FACTORS AFFECTING BEEF CATTLE PRODUCTION AMONG PASTORAL COMMUNITIES OF MARSABIT COUNTY

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DECLARATION AND APPROVAL

Declarations by the Student

This thesis is my original work and has never been submitted for a degree at another university.

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Approval by the Supervisor

This thesis has been submitted for examination with our approval as the university supervisors.

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DEDICATION

To my late parents Mr and Mrs Waqo Roba, spouse Safia Abduba Dadacha, children Rahma, Guyatu, Waqo and Qàbale.

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ABSTRACT

Beef cattle production in Kenya is a vital sector of the agricultural industry, contributing significantly to the country's economy and food security. The industry is dominated by indigenous breeds such as Zebu and Boran, which are well-adapted to Kenya's arid and semi-arid regions. This study focused on establishing the factors affecting beef cattle production among pastoral communities in Marsabit County Kenya. The following specific objectives guided the research: To determine the effects of inter-pastoral communities conflicts on beef cattle production, to determine the effects of livestock diseases on beef cattle production among pastoral communities in Marsabit County, to determine the effects of feed supplementation on beef cattle production among pastoral communities in Marsabit County, and to examine the effects of market prices on beef cattle production among pastoral communities in Marsabit County. Anchored under the Basic Needs Theory, Resilience and Food Production Theory and Livelihood Diversification Theory. The study adopted descriptive survey research design. The target population comprised of 1210 beef cattle farmers in Marsabit county from which a sample of 320 households was established through judgmental and stratified random sampling method. The distribution of the questionnaires was guided by the perceived level of engagement of respondents in beef cattle farming. Further, to corroborate the responses from the respondents on the variables of study. Data was collected through drop and pick and analyzed by use of SPSS version 27. Validity and reliability of the questionnaire constructs was confirmed before its use. Test for Multicollinearity Test, Test for Heteroscedasticity and Normality Test were conducted before multivariate regression analysis. A reliability coefficient of Cronbach alpha of over 0.7 was returned for all constructs of the independent variables. Descriptive statistics were used to explain the findings. Correlation analysis revealed that Inter community conflicts, livestock diseases, feed supplements and market price were positively and significantly correlated to Beef Cattle Production. Regression analysis results indicated that the factors under study explained 90.2% of the variation in Beef Cattle Production in Marsabit county with effects of Inter community conflicts not statistically significant (β=-0.024; p=0.455) as were effects of feed supplements (β= 0.022, p=0.593) while those of Livestock diseases (β=-0.112; p=0.014) and market price (β=0.820; p=0.000). The ANOVA results confirmed that the model was significant in predicting beef cattle production. It was concluded that all the independent variables collectively influenced beef cattle production. It was recommended that there is a need for proactive measures to mitigate inter-community conflicts, including conflict resolution initiatives, community dialogues, and improved security measures to safeguard both livestock and human lives. Future research should consider these areas can contribute to the development of evidence-based policies and interventions aimed at promoting sustainable beef cattle production and enhancing the resilience of pastoral communities in Marsabit County.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Globally, Livestock production was a major source of livelihood in Arid and Semi-Arid Lands (Davies, 2018). Global, livestock production hired 2.3 billion persons, providing incomes for 2 billion of the world's poor persons, and which accounts for 60 percent of global farming GDP (Batello, 2018). A study by Allan (2020) indicated that, the livestock that were practiced in the dry areas for food and income generation are; cattle herds, sheep, goats and camels. Another study by Cannon (2019) on limits to cow's production in a semi-arid pastoral system in London confirmed that livestock kept in semi-arid lands served as source of food, income and a social security. However, the social security from livestock was predominantly non-monetary and unreliable assets because of limited production due to drought, conflicts and diseases that led to massive loss of animals as illustrated by Food Agricultural Organization (FAO, 2016) report.

In Nigeria, a study by Noorani (2015) found that beef cattle production was mainly practiced in large herds for meat provision. This was supported by World Bank (2017) report which underscored that, beef cattle production was on increase in Africa countries due to high demand of meat to feed skyrocketing population. The report also added that, an estimated demand of 600 million tons of meat was in demand by 2040. According to Mwape (2017), affirmed that beef cattle farming in Zambia were the largest contribution to livestock GDP, 47% contribution (2016) which was thus an important industry which needed to be harnessed and developed to international standards.

In East African countries like Uganda, the deliberate efforts were made by the government of Uganda to commercialize beef cattle production through market and trade liberalization (Kalemera, 2017). In addition to food and income, livestock farming provided social sanctuary that was taken as mobile banks, wealth accumulation, and social esteem. Weliwita et al. (2018) conducted a study on the economic significance of beef farming in Tanzania and found that, at the moment, investments in butcheries that process beef were growing in the nation as a result of higher profits, which had produced stable employment, income, and living conditions. The meat was carefully packaged and supplied to a variety of specialty markets, including minimarkets, supermarkets, and mining districts. Notably, the cost of the meat in these markets was greater than in butcher shops, which provide high-paying jobs for Tanzanians (Lafreniere et al., 2016).

In Kenya, Beef production was the main source of livelihood particularly under Pastoral management that was practiced by pastoralists in the Arid and Semi-Arid areas (Veronica, 2020). The sector provided a livestock's base of approximately 9 million beef cattle that generally provide meat source to the rapid growing population (Owuor & Kiteme, 2020; Kenya National Bureau of Statistics Census report, 2019). A further study by Alarcon et al. (2017) indicated that the majority of beef cattle production occurs in Kenya's Arid and Semi-Arid (ASALs) counties, which were home to 75% of the nation's livestock herd.

Marsabit County was one of the ASAL counties where beef cattle production was a large economic activity and a major source of household livelihood, according to the Household Baseline Survey Report (HBS, 2019). Muthee (2016) claimed that the

primary slaughterhouses in Nairobi County receive a significant amount of their beef cattle from Marsabit County.

Despite of the importance of beef cattle for food (meat) provision, income, poverty reduction and employment, the production was face with many challenges that led to low production. Understanding the factors that affect the beef cattle production was relevant as it provided a framework to improve the production and there, this study was very useful to the pastoralists in Marsabit in particular to understand the factors that might affect their beef cattle production.

1.2 Statement of the problem

Livestock played a very big role in the economy of pastoralist communities as was regarded as a key production structure of livestock in the ASALs (Africa Union, 2016). For the large population in these areas, pastoralism was consequently especially important as a source of income (Allegretti et al., 2016). The analysis showed that poverty rates were high and that development indices remained low throughout the previous few decades. The primary source of revenue, cattle, had yielded minimal returns, which has been the main cause of this. Kenyan beef cattle were exposed to harsh conditions and limitations, which have an impact on their productivity in several ways (Mundia et al., 2019). Literature revealed that over the last one decade, the production of beef cattle decreased in Kenya. This could be due to a variety of production reasons. Many elements were thoroughly investigated to see how they influence beef cattle productivity.

Veterinary services availability, drought, insecurity, insufficient funding, high input costs, insufficient decision-making skills, and lack of access to markets were only a few of the concerns investigated. However, research on how inter-communal disputes,

livestock diseases, feed supplementation, and relative market prices affect beef output in Marsabit County was minimal. These restrictions endanger pastoralists' livelihoods in addition to making it more difficult for them to adapt to shifting market demands. In actuality, Letai (2019) classifies pastoralists as one of the producer categories with the lowest development metrics. Due to feed supplementation's concomitant effects on the availability of two essential production resources—pasture and water both pastoralists and large-scale ranchers were seriously threatened throughout most of the country (Mohammed & Hesse, 2016).

The pattern of decreased production in beef cattle fueled the Kenyan government and development partners to initiate programs that were targeted to overhaul the beef cattle production like revamping Kenya Meat Industry (Mbweka, 2015). The study also indicated that, the government of Kenya was providing hays specifically for beef cattle that were met for slaughter in Marsabit county as well as county government of Marsabit had of recent began to support beef cattle farmers with feed and water (Marsabit County Integrated Development Plan, 2019).

In spite of beef cattle production support programs, the production was still low. There was limited documented literature that helped understanding of the circumstances that made beef cattle production low in Marsabit County despite government-initiated programs. Therefore, this study was originated with the overall purpose of analyzing factors affecting beef cattle production among pastoral communities of Marsabit County. The study findings therefore, added knowledge to the current literature that aided farmers to understand factors that affected beef cattle production among pastoral communities.

1.3 Purpose of the study

The study sough to analyze factors affecting beef cattle production among pastoral communities of Marsabit County.

1.4 Objectives

The study specific objectives were to:

i. Determine the effects of inter- community conflicts on beef cattle production among pastoral communities of Marsabit County.
ii. Establish the effects of livestock diseases on beef cattle production among pastoral communities of Marsabit County.
iii. Find out the effects of feed supplementation on beef cattle production among pastoral communities of Marsabit County.
iv. Determine the effects of market prices on beef cattle production among pastoral communities of Marsabit County.

1.5 Research questions

The study sought to answer the following research question;

i. What the effects were of inter- community conflicts on beef cattle production among pastoral communities of Marsabit County?
ii. To what extent did livestock diseases affect beef cattle production among pastoral communities of Marsabit County?
iii. To what extent did feed supplementation affect beef cattle production among pastoral communities of Marsabit County?
iv. How did market prices affect the production of beef cattle among pastoral communities of Marsabit County?

1.6 Scope of the study

The study took place in Marsabit County, which was situated in the most northern region of Kenya and spans a total area of 70,961.2 square kilometers. To the north, the county borders Ethiopia; to the west, Turkana County; to the south, Samburu County; and to the east, Wajir and Isiolo counties (CIDP, 2018–2022). The county was made up of Saku, Laisamis, North Horr, and Moyale administrative sub-counties. It was located between latitudes 02° 45° North and 04° 27° North and longitudes 37° 57° East and 39° 21° East CIDP, Marsabit (2018–2022). The review also, added that, nearly every rural and peri-urban household in Marsabit County keep livestock especially beef cattle (FAO, 2017). It was therefore; from this basis that this research was relevant as it sought to analyze factors that affected beef cattle production under pastoral communities in Marsabit County.

1.7 Justification of the Study

Livestock farming was the mainstay of pastoralists under pastoral management as was the main source of livelihood. Particularly, beef cattle farming were handy because of the climatic condition in Marsabit County. According to Njora and Yilmaz (2021) beef cattle production played a very significant role in the provision of income, food, social protection and economy booster. The rationale of this study was therefore to assess how inter- community conflicts, livestock diseases, feed supplementation and market prices affected beef cattle production in Marsabit county. This study primarily benefited the policymakers of the county governments and national government by helping them to understand how these factors affected beef cattle production in Marsabit County in order to encourage them to maximize their efforts to tap unexploited potentials in their production.

1.8 Limitations of the study

The study was limited to factors that influenced the yield of beef cattle in Marsabit County. As a result, the results were not applicable to other beef-producing regions. Another major block was obtaining interviews with beef farmers under pastoral management, where beef cattle production was done out. If the underlying features differ, the conclusions were not generalizable to other counties.

1.9 Assumptions of the study

The following were the assumptions that were made during the research;

i. That the respondent provided accurate answers to the questions in an objective and sincere manner.
ii. That the data gathered from the sampled participants accurately reflected the parameters impacting beef cattle production in Marsabit County.

1.10 Definition of Operational Terms

Inter- community conflicts	Refer to clashes between different groups or communities that are often delineated along ethnic, religious, or regional lines (Regassa & Korf, 2018).
Livestock diseases	Refer to illnesses that affect animals raised for various purposes, such as meat, milk, wool, or labor. These diseases can have significant economic and health impacts on livestock populations (Okello, 2020).
Feed supplementation	Are phosphate, calcium and trace mineral mixtures that can be given to grazing animals during the dry or rainy season. They supplement grazing when it is deficient in minerals and trace minerals (Ndlovu et al., 2020).
Market prices	Refers to the current price at which a good or service can be bought or sold (Rubio, 2020).

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter provides a review of scholarly work conducted in the past, examining the factors that affect beef cattle production. It includes empirical review and theoretical framework sections, conceptual framework, operational framework, and research gaps.

2.2 Beef cattle production in Kenya

Livestock contributed to the livelihoods of Kenyan farmers in a variety of ways, including providing food, traction, manure, raw materials, investment, monetary revenue, foreign exchange profits, and social and cultural identity (Nyariki & Amwata, 2019). Over 80% of Kenya's population in ASALs was dependent on pastoralism (Irungu et al., 2021; Nyariki & Amwata, 2019). Beef cattle have been a substantial source of revenue for many years, particularly in rural and agricultural communities. The Kenya Meat Commission (KMC) launched a self-sufficiency strategy in beef meat with the purpose of developing a ready market for local livestock farmers and supplying consumers with high-quality meat and meat products (Kiriti et al., 2018). The project looked to have collapsed as a result of a terrible management crisis, but it was also deeply in debt, unable to pay its workers and livestock suppliers, the bulk of which have discontinued deliveries in favor of KMC's well-heeled competitors (Yusuf et al., 2019). According to Nyabuto (2021), KMC program highlighted the demand for beef cattle, as many Kenyans were suffering from hunger as a result of KMC's closure. Kenya Meat Commission (KMC) resumed operations in 2006 after the Kenyan government recognized the company's potential for economic development (O'Neill, 2018; Rogei, 2021). In Kenya, the majority of

beef cow production occurs in pastoral areas typified by smallholder agriculture. Cattle were largely considered as vital for smallholder livelihoods globally (Agus & Widi, 2018). Smallholder farmers were those who breed beef cattle primarily for personal consumption and somewhat for commercial interests (Avadí et al., 2022). A study by Ndiritu (2020) found that pastoralists keep beef cattle not just to generate meat for the urban market, but to provide manure, draught power for crop production and livelihood assets. The findings of Ndiritu (2020) were consistent with those of Eindhoven (2019) who, claimed that cattle farming provide social and cultural protection through savings, buffering, fine payment, and dowry incentive. According to Mugonya and Hauser (2022), the majority of beef cattle farmers kept breeding stock instead of fattening cattle in order to keep animals for longer periods of time and produce progeny for sale, as well as a steady supply of stock to provide manure for cropping fields. The government pushed cattle breeding in order to expand the national herd; however, the majority of cattle breeders work on a low-input, low-output basis, resulting in low beef production rates. As a result, as stated by Gitau (2013) Kenya's beef cattle productivity was low as a result of a lack of supplement feeds, livestock disease invasion, and low marketability, all of which contributed to relatively low beef cattle prices and frequent inter-pastoral community wars and conflict over grazing lands and restocking mechanisms. Additionally, Ajak et al. (2020) as well as Duot (2020) posits that, cattle's low fertility, which includes low conception rates (56%), long calving intervals (18–21 months), high calf mortality (5–10%), and low body condition score, contributes to the herd's slow expansion. Additionally, farmers regularly sold productive female cattle, with between 10% and 30% sold and slaughtered each year due to the absence of clear

government legislation barring the slaughter of productive female cattle (Carder et al., 2019). This has exacerbated the country's beef cattle growth slowdown.

Since 2013, the county government of Marsabit promoted beef cattle intensification by introducing cross-breeding with breeds with high output potential via Artificial Insemination (Bahal et al., 2018). As defined by Morales et al. (2019), intensification was the process of increasing the use of external inputs and services in order to increase the quantity and/or value of the product. Crossbreeding as an intensification approach entailed improved nutrition and management, as well as a slew of externally sourced improvements such as feed, livestock health, breeding services, and marketing.

Furthermore, the county government of Marsabit was working to resolve intercommunity disagreement over grazing fields and stocking missions in partnership with the national government to promote livestock production (CIDP Marsabit County, 2018-2022). This was accomplished by deploying Kenya reservist forces and facilitating amicable dialogue with community leaders (Ltipalei et al., 2020). As a result, national development planning placed a lower focus on beef cattle improvement for many years (Lind, 2018). In Marsabit County, beef cow production was primarily subsistence-based and was based on a massive low-external input system (Watson, 2008). This system was based on indigenous knowledge and was vulnerable to harsh climatic conditions, such as regional and temporal variability in rainfall and forage availability. As Kimaro et al. (2018) indicate, beef cow production in pastoral settings was under pressure as a result of a variety of changes in the production environment. Increased human population pressure on pastoral grazing areas, as well as the economic effects of diseases, relative prices, inter-communal

violence, and a lack of veterinary facilities, all impact traditional beef cow production negatively (Ong'eta, 2021).

2.3 Empirical Review

Empirical studies are those that collect data through direct research or observation in order to answer a question or test a hypothesis (Hapsari, 2019). The study must give the various opinions and views of positive thinkers and functionalists in order to contrast or argue each stance with regard to the study's issue.

2.4 Inter-community conflicts and beef cattle production

Livestock were an integral part of pastoral communities' cultural, economic, and social fabric, as they confer social status and prestige (Lightner & Hagen, 2021; Nyariki & Amwata, 2019). A study in Europe by Doubleday and Adams (2020) unearthed that; livestock was used to settle dowries, compensate victims of crime, and resolve disputes, as well as to preserve wealth. According to the literature, pastoralists rarely sold livestock, resulting in large herds (Benti et al., 2022) leading to natural resources depletion. As a means of securing grazing pastures, restocking after cattle raids and outbreaks of livestock disease, and rising bride wealth rates all contribute to intercommunity conflict (Said, 2020). This conclusion was supported by another study, which claimed that cattle raiding were a very successful weapon of war since it robbed the targeted populations of their most valued resources, both socio-culturally and economically (Regassa & Korf, 2018). For this reason, cattle raiding had a long history in pastoral communities across East Africa (Wild et al., 2018).

According to Mayik (2021), "the pastoral communities of the Nuer, Dinka and Murle in South Sudan were prone to cyclical cattle raiding". According to Idris (2018) tribes engaged in cattle raiding as a result of decreased access to arable land, grazing areas,

and watering points for livestock, as well as compensation missions. Additionally, Wasike (2021) stated that growing cycles of violence motivated by vengeance exacerbate community conflicts and cattle raiding originated due to cattle's central role in livelihoods, as well as social and cultural systems of pastoralists. The attack of one community on another study by Waldman (2019) resulted in the latter's retaliation, and so on. In pastoral regions where such raids were not benign, cattle rustling occurred on a small scale and involved little violence. Additionally, Waldman (2019) noted that the majority of conflicts were sparked by minor incidents but resulted in a cascade of serious consequences for human lives, property, and other resources. Raids posed a serious threat to pastoralists' health and well-being, as well as the health and well-being of their communities. Pastoralists moved their livestock away from waterlogged/flooded areas or during dry spells to gain access to better grazing land. They believed that livestock health, milk and meat yields, and productivity all benefit from access to such land and water points. This consistent movement resulted in a high number of intercommunity conflicts, which have shown to have a negative effect on beef cattle production where meat-hunting raid warriors, not cattle raids with restocking missions, were the primary target of beef cattle raids (Furholt, 2021; Opiyo et al., 2014).

2.5 Livestock diseases and beef cattle production

Livestock were prone to infectious disease, which had a significant negative impact on beef cattle productivity (Espinosa et al., 2020). Foot and mouth disease (FMD), trypanosomiasis, East Coast fever (ECF), contagious bovine pleuropneumonia (CBPP), lumpy skin disease (LSD), black quarter, and malignant catarrhal fever (MCF) were among the livestock disease experienced in pastoral communities (Ikiror et al., 2020). These diseases resulted in decreased meat production, weight loss,

maturation delays, and increased mortality rates (Muzzo & Provenza, 2018). According to Arseneault (2018), the consequences of livestock disease were complex and not always well understood, making the development of effective policy responses more difficult. This was particularly true in a large portion of the developing world, where livestock were critical to household livelihoods and, in some cases, served as a means of social protection and escaping poverty (Okello, 2020).

In such context of livestock disease, beef cattle suffer the most of all livestock managed pastorally (Turner & Schlecht, 2019). Specific diseases had the potential to significantly reduce or even eliminate beef production on pastoral lands, having a significant impact on the presence of beef cattle (Mwangi et al., 2020). Dryland's climates were ideal for endoparasites and ectoparasites that survived for at least part of their life cycle in beef species. These parasites directly competed with their hosts for nutrients, thereby limiting their growth or productivity. Additionally, research indicated that ectoparasites acted as vectors for the transmission of other parasitic, bacterial, or viral diseases (Lutz et al., 2021). One insect that transmitted trypanosomes was the tsetse fly, which resulted in a debilitating disease that threatens beef cattle production.

Similarly, Wako and Shen (2020) found that pastoralists were acutely aware of the keeping their animals healthy. Also, according to Hoque et al. (2022), livestock diseases reduced pastoralists' income and jeopardized their food security and general well-being, hence low beef production. According to Adekunle and Filson (2020), infected beef could not be slaughtered for human consumption or export as also evidently revealed in McLean (2013) findings, which state, "Despite significant export demand and the potential of various countries, the presence and prevalence of a

number of trade-restricting transboