising and promoting all activities that relate to the development of beef business in the country. -Looking for and developing livestock and livestock products' markets within and outside the country. -Supervising production of quality beef and beef products. -Taking care of interests of meat producers in the country. 	
Sokoine University of Agriculture	<ul style="list-style-type: none"> Conducting research on animal nutrition and marketing. 	

The actors and supporters of the beef subsector in Kongwa district as identified on the case study are presented by using chain maps in figure 5 and 6. The red arrow in the maps indicates money flow, blue arrow information flow and black arrow product flow. Smallholders in figure 5 have value share of 57% and traders who are also owner of butchery 43%. The chain is supported by the district government and the ministry of livestock and fisheries development

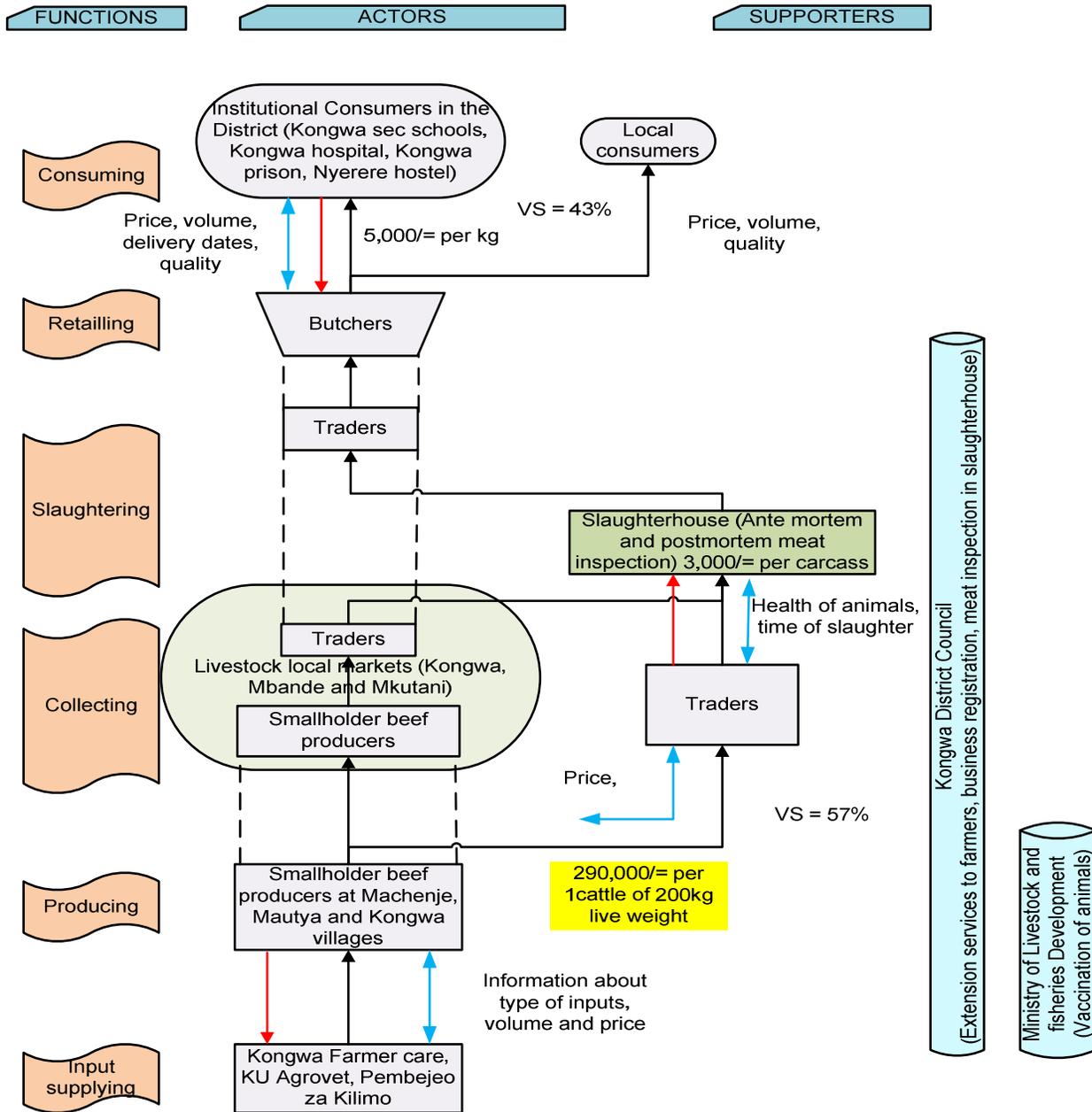


Figure 5: Beef chain map (Smallholder producers)

NARCO integrates all activities in the chain from production to retailing, figure 6. There are different meat cuts sold at the ranch butcher and other butchers owned by the ranch in urban areas. Export is to Middle East, Zambia and Comoro and it is only 5% of the total annual sale.

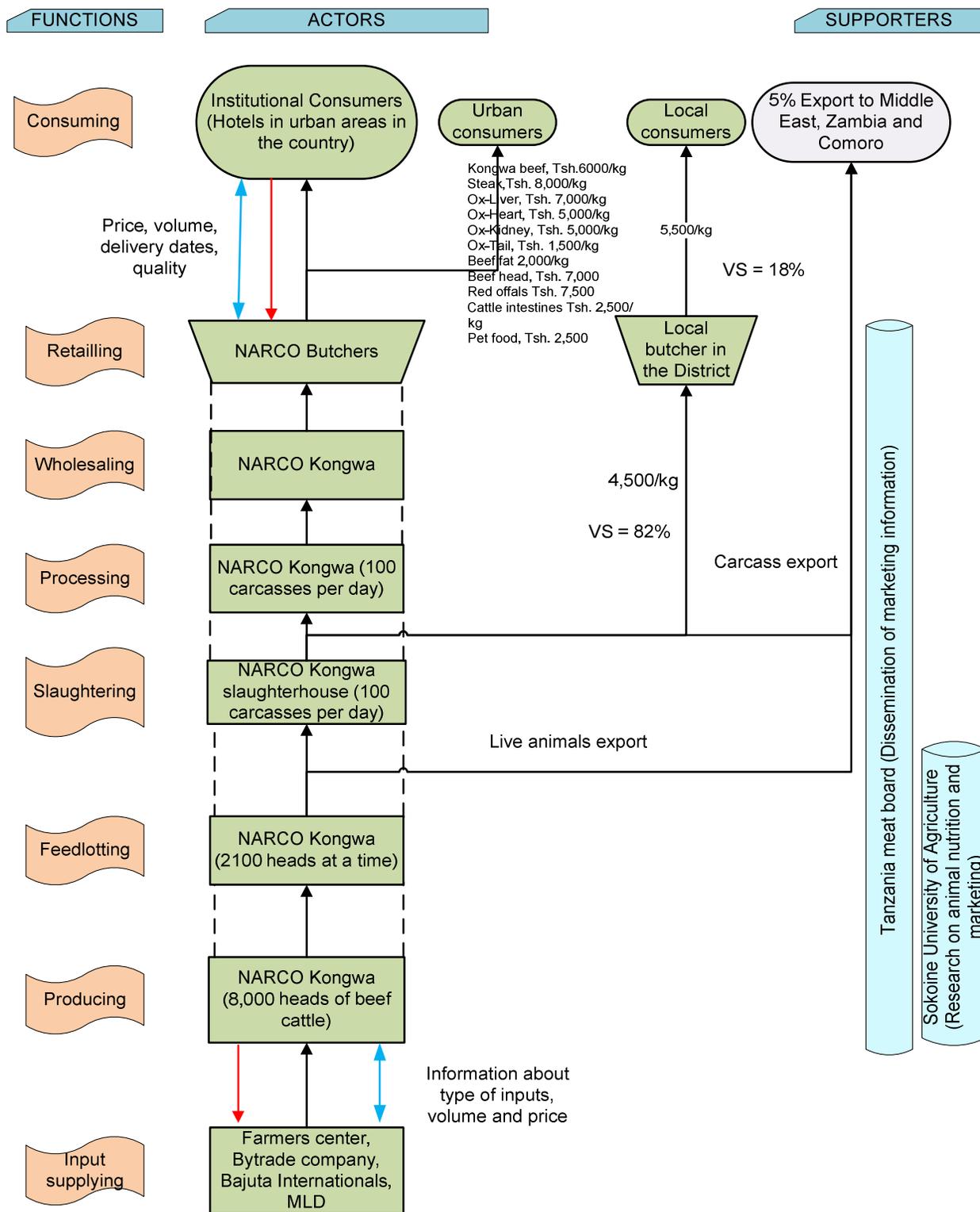


Figure 6: NARCO Kongwa beef chain map

4.2 Results from the survey:

4.2.1 Smallholder beef producers' demography

This section provides the findings based on the response from the 36 smallholders from the three villages. In order to have a better understanding about the competitiveness of smallholder beef producers in the district, background information about their age, education, land size/ownership and herd size were collected by using a survey questionnaire (Annex 5) and presented in form of tables, bar charts, pie charts as well as value shares.

Age

Smallholder beef producers in Kongwa district are those with an average age of 41 years (table 7). The minimum age was 27 and the maximum was 84.

Table 7: Age of smallholder beef producers

Actor	Mean age	Std. deviation	Mode	Std. error of the mean
Smallholder beef producers	41	10.55	42	1.76

Education background

Knowledge as one of the important criteria in beef husbandry; majority of interviewed smallholder beef producers have primary education (Standard seven) 69.4%, 27.8% never attended school and only 2.8% had ordinary level secondary education, figure 7.

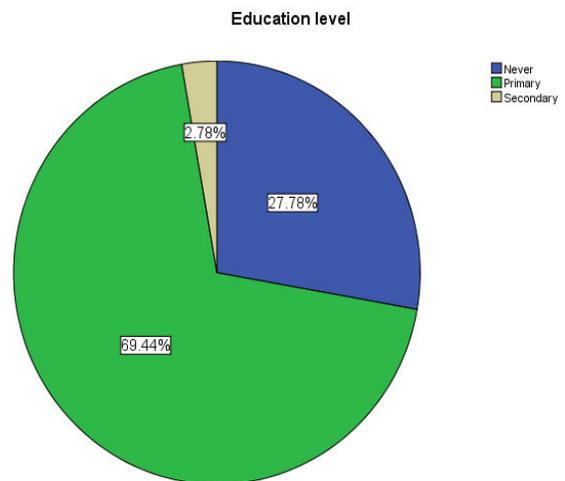


Figure 7: Farmers' education background

Household size

As household size can have impact on the decision of selling animals; the average household size among the interviewed smallholder beef producers is 7 people as it appears in table 8, however the most frequent household size are those with 9 members.

Table 8: Average household size

Actor	Mean household size	Std. deviation	Mode	Std. error of the mean
Smallholder beef producers	7	2.38	9	0.396

Herd size

The average herd size in the surveyed villages is relatively higher than that of the national average of 13 heads. Smallholders in the surveyed villages have average of 21 heads of cattle as it appears in table 9.

Table 9: Average herd size

Actor	Mean herd size	Std. deviation	Std. error of the mean
Smallholder beef producers	21	11.97	1.995

Land ownership

Majority (69.44%) of interviewed smallholder beef producers own land of 5 acres and above which they use for crop cultivation and grazing after harvest, though they have no land lease, figure 8.

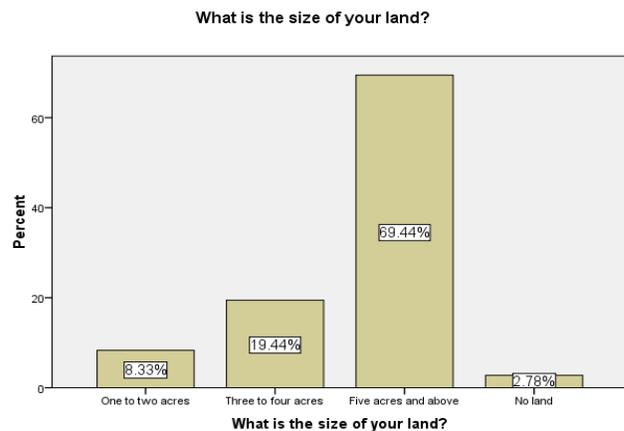


Figure 8: Land ownership

Gender roles

Gender roles seem to be relatively equally shared between males and females (figure 9) though males seem to dominate on trekking for pastures (42% and females on milking (24%). Child labour is practiced by 5% of the respondents. However; these roles are only for working but ownership of animals and final decision whether to sell an animal or not is done by males.

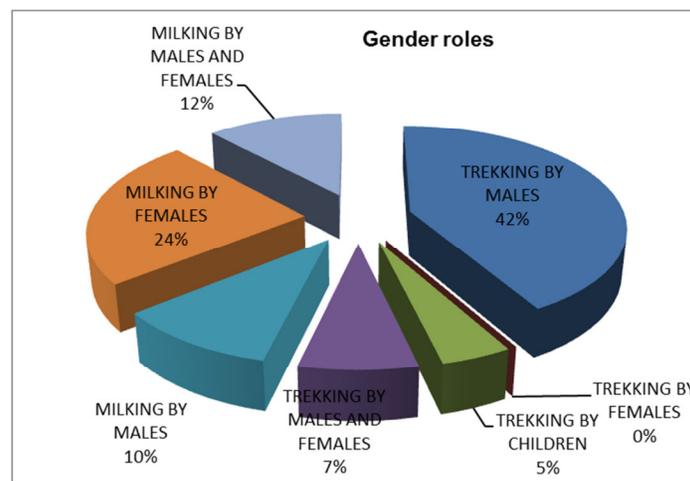


Figure 9: Gender roles

4.2.2 Relative share of each actor in the chains

For better understanding the value share of each actor in the informal beef chain, the data collected from the survey and case studies were used to calculate gross margin, added value and value share as described below:

Variable costs: Costs that occur only if something is produced and are directly related to the amount of the product produced.

Gross output: The value of what is produced by the enterprise (In this case, the selling price).

Gross margin: This the total output less the variable costs.

Added value: This is the revenue of one actor less the previous actor's revenue.

Value share: Is the percentage of the ratio between the added value and the retail price.

Information on the direct costs related to the beef business was easily provided by the interviewee, calculated (Detailed calculations in annex 6) and summarised in table 10.

Table 10: Actor shares in the informal beef chain

Actor	Variable costs	Gross output	Gross margin	Added value	Value share
Smallholder beef producer	106,000	290,000	184,000	290,000	57%
Livestock Traders who are also owner of Butchers	19,000	510,000	491,000	220,000	43%

Smallholders receive an average of 290,000/= Tanzanian shillings (57% of the final value) for an animal with an average weight of 200kg live weight (With a dressing out percentage of 51%) which has been raised for about six years, while the trader earn about 43% of the final value of the same animal.

The ranch sells carcasses to a local butcher in the district at a price of 4,500/= per kilogramme of meat. The butcher sells the meat to local consumers in the district for 5,500/= per kilogramme. The value share for the ranch is $4,500/5,500 \times 100 = 82\%$ and that of the butcher is $1,000/5,500 \times 100 = 18\%$. The total production costs of rising an animal for two years with an average of 200kg live weight at the ranch is 61,500/= Tsh. At its own butchers in urban areas the ranch gains a share of 100%. From the interview with manager of NARCO-Kongwa, the ranch is selling live animals at 2,500/= Tsh. per kilogramme live weight and they are currently willing to buy animals from local markets if weighing balances are installed at 1,800/Tsh per kilogramme live weight.

4.2.3 Quality control measures existing in the beef chains

In order to find how well farmers are informed about beef quality, they were asked if they were aware about beef quality. The results show that; only 33% (n=36) of respondents they are aware and 67% they are not aware about beef quality. Response on which quality control measures are practiced by smallholder beef producers among the options provided are presented in figure 10. The most practiced beef quality control measure is minimal use of drugs (100%) followed by proper feeding and watering (19.4%). Other beef quality control measures like records and record keeping, proper housing, proper drugs and chemical storage are not practiced by smallholder farmers (0% respectively).

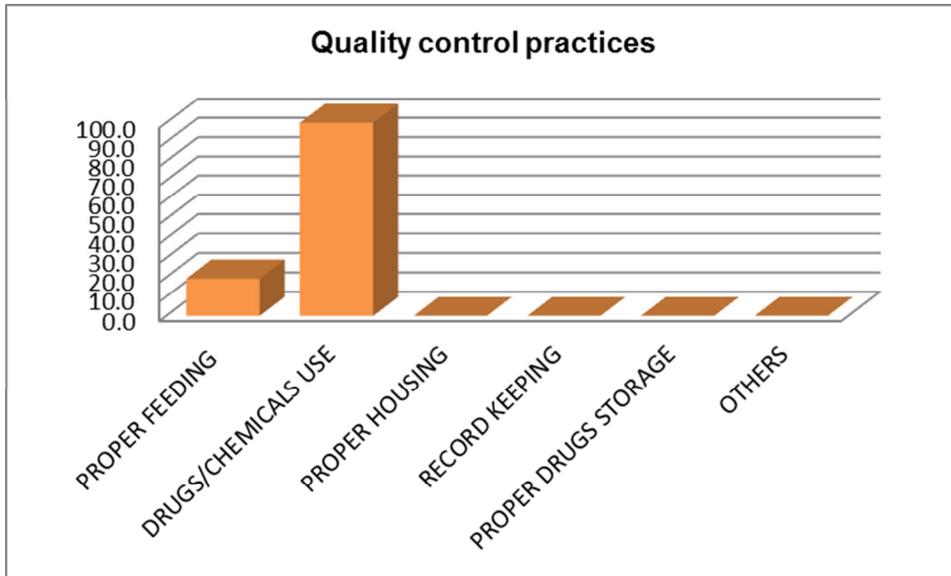


Figure 10: Quality control measures

Animals are improperly housed and have scarcity of water (Photo 4); improper housing and inaccessibility to adequate water can have a negative effect on beef quality during slaughter. Improperly housed animals are exposed to natural phenomena like rains and strong winds.



Photo 4: Improper animal housing and water scarcity
 Source: Field observation by the researcher.

Other actors in the chain hardly practice beef quality control measures. In the slaughterhouse animals are skinned on the floor with gut contents placed on the skinning floor as it appears in photo 5, creating a possibility of meat contamination.



Photo 5: Carcasses are skinned on the floor
Source: Field observation by the researcher.

4.2.4 Challenges facing smallholders, NARCO, traders and supporters

Actors in the informal and formal beef chains in the district are faced by various challenges. These challenges differ from one actor to another. Smallholder beef producers were asked to rank their challenges from 1 to 8. One being the most important challenge and eight the least important challenge, the farmers' responses are presented in table 11.

Table 11: Smallholder beef producers' challenges

Rank	Challenge	No. of response	% of response
1	Inadequate animal feed	17	47.2
2	Inadequate market information	11	30.6
3	Low price paid by traders	13	36.1
4	Difficulty access to credit	9	25
5	Inexistence of producers organisation	11	30.6
6	Inadequate extension services	16	44.4
7	Inadequate water for animals	13	36.1
8	Others (Absence of improved beef breed)	1	2.8

The most important challenge to smallholders is that given rank 1 (table 11). This challenge ranked first by majority of smallholders as the district is very dry for almost six months of the year. Other challenges those given rank 2 and 3 as majority of smallholders said they cannot wait the market day when they are in need of money, so they call traders who pay low price at farm gate. Rank 4 and 5 were mentioned in the surveyed villages, according to smallholders from Machenje village, they tried to form farmers' group but it was not active due to the misuse of money by the management.

Interview with the manager revealed different challenges, the major challenges facing NARCO-Kongwa includes; presence of livestock diseases within the ranch, bush fires especially during dry seasons, encroaching animals from neighbouring villages, high standards requirements by the international markets and financial demand from the ranch headquarters (interviews, section 4.1(IV))

Traders are faced by various challenges, including; high interest rates on bank loans (24% annually) one trader mentioned that; *“We are getting profit but we take all the profit to the banks, we are like working for them”*, other challenges are low quality beef especially on dry season, high rate of organ condemnation, multiple taxes paid to the same government (Market fee, movement permit, abattoir fee, butcher business licence, income tax and government butcher hiring fee) and power instability leading to difficulties in meat storage (Section 4.1 (II)).

Extension officers as supporters of the beef mentioned; livestock diseases, low knowledge on beef production among smallholders and transport to reach large number of smallholders who are scattered in the villages as their main challenges (Section 4.1 (III)).

Other challenges mentioned by the Tanzania meat board as one of the supporter of the beef chains is inadequate approved slaughter facilities. There is only one approved slaughter facility in the country (Dodoma abattoir) with the capacity of 200 beef carcasses per day which is not enough to meet demand of the international market. Inexistence of market infrastructures like weighing balance and cattle holding pans in livestock market is also a challenge in most of the livestock markets in the country.



Photo 6: Inadequate market infrastructures
Source: Field observation by the researcher

4.2.5 Impact of herd size and structure on market participation among smallholders

The size of the herd has an impact on market participation among smallholder beef producers. There is a significant difference on market participation ($p < 0.05$) between the two clusters. Majority of smallholders who sold animals within 12 months are those with animals ranging from 26 to 50, cluster 2 (41.67%) figure 11.

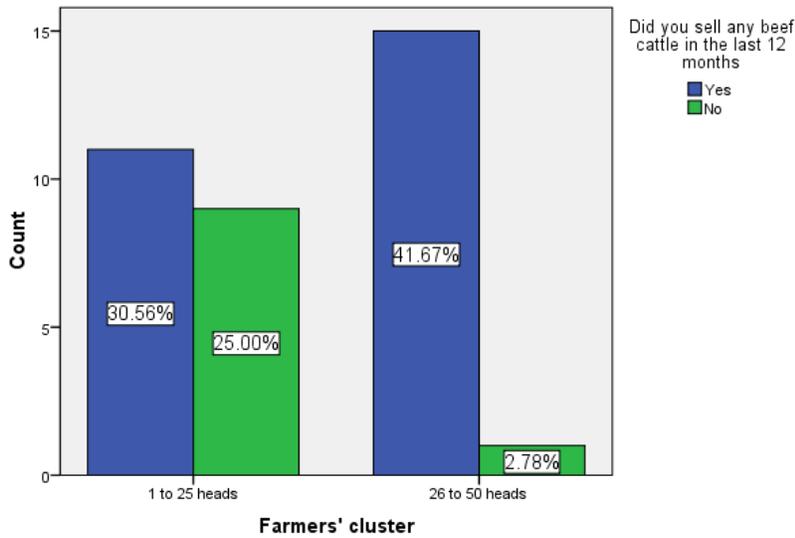


Figure 11: Impact of herd size on market participation

Among the two clusters; majority of smallholders in cluster 2 (25%) sold their animals at the local market, while those in cluster 1 (16.67%) sold their animals to a trader at farm gate price. Among the two clusters, 25% of smallholder beef producers in cluster 1 didn't sell any animal in the last 12 months while in cluster 2, only 2.78% didn't sell animals in the last 12 months (Figure 12).

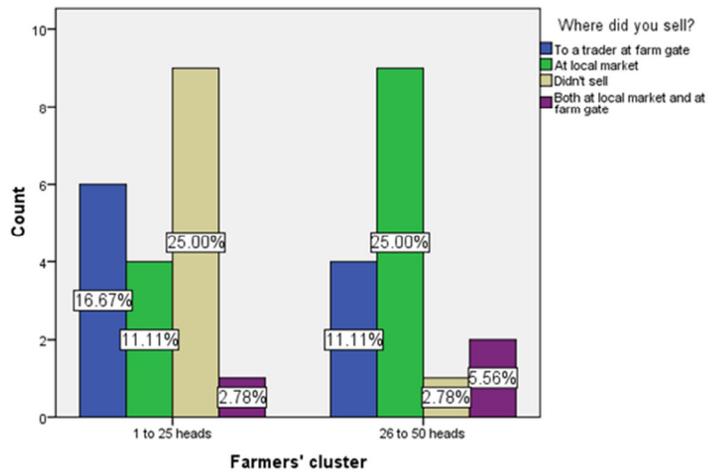


Figure 12: Choice of where to sell

Smallholders in the district are in favour of cows (38%) and steers (22%) as it appears in figure 13. This helps them to maintain their herds as the major source of animal inflows in their herds is through birth. In the surveyed villages steers are used for draught power as smallholder livestock producers also practice crop farming.

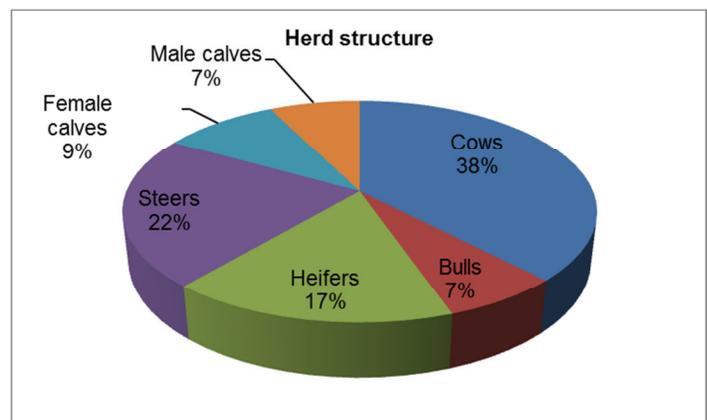


Figure 13: Herd structure and composition

Distance to market has an impact to market participation among smallholders in the surveyed villages as majority (27.8%) of smallholders who sold animals to a trader at farm gate are those in villages located more than five kilometres from the local market, figure 14.

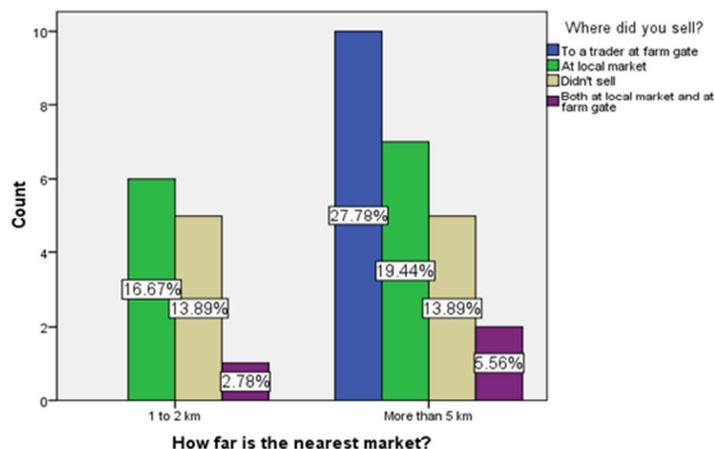


Figure 14: Impact of distance to market

4.2.6 Methods used by smallholder beef producers to access market information

There are different methods used by smallholders in the district to access market information, however; the most significant one (88.89%, figure 15) is by visiting the nearest local market and from traders and neighbours are 5.56% each. The market information required by majority of smallholders in the district is only price.

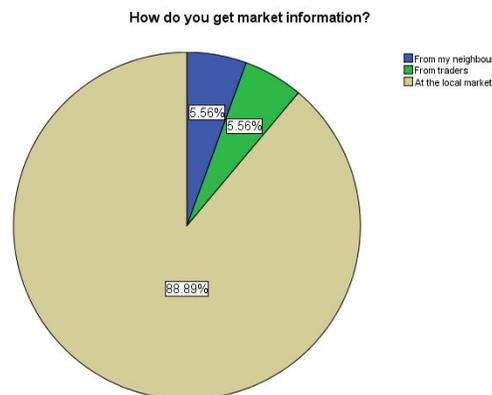


Figure 15: Sources of market information for smallholders

4.2.7 Criteria for competitive farmers to be linked to NARCO

From the survey study; criteria for selecting farmers to be linked to NARCO from the two clusters were set. Those farmers that have the ability to offer beef cattle that meet quality standards of NARCO at price that are competitive and provide adequate returns on resources used in producing them are grouped as competitive. From these criteria; farmers from cluster 2 are considered as competitive.

Table 12: Criteria for competitiveness

S/N	Criteria	Farmers' clusters	
		1	2
1.	Herd size: A farmer must have surplus animals for selling	x	✓
2.	Use of inputs: Ability to invest especially use of inputs	x	✓
3.	Off-take rate of at least 10% per year	x	✓
4.	Ability to adapt to natural disasters like drought by having stock feed	x	✓
5.	Ability to produce animals with dressing out % of about 50%	x	✓
6.	Land ownership of at least 10 hectares	✓	✓

5.0 DISCUSSION

This chapter discusses the findings from the case study, survey and observation that presented in chapter four.

5.1 The situation of beef subsector in Kongwa district

5.1.1 Actors and their roles in the beef chains

The beef subsector in Kongwa district is composed of formal and informal chains. Actors involved in the informal and formal chains are input suppliers, smallholders, NARCO, traders who are also owners of butchers, and consumers in the district, regional, national and international levels.

The formal chain (figure 6) is dominated by NARCO which operates all activities in the chain a process described by KIT, Faida MaLi and IIRR (2006) as chain integration. The ranch keeps beef cattle mainly Boran breed, calves are produced within the ranch herds, some of the calves are sold when they are about 200 kg live weight and others are taken to the ranch's feedlot for fattening for about three months and slaughtered in the ranch mini abattoir and some are exported as live animals to Zambia and Middle East. Branded beef from the ranch bears the name of "Kongwa Beef" is sold at the ranch's butcher within the ranch and some are distributed to ranch's butchers in urban areas in Dodoma and Dar es Salaam. The ranch sources its inputs like drugs and chemicals from importing companies. The informal chain (figure 5) which is poorly coordinated is dominated by smallholders with an average herd size of 21 heads of cattle (Table 9) which contradicts with the average herd size given NBS (2012) of 13 animals; this might have been influenced by the sampling design (purposive sampling) and the small sample size used in this study.

For better competitiveness a firm needs four determinants; factor conditions, demand conditions, related and supporting industries and firm strategy, structure and rivalry. Among the factor conditions are skilled labour and capital investment (Porter, 1990). Majority (69.44%, figure 8) of smallholder beef producers in the interviewed villages in the district own land of five acres and above which is not only for beef production but also for crop cultivation. During the cropping season animals have no enough land for grazing and mainly use the communal grazing areas which are not well developed and highly populated with animals creating chances for disease transmission between herds. Skilled labour as one of the factors for better competitiveness, smallholders in the interviewed villages are not skilled enough to compete in the regional, national and global market as majority of them (69.4%, figure 7) have only primary education which does not provide skills for animal production and marketing. From the findings, age also can be a factor reducing competitiveness as majority of smallholders surveyed are those with average age of 41 (Table, 7) as youth are engaged in the motorcycle transport business. These findings are supported by that of Holloway and Ehuis (2002) who explained in their studies that; smallholder generally have inadequate intellectual capital resources such as experience, education and extension that limit their ability to compete in the market.

Traders as actors in the informal chain plays major roles of searching animals from smallholders in their villages as well as at local markets however their roles are not yet realised by smallholders. Traders are perceived as people who are not trustful and working for extremely higher profit; in their local language smallholders calls traders a nick name known as "*galagaja*", As one smallholder noted saying; "*if you call galagaja in your homestead they will try to give you as low price as possible since they know you have no any other alternative*". In their studies KIT and IIRR (2008) explains that traders are treated with great suspicion not only by farmers but

also by extension workers, development practitioners, policy makers, researchers and consumers and what they think about them are words like exploitation and manipulation. They further argue that the lack of market access for smallholders in Africa is partly related to this limited respect for the role of traders.

5.1.2 Relative share of each actor in the chain

Smallholders have relatively higher share (57%, table 10) as compared to traders (43%, table 10). However this does not mean that smallholders are the one who get more profit due to the fact that; for a farmer to raise an animal to reach an average of 200kg live weight it requires about six years (Mlote, Mdoe, Isinika and Mtenga, 2012) and therefore more investment is required. Farmers are incurred costs such as feeding, labour, veterinary services, housing and trekking costs which are normally not documented by majority of smallholders. Though traders received 43% of the end price, however they the one who carry all the business risks and pays all the taxes to the government. These findings are supported by that of KIT and IIRR (2008) who found that beef farmers received the highest value share among actors of the beef chain in in Zimbabwe. NARCO on the other hand it receives 82% value share when it sells to a local butcher and 100% to its own butcher, this explain the importance of chain integration as it improves chain performance and profit margin.

5.1.3 Quality control measures existing in the beef chains

Farmers in the villages where the study was conducted are not aware about beef quality; this might have been influenced by their level of education as majority (69.4%, figure 7) have primary education. Though farmers are not aware about beef quality, majority (100%, figure 10) they unknowingly practice minimal use of drugs and chemicals as one of the indicators of beef quality control. Minimal use of drugs and chemicals has been practiced by farmers since it is associated with money investment and they are not willing to invest in beef production due to low returns to labour. In their studies, Holloway and Ehuis (2002) and UNIDO (2012) found that low farm-gate price, increased input costs and remoteness are among the factors that demotivate farmers and making them reluctant to invest in their farming activities.

From the interview with the manager of NARCO Kongwa (Section 4.1 (IV) and field observation at the ranch, beef quality control is well practiced at the ranch as compared to smallholders. This can be explained by the demand conditions set by the market as the ranch access the international market that demand high quality beef. Traders at the local slaughterhouses are not practicing beef quality as animals are slaughtered and skinned on the floor creating a possibility of meat contamination (Photo 5); this is influenced by inadequate infrastructures and poor enforcement of hygienic procedures at slaughterhouses.

5.1.4 Challenges facing smallholders, NARCO, traders and supporters

Smallholder beef producers in the surveyed villages are faced by a number of challenges, the most important challenge that has given first rank by majority of smallholders (Table 11) is inadequate animal feed as they normally depend on communal land for grazing their animals. Beef producers explain that; due to feed scarcity they are forced to graze secretly in the ranch area where they pay 15,000/= per head of cattle if found by the ranch management which is large amount of money for smallholders. Inadequate animal feed is a major challenge identified by UNIDO (2012) where they came to find that over 80% of pastures used by smallholders for grazing are communally owned, overgrazed with poor pasture development makes feeding to be a major challenge among livestock keepers in Tanzania. Majority (Table 11) of smallholders mentioned inadequate market information as the second most important challenge in their beef production. Inadequate market information was mentioned by Holloway and Ehuis (2002) as

one of the major challenges among smallholder producers in Ethiopia. Low price paid by traders is due to lack of market information among smallholders and most of them are selling their animals at farm gate. Though other challenges were given lower ranks; it doesn't imply that they are not important but is due to matter of ranking and farmers' priorities.

From the interview with the manager of NARCO (Section 4.1 (IV)), the ranch is faced by a number of challenges including animal diseases. Diseases especially Trans-boundary Animal Diseases (TADs) that also interfere with beef export are difficult to control since animals from smallholders are grazing in the ranch. According to MLD (2006), control of TADs is constrained by inadequate animal health support services and infrastructure, weak private sector, high cost of vaccines and inadequate knowledge on TADs among stakeholders.

As other actors in the chain, traders are encountered by several challenges (Section 4.1 (II)). Traders in the informal beef chain are involved in different roles in the chain. They source animals from producers in their scattered villages or at local markets and transport them to slaughterhouses at the district. These traders are also owners of butchers and they are paying taxes at every stage in the chain and that's why they are not comfortable with the number of taxes paid. KIT and IIRR (2008) explain that trading in Africa in general is a high risk business due to informal taxation at road blockades. They further inform that; taxes from the government, tolls for market stalls, fees for brokers, membership fees and tips at road blockades account for 10 to 15% of market margin. Apart from taxes, traders in the district are paying high interest rates to financial institutions. In the district there is only one bank, the National Microfinance Bank (NMB). Studies conducted by KIT and IIRR (2008) found that outreach of microcredit schemes is limited often to the cities only and they operate with relatively high interest rates, a situation which also exist in the district.

5.1.5 Impact of herd size and structure on market participation among smallholders

The size of the herd owned has an impact on market participation among smallholders in the surveyed areas. As expected; it was observed from this study that; majority (41.7%, figure 11) of respondents who sold animals within 12 months are those farmers in cluster 2 who owned between 26 to 50 animals as those in cluster 1 (25%, figure 11) didn't sell any animal within a period of 12 months. Comparison on the market participation between the two clusters revealed a significant difference ($p < 0.05$). These findings suggest that smallholders with relatively large herds are more likely to sell their animals than those with smaller herds. The findings from this study are supported by that of Negassa *et al* (2011) who explained the importance of having surplus animals for smallholders to participate in livestock marketing and that's why smallholders in the surveyed villages are in favour of cows (38%, figure 13) in order to have more animals produced from the herd for maintaining herd sizes. Not only herd size and structure but findings from this study which is also supported by that of Holloway and Ehuis (2008) shows that distance to market have an impact to market participation among smallholders. Majority (27.8%, figure 14) of interviewee who are located more than 5km to a local market have sold their animals to a trader at farm gate price; while those from villages that are located 1 to 2km from a local market didn't sell any animal at farm gate price.

5.1.6 Methods used by smallholder beef producers to access market information

Market information is not readily available among smallholders, what they do in order to get information is that; they visit the local markets and asks about prices of animals and compare the size of the animals sold and in the next market day they sell their animals with reference to the price of the previous market. Majority (89%, figure 15) of smallholders used this method to get market information. This is not a reliable source of information as price might change

between market days depending on the number of animals brought on the market or the number of buyers present in the market. Market information required by all surveyed smallholders is only price, but market information is more than that; including where is the market, what does the market want, what rules and regulations govern the market. Access to market information by improving physical infrastructures such as information technology is one of the tools suggested by KIT and IIRR (2008) and IFAD (2011) to connect smallholder producers to markets. Though there are a number of market information sources present in the country including local newspapers, television and radio stations but smallholders do not access them; probably this might have been influenced by their low level of education.

5.2 The ability of NARCO Kongwa to meet smallholder beef producers' market access challenges

5.2.1 Production capacity of NARCO-Kongwa

NARCO has an area of about 38,000 hectares with a capacity of holding 14,000 heads of cattle, but currently the ranch has only 8,000 heads of cattle (Interview results section 4.1 (IV)) which is only 57% of its stocking density; this means the ranch is under producing. According to Harsom (2011), the main goal of managing animals under ranch conditions is to utilise the pasture at its maximum potential and any underutilisation can have a negative impact on the enterprise profitability. From his study he found that; as the stocking density is decreased by 10% there is a decrease in ranch revenue by 10% because there were fewer animals with which to assign the fixed costs associated with the land as the stocking density decreased. Several reasons can be associated with this underproduction; the ranch is selling 2,000 heads of cattle per year which is about 25% off take rate; this off take rate is higher when considering the fact that the main restocking method in the ranch is through birth within the herd. The ranch depends much from its herd rather than buying from the local markets due to the fear of introducing diseases in the ranch but also as noted from the Manager; at the local markets there are no weighing balances which makes difficult for the ranch to buy basing on visual weight estimation.

Apart from the available land for animal production the ranch also has processing facilities like mini abattoir and two chilling rooms with a capacity of handling 100 carcasses per day. But from the interview results, the ranch currently slaughters 1 to 5 animals per day as many animals are sold live; this is also underutilisation of the processing facilities.

5.2.2 Beef production technologies practiced at NARCO-Kongwa

The use of technologies is necessary to improve animal performance and wellbeing and to increase profitability. According to Harsom, Thrift and Yelich (2011), the use of technologies in beef production is a major contributor to the safe, wholesome and affordable beef supply. They further explain that the use of technology in beef industry has improved the animals and enterprise efficiency and has decreased the resource inputs of feed and land. At NARCO-Kongwa the main modern production technologies practiced are artificial insemination and nutrition especially on feedlot (Interview results, section 4.1(IV)), other technologies like the use of growth promoters like antibiotics and use of genetics are not practiced at the ranch probably due to the negative perception of customers towards genetically modified organisms. Important production technologies suggested by Harsom *et al* (2011) includes; antibiotics, implants, ionophores, pesticides, genetics, vaccines, physiological modifiers and nutrition. Though these technologies might seem to be profitable; however its applicability in Tanzania depends much on beef consumers' demands as they prefer more of naturally produced beef.

5.2.3 Capacity of NARCO-Kongwa to meet demand requirements of its customers

From the interview with manager of NARCO-Kongwa (Section 4.1 (IV)) there are a number of customers within and outside the country with different demand requirements. Studies conducted by Kurwijila, Makokha and Omore (2011) in Kenya, Tanzania and Ethiopia showed that quality attributes demanded by beef customers in Tanzania includes; tenderness, juiciness; special cuts and good beef colour which according to the manager; the ranch is able to achieve. The challenge is on the international market where apart from quality standards but also constant supply of the required volume and quality; needs a special attention. NARCO has a tender of supplying 25 tonnes of beef to ZAMBEEF company in Zambia and according to the Tanzanian meat board, currently negotiations are going on between Tanzania government and China for Tanzania to supply beef to China which according to the current production; NARCO alone cannot have a capacity to accommodate this market demand creating a need for outsourcing.

5.2.4 Methods used by NARCO-Kongwa to get market information

From the interview with the Manager of NARCO-Kongwa (Section 4.1 (IV)), the ranch has different sources of market information. By having access to market information the ranch is in a good position to compete in the market by producing according to the market demand. In his study Adegbid (2012) explain that; availability of information and effective use of the available information is considered as an advantage to producers. Access to market information makes producers more eager to practice commercial production and especially if the information is adapted to their needs. He further explain that; the availability and timely use of reliable information on prices, quality, supply volume and market demand conditions contribute to ensuring a better market environment and to balance the value share of different actors in the chain.

5.3 Possible linkages of smallholders to NARCO

According to the types of market linkages suggested by FAO (2007), competitive farmers in cluster 2 (Table 12) can be linked to NARCO based on the following types of market linkages; NARCO is a domestic trader and therefore farmers will benefit the long term sustainability and a better access to profitable markets. NARCO is also a retailer since it has its own butchers, according to FAO (2007) this type of market linkages requires farmers to be in formal groups which are also requirements of NARCO. Linkage through an exporter is also possible since NARCO is an exporter, however according to FAO (2007) complex standards required in this type of linkage might exclude some marginalised smallholders (Cluster 1, table 12). The fourth type of possible market linkage of smallholders to NARCO is through a processor; NARCO is also a processor, FAO (2007) suggest farmers to be in formal or informal groups in order to have a secured market. Another possible link is through a leading producer, NARCO is a leading producer in the district and the country in general and this will make farmers to have a better negotiating power (FAO, 2007). The last two types of market linkages; contract farming and cooperatives might be not possible at this moment due to the low competitiveness of smallholders and due to the inexistence of beef producers' cooperative in the district.

Therefore for better linkages and with improved feeding smallholders can raise animals with 150kg live weight for three years. NARCO can open collection centres in each ward in the district where animals from farmers are collected and weighed by using a mobile weighing balance owned by the ranch. The ranch collects these animals and put them in its feedlot for three months and at that time they can reach about 200kg (Daily gain of about 560g per day). The ranch then sells these animals whether live or carcasses to traders who will sell them at their butchers or transport them as live animals.

With this model the value share will be as follows;

Smallholders: Will sell animals with 150kg at 1800Tsh/kg live weight to the ranch.

NARCO: Will sell animals with 200kg at 2500Tsh/kg live weight to traders (or carcass weight at 4500Tsh/kg.

Traders will sell meat to consumers at 5500Tsh/kg.

For an animal with 200kg live weight and a dressing out percentage of 51% will have a carcass weight of $51/100 \times 200 = 102\text{kg}$ and if each kg will be sold at 5500Tsh, the final price of this animal will be $5500\text{Tsh} \times 102\text{kg} = 561,000\text{Tsh}$

Value share for smallholders for each kg will be: $((150\text{kg} \times 1800\text{Tsh} = 270,000\text{Tsh}/\text{animal})/561,000\text{Tsh}) \times 100 = 48\%$

For NARCO: $((200\text{kg} \times 2500\text{Tsh} = 500,000\text{Tsh}/\text{animal})/561,000\text{Tsh}) \times 100 = 41\%$

For traders: $(561,000\text{Tsh} - 500,000\text{Tsh} = 61,000\text{Tsh})/561,000\text{Tsh} \times 100 = 11\%$.

This value share is important because farmers stayed with the animal for 3 years so they incurred costs, NARCO added value by fattening the animal for 3 months which also is expensive and the trader has stayed with the carcass for one or two days and therefore they incurred lower costs.

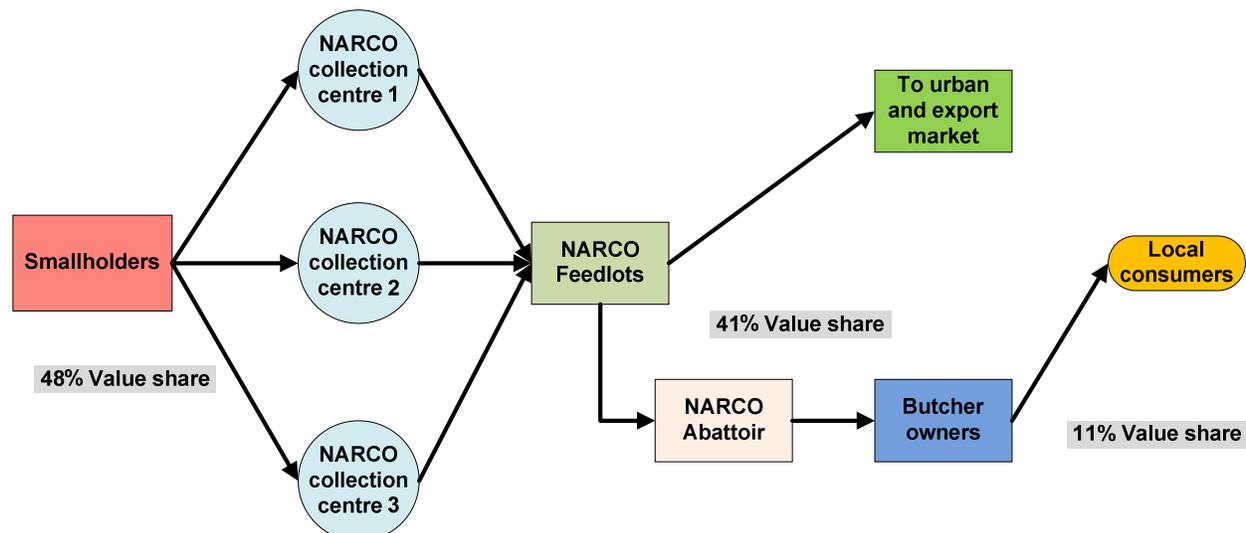


Figure 16: Possible linkage

5.4 Suggestions for further research

The sample size used in this study is very small to be a good representative of all smallholders in the district.

The sampling design also might have influenced the results as purposive sampling was used in this study.

Further studies are suggested to find out the economic off take rates among smallholders herds as this will give a clear understanding as to what extent smallholders are willing to sell their animals.

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The beef subsector in Kongwa district is composed of smallholder producers who own an average of 21 heads of cattle and one large producer NARCO owning 8,000 heads of cattle. There are generally two chains one is informal, dominated by smallholders and the formal chain dominated by NARCO (A 100% government owned company). Smallholders and NARCO are mainly involved in production of beef animals and selling them to traders. Other actors are input suppliers who source inputs from different areas of inside and outside the country and sell them to producers, traders who source animals from smallholders in their villages and at local markets, slaughtering them at government slaughterhouses and sell warm meat to consumers in the district. Other actors are consumers in the district, regional, national and international level who buy warm and processed meat from the formal and informal chains.

Producers in the formal chain have the greatest share as compared to other actors, however in informal chain there is no big difference in the shared value between producers and traders.

There are no quality control measures practiced by smallholders as majority of them are not aware about beef quality control measures. Smallholders practice only minimal use of drugs and chemicals as a beef quality control measure. At slaughterhouses and during transport, traders do not practice any quality control measure in such a way that animals are slaughtered on the floor creating a possibility of meat contamination. Quality control measures are practiced by NARCO especially on the process of raising animals as it involved in export of beef where quality is highly demanded, however animals are also slaughtered on the floor leading to possible meat contamination.

There are several challenges facing actors and supporters of the beef chains in Kongwa district. For smallholders includes; scarcity of animal feed, inadequate market information, low price paid by traders at farm gate and at local markets, inadequate water for their animals, inadequate extension services and difficulty access to credit. NARCO on the other hand is faced by a number of challenges including animal diseases, encroaching animals from neighbouring villages that consume the ranch pastures, high standards set by the international markets that are difficult to achieve, bush encroachment that interfere with ranch pastures, absence of weighing balances at local markets that makes difficult for the ranch to buy animals basing on visual weight estimation, bush fires that destroy ranch pastures and high financial demand from the higher ranch authority. Challenges facing traders include; high interest rates demanded by the financial institutions, multiple taxes paid to the government, low quality beef on dry seasons and high rate of organ and carcass condemnation. Extension workers as supporters of the beef chain are faced by challenges like emerging livestock diseases and lack of transport to reach farmers.

Herd size and structure have impact on market participation among smallholders as those with relatively large herd size composed of mainly steers and bulls are the one that has participated on selling their animals at farm gate and at local markets.

Though there are several sources of market information available but smallholders do not access them. For them to get market information they normally visit the local markets to search information about price and in the next market day they sell their animals with reference on the price of the previous market, though few gets market information from traders and neighbours. The main information required by majority of smallholders is only price.

Comparing the available land size, infrastructure, human resources and the number of animals currently present at NARCO-Kongwa; the ranch has a capacity to produce more. It is only 57% of the available land is used for production and only 5% of the processing facilities are used, this is underutilisation of the available resources and therefore something has to be done to maximise the utilisation of the available resources.

There are few production technologies that are practiced at NARCO-Kongwa including artificial insemination and nutrition (Feedlot). These are not complicated technologies to be applied by smallholders if they are well supported. If with these simple technologies NARCO-Kongwa can compete in the international market; with support smallholders can also do.

NARCO-Kongwa has a capacity to meet quality requirements of its customers but not constant supply in terms of volume with the increasing beef demand nationally and internationally creating a need for outsourcing.

NARCO-Kongwa uses different methods to get market information. The major sources of market information to NARCO are local and international television and radio stations, newspapers, brochures, from Tanzania meat board and from different websites. It is easy for NARCO to access market information since there is marketing manager responsible for searching markets for the beef produced.

It is generally concluded that; smallholders in the district are not competitive enough to stand alone without support from other stakeholders to address their market access challenges and NARCO as one of those few stakeholders has relatively good performance and capacity to address smallholder beef producers' market access challenges.

6.2 Recommendations

For better linking smallholders to profitable markets through NARCO, a leading producer, processor and exporter of beef; the following are recommended to extension workers working with smallholders and the government.

6.2.1 Recommendations for extension workers

Because NARCO cannot work with individual farmers it is better for them to organise those competitive smallholders (cluster 2, table 12) into formal groups in order to increase economies of scale and to reduce transaction costs. Being in formal producer organisation will also help them improve their bargaining power.

NARCO is also exporter of beef and in the international markets, beef quality is highly recommended, therefore for better linkage with NARCO it necessary for extension workers to train smallholders to start practicing beef quality control measures.

Since most of smallholders are in remote areas and traders are their only hope it is now time for extension workers to encourage smallholders to build trust on traders and stop giving discouraging nick names to traders; as they (traders) can be a good linkage between smallholders and NARCO.

6.2.2 Recommendations for the government

For the government which the author is also part of it, there is a need to do the following;

For the district council- Department of livestock development

To help farmers organise in groups whether formal or informal by conducting a special campaign village per village by using village general meetings to explain to them the importance and benefits of producer organisations.

To provide technical assistance to farmers in informal or formal groups by training them on different production, marketing and quality control techniques as these will help them to improve their competitiveness.

To make market information readily available to each village office by making sure that the district marketing master have a direct contact with village executive officer who will prepare black boards in their offices for writing market information including prices, volume and quality requirements and this information updated on a regular basis and made available to producers.

To reduce some of the taxes taken from the beef business as these discourage more traders from getting into the beef business, but also it makes those traders who are already in the business to pay low price to producers in order to have profit after paying the taxes.

To conduct mass vaccination against trans-boundary animal diseases as they interfere with the livestock business especially the livestock export business. This can be done on phases depending on the available budget and the impact of the disease on the business.

To improve market infrastructures especially putting weighing balances at local markets as these will improve transparency and encourage NARCO to buy animals at local markets.

For the Ministry of Livestock development

To set a certain percentage that each ranch has to contribute to the NARCO head office depending on the performance of the ranch as inappropriate financial demand from the head office will decrease the performance of NARCO-Kongwa.

For the Tanzania meat board

To look for more international markets and improve the local markets by conducting campaigns on consumption of locally produced beef in order to create more demand.

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8.0 ANNEXES

Annex 1: Checklist of interview questions with input suppliers

1. Where do you source the inputs?
2. What is the most important input that is preferred by smallholder farmers?
3. What is the buying price of that input?
4. What is the selling price of that input?
5. Apart from smallholder farmers, who else buy inputs from your shop?
6. What challenges do you encounter in your business?
7. What are your views towards the linking of the local beef chain with that of the National Ranching Company?

Annex 2: Checklist of interview questions with traders

1. Where do you source animals for your business?
2. What is the average purchasing price per animal?
3. What are the costs associated with your business?
4. Do you have any business arrangement with your suppliers?
5. Do you have any business arrangement with your customers?
6. What challenges do you face in your business?
7. What are your views towards the linking of the local beef chain with that of the National Ranching Company?

Annex 3: Checklist of interview questions with extension officers

1. What challenges do smallholder farmers face in your working area?
2. What beef quality control measures do farmers practice in your area?
3. Who are the major livestock business actors in your working area?
4. What sources of beef market information do you use?
5. How do farmers in your area access market information?
6. What challenges do you encounter in your extension work?
7. What are your views towards the linking of the local beef chain with that of the National Ranching Company?
8. What do you think is the best approach to link smallholder beef producers to profitable markets?

Annex 4: Checklist of interview questions with the Manager of NARCO Kongwa

IDENTITY

1. Is your company name registered?
2. Do you have a constitution?

PURPOSE

3. What is your Vision?
4. What is your mission?
5. What is your target market?

STRUCTURE

6. How is your organisation structured?
7. What other organisations do you have relationship with?

PARTICIPANTS

8. Who are your input suppliers?
9. What are your customers?
10. How do you communicate with your customers?
11. How do you reach your customers?
12. How do you cope with your customer routines?
13. How many workers (Males and females) do you have?

PARTNERS

14. Who are your important key partners?
15. What support do you get from your key partners?
16. What activities do your partners perform?

ENABLERS

17. Do you have a brand name?
18. How do you finance your business?
19. What is the size of your land?
20. What other physical infrastructures do you have apart from land?
21. What production technologies do you use?
22. How do you get market information?
23. How do you finance your business?

ACTIVITIES

24. What beef production activities do you perform?
25. What marketing and sales activities do you have?
26. What research and development activities do you perform?

DELIVERABLES

27. What are your main products?
28. What services do you offers to your customers?

INFLUENCES

29. What are the constraints in your business?
30. What are the risks and threats associated with your business?
31. What are the existing opportunities for your company?

32. Who are your competitors?

CULTURE

33. What are the rules and customs of your organisation?

34. What is your company doing to develop your workers?

PERFORMANCE

35. What is your turnover per year?

36. What is your production capacity?

37. What is your processing capacity?

38. Do you have a balance sheet?

39. Do you have a profit and loss account?

40. What are the average production costs per animal?

41. What are the sales and marketing costs?

42. Which resources are most expensive?

43. What is the price per kilogram of each beef product?

44. What is the method of payment?

ADDITIONAL QUESTIONS

45. What are your views towards working with smallholder beef producers?

46. What smallholder beef producers should do in order to work with you?

Annex 5. Survey questionnaire for smallholder beef producers

*My name is **Omary Athuman Nkullo**. I am a Master student from Van Hall Larenstein University of Applied Science conducting a research on the roles of Kongwa ranch to link smallholder beef producers to profitable markets. You are kindly requested to cooperate in answering questions from this questionnaire; the information you provide is going to be used for academic purposes only and will remain confidential.*

Date.....Questionnaire number.....

Name of the farmer.....Gender.....Village.....

Section A: Control questions

1. What is your age?
2. What is your education level?
 - (a) Never been to school
 - (b) Primary education
 - (c) Secondary education
 - (d) College:
 - Certificate
 - Diploma
 - (e) University
3. How many people are there in your household?
4. How roles are distributed among members of your household in taking care of your animals?

Section B: Present situation of the beef subsector

5. Do you own land? Yes
6. What is the size of your land?
 - (a) Less than 1 acre
 - (b) 1-2 acres
 - (c) 3-4 acres
 - (d) 5 acres and above
7. How many beef cattle do you have?

8. Herd structure and composition

Animal category	Current number
Cows	
Bulls	
Heifers	
Steers	
Female calves	
Male calves	
TOTAL	

9. Herd dynamics (What are the sources of animal outflows and inflows in your herd?)

(a) Sources of inflows	Rank
(i) Birth	
(ii) Purchases	
(iii) Other (Please specify)	
(b) Sources of outflows	
(i) Deaths	
(ii) Sales	
(iii) Slaughter	
(iv) Gift	
(v) Theft	
(vi) Dowry	
(vii) Others (Please specify)	

10. What costs do you incur in beef production?

Item	Total costs
Concentrates	
Extension services	
Water	
Labour	
Other costs (Specify).....	

11. Are you aware about beef quality? Yes No

12. Which one among the following do you practice as a measure to control beef quality in your farm?

- (a) Proper feeding and watering
- (b) Minimal use of drugs and chemicals
- (c) Proper housing
- (d) Record keeping for inputs, output and farm visitors
- (e) Proper storage conditions for inputs (Drugs, feed)
- (f) Others.....(Please specify)

13. Do you have livestock market in your village? Yes No

14. How far is the market?

- (a) Less than 1km
- (b) 1-2km
- (c) 3-4km
- (d) 5km
- (e) More than 5km

15. How frequently is that market?

- (a) Once per week
- (b) Once per month
- (c) Twice per month
- (d) Others.....(Please specify)

16. Did you sell any animal in last 12 months? Yes No

17. If the answer is yes to question 6 above. Where did you sell it?

- (a) To a trader at farm-gate
- (b) At local market
- (c) To Kongwa ranch
- (d) Others.....(Please specify)

18. If no, what are the reasons for not selling?

.....

19. What challenges do you encounter in beef production?

S/N	Challenge	Rank
1	Inadequate market information	
2	Inadequate extension services	
3	Low market prices	
4	Inadequate animal feed	
5	Inadequate water for animals	
6	Inexistence of producers organisation	
7	Difficulty access to credit	
8	Others (Please specify)	

20. How do you get market information?

- (a) From the extension officer
- (b) From the media
- (c) From my neighbour
- (d) From traders
- (e) Others.....(Please specify)

21. What type of market information do you get from the source mentioned above?

- (a) Price.....

(b) Market demand.....

(c) Others.....(Please specify)

22. If you are given a chance to do beef business with NARCO Kongwa which one among the following will you prefer most?

(a) Selling animals direct to NARCO

(b) Selling animals to NARCO through a trader

(c) Selling animals to NARCO through a producers organisation

(d) Using the processing facilities of NARCO for fee payment

(e) Working on a contractual basis

(f) Others.....(Please specify)

23. If one of the requirements of doing business with NARCO is through producer organisation, are you willing to join a smallholder beef producer organisation?

Yes

No

Thank you very much for your time and cooperation!

Annex 6: Calculations of Actor's value shares

S/N	ACTOR	VARIABLE COSTS (VC)		FIXED COSTS		TOTAL COSTS	GROSS OUTPUT(GO)	GROSS INCOME	ADDED VALUE	GROSS MARGIN (GO - VC)	SIMPLIFIED GM (%)= GM/VC*100	VALUE SHARE
		ITEM	COSTS FOR TWO YEARS	ITEM	COSTS PER ANIMAL		(Selling price)	Revenue - Costs				
1	Farmer	Extension services per head 6,000/year x 2	12,000	Cattle craal	12,500	24,500	290,000					
		Buying crop residues: 50/= x 1animal x 30days x 6months x 6years	54,000	Labour	14,600	68,600						
		Water for animals: 50/= x 1 x 15days x 6months x 6years	27,000			27,000						
		Permit to take animal to the local market	1,000			1,000						
		SUBTOTAL	94,000		27,100	121,100	290,000	168,900	290,000	196,000	58	56.9%
2	Trader			Butcher hiring fee 50,000/month	1,700	4,700	Selling price = 5,000/= per kg carcass weight = 5,000 x 102kg = 510,000					
		Market fee	3,000	Income tax: 575,000/year	1,600	4,100						
		Cattle tracking	2,500	Business licence: 100,000/year	300	800						
		Movement permit	500	Water: 6000/month	200	3,200						
		Abattoir fee	3,000	Buying price	290,000	300,000						
		Meat transport	10,000	Payment for meat seller 3000 x 2	6,000							
		SUBTOTAL	19,000		299,800	312,800	510,000	197,200	220,000	491,000	39	43%

Annex 7: Descriptive statistics

Farmers' Demography

(i) Education level

Education level

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Never	10	27.8	27.8	27.8
Primary	25	69.4	69.4	97.2
Secondary	1	2.8	2.8	100.0
Total	36	100.0	100.0	

(ii) Land ownership

What is the size of your land?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid One to two acres	3	8.3	8.3	8.3
Three to four acres	7	19.4	19.4	27.8
Five acres and above	25	69.4	69.4	97.2
No land	1	2.8	2.8	100.0
Total	36	100.0	100.0	

(iii) Impact of herd size on market participation

(a) Comparison on who sold animals between the two clusters

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.653 ^a	1	.010		
Continuity Correction ^b	4.862	1	.027		
Likelihood Ratio	7.534	1	.006		
Fisher's Exact Test				.022	.011
Linear-by-Linear Association	6.468	1	.011		
N of Valid Cases ^b	36				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.44.

b. Computed only for a 2x2 table

(b) Comparison on where the animals were sold between the two clusters

Chi-Square Tests

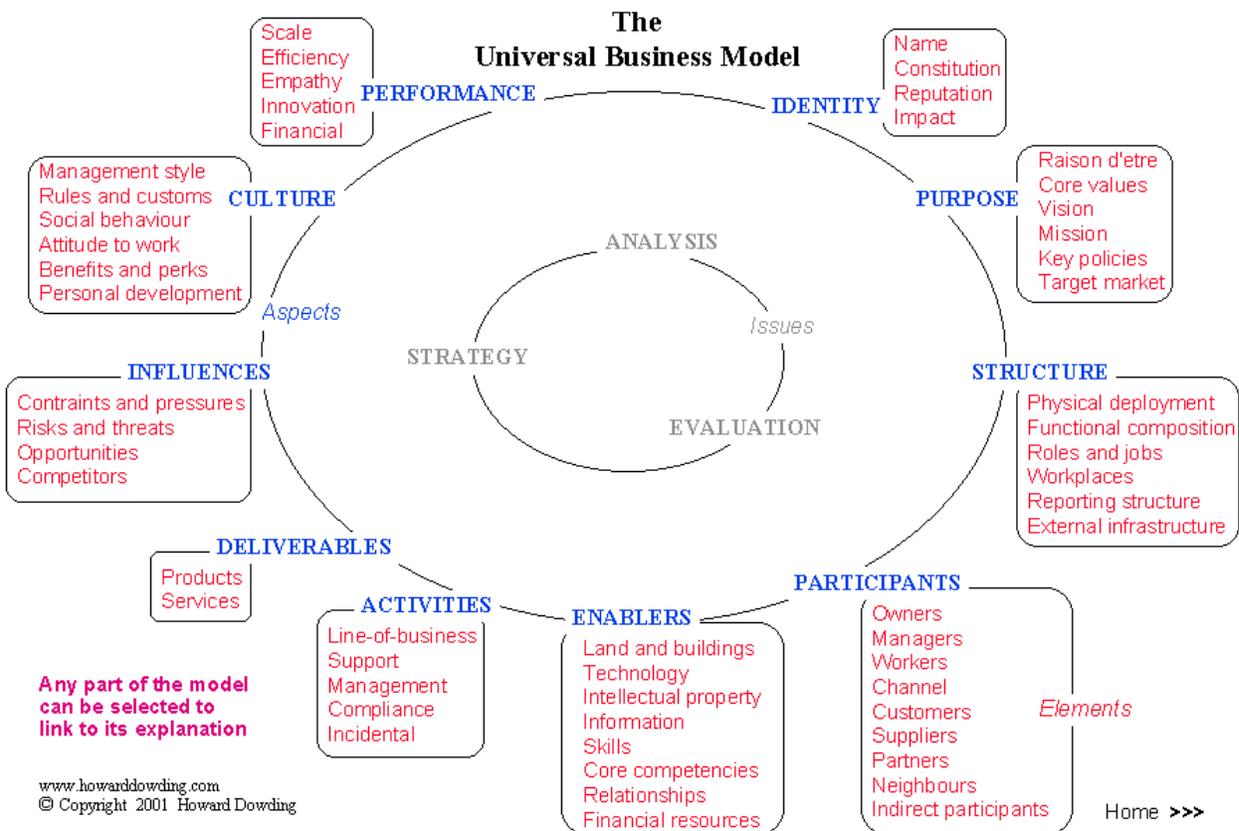
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.720 ^a	3	.033
Likelihood Ratio	9.632	3	.022
Linear-by-Linear Association	1.161	1	.281
N of Valid Cases	36		

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.33.

Annex 8: Detailed description of NARCO-Kongwa

Kongwa ranch is located 80 km east of Dodoma municipality along Dar es Salaam- Dodoma highway. The ranch occupies 38,000 hectares of land. The climatic condition of Kongwa ranch is that of savannah grassland with a uni-modal rainfall pattern (November to April). It receives 240 – 600 mm of rainfall per year with temperatures ranging between 27°C to 32°C during the day and 10°C to 18°C during the night depending on the season of the year. The dominant grass species include Rhodes grass, *panicum*, *cenchrus* and star grass species.

The ability of NARCO Kongwa to meet smallholder beef producers' market access challenges depends on its performance. The performance of this company was accessed by using the Universal Business Model and presented as follows;



Source: <http://www.howarddowding.com/modelx.htm>

➤ Identity

Name: The National Ranching Company (NARCO), registered under the company ordinance Act No. 212, Kongwa ranch is one of the ranches owned by NARCO.

Constitution: The ranch has no constitution rather it uses guidelines from the ministry of livestock and fisheries development.

Reputation: The ranch has a reputation of providing high quality and tender beef to its customers at an affordable price.

Impact: The environment at the ranch is very friendly for workers and customers. Customers are allowed to visit the ranch and buy products at the butcher which is located within the ranch.

➤ **Purpose**

Raison d'etre: The main objective of NARCO is to undertake large scale ranching in order to achieve self-sufficiency in the supply of quality beef and other livestock products in the domestic market and for export.

Core values: Organically produced beef, HALAL slaughtered, juicy and tender.

Vision: To have progressive dynamic and profitable beef cattle ranching that will technically, socially and economically support production of meat animals while maintaining the environment.

Mission: To promote and facilitate production of quality meat animals, meat and meat products from breeding beef cattle.

Key policies: Producing and raising calves by using natural and artificial insemination, slaughtering cattle with tender and juicy beef, customer satisfaction by building long term relationships.

Target market: Regional, national and international markets targeting the low, middle and high income consumers.

➤ **Structure**

Physical infrastructures: The ranch has a land covering a total of 38,000 hectares. Currently, the ranch has 8,000 cattle, 600 sheep, 8 horses and 300 goats however with the size of land it has a capacity to hold 14,000 heads of cattle. This capacity can increase up to 100,000 heads of cattle with optimal management and feedlot conditions. Other physical infrastructures are as appears in the table

Infrastructures at NARCO-Kongwa

Infrastructure	Quantity
Ground water reservoir with capacity of 1.8 million litres	2
Ground water reservoir with capacity of 1.2 million litres	1
Water reserve tanks	6
Cattle dip 13,000 litres	1
Cattle dip 15,500 litres	1
Spray race 2,000 litres	1
Boreholes	12
Fencing	12km
Roads and fire breaks	20km
Office buildings	2
Abattoir (Mini)	1
Residential houses	67
Water troughs	30
Tractors	3
Trailers	2
Rig machine	1
Cars	3
Go downs	3
Garage with machine tools	1
Feedlot (2100 animals at a time)	2

➤ **Reporting structure:**

The ranch manager is the head of all ranch activities and under him are 8 units that reports direct to the ranch manager. The units includes; animals production unit, workshop unit,

feed lot unit, pasture development unit, disease control unit, marketing unit, human resource management unit and accounting unit

➤ **Participants**

Owners: The ranch is owned by the government of the United Republic of Tanzania under the National Ranching Company (NARCO).

Managers: Managers of the ranch are appointed by the minister of livestock and fisheries development.

Workers: The ranch has a total of 109 workers, among these 9 are females and 100 are males.

Channels: The ranch has different customer channels depending on the products, but mainly includes local channels where butchers in the district buy slaughtered animals and sell locally in the district, regional and national channels whereby institutional consumers like hotels and government institutions buy different meat products and international channels like Zambia Beef Company (ZAMBEEF) that buy live animals. Other channels are Oman, Comoro and Saudi Arabia where animal carcasses are transported to.

Customers: The ranch targets all customer segments including low, medium and high income customers.

Suppliers: The major suppliers are those of drugs and chemicals including Farmers' centre, Baytrade and Twiga chemicals. Others are suppliers of semen for artificial insemination (Buhuri Centre in Tanga that import semen from the Netherlands).

➤ **Partners:**

Neighbours: The ranch is bordered with 8 villages; which it considered as its neighbours. The villages that share borders with the ranch include; Machenje, Mbande, Sejeli, Chamae, Mtanana, Mautya, Ndalibo and Msingisa; however the relation with these neighbours is uncertain because when they found grazing in the ranch they pay 15,000/= Tsh. per head of cattle.

Indirect participants: These includes banks like Tanzania Investment Bank (TIB) that provides loans for investment, other ranches within the country, Livestock Multiplication Units (LMUs), the district government, training institutions (Sokoine University, Dodoma University, Saint Gasper University, Vocational Education Training Agency) and the regional government.

➤ **Enablers:**

Land and buildings: The ranch has enough land and buildings as it appears in the table above.

Technology: Modern technology is used in the production and processing of meat. Artificial insemination is used to produce high quality beef cattle breed and feedlot.

Intellectual property: The ranch has 109 experienced personnel and some of them have built excellent relationship with the customers in the district, regional and at national level.

Information: Information is well shared among workers in the ranch. Market information is reaching the ranch through different means including, television and radio stations, newspapers, and brochures.

➤ **Activities**

There are a number of activities performed at the ranch on a daily basis. The main activities include production, marketing, research and training. The production activities are feedlotting for three months, castrations, vaccinations, deworming, branding and dipping. Marketing activities are like searching for markets, distribution of meat products to butchers and institutional customers at regional and national levels. The research activities are conducted in collaboration with Sokoine University of Agriculture and include research on animal nutrition. The ranch conducts training to staff, students from different institutions in the country and to farmers on various production technologies.

➤ **Deliverables**

Products: The main products are different beef cuts and live animals. The beef cuts produced at NARCO are Kongwa beef, different types of stakes, ox-liver, ox-heart, ox-kidney, ox- tail, beef fat, ox-head, red offal, beef intestines and pet food.

➤ **Services:**

The main services offered by the ranch to its customers and the communities surrounds include; training on animal husbandry and meat cuts, artificial insemination to beef cattle in neighbouring villages and selling hay to farmers in the district.

➤ **Influences**

Constraints and pressures: The major constraints facing the ranch and interferes its production include; animal diseases that sometimes interferes with the meat export business, high quality standards that set by the international markets which are difficulty to meet, animals from neighbouring villages grazing on the ranch creating difficulties in controlling animal diseases, bush fires that burn animal pasture in the ranch and absence of weighing bridges at local markets creating difficulties for the ranch to buy animals at local markets in the district.

Opportunities: Availability of different banks and their willingness to provide loans to the ranch, large beef market in the region and national at large and availability of experienced staff at the ranch.

Competitors: The major competitors for beef production are emerging small ranches that are privately owned, however; the competition is not yet stiff because these ranches are still few.

➤ **Performance:**

The ranch is fairly developed with some basic livestock related infrastructure which is vital for livestock production. Under Tanzanian conditions the ranch production coefficients are relatively good and comparable to other commercial ranches in the tropics. Generally the ranch has conception rate of 90 %, calving rate 85%, mortality rate 1.5%, weaning rate, 75% and off take rate of 25%.

The average production cost per animal is 50,220/= Tsh. Sales and marketing costs averages 11, 270/=Tsh. per animal. The total production and marketing costs per animal is 61,490/= Tsh. The ranch sales about 2000 beef cattle per year with a turnover of about 1.2 Billion Tanzanian shillings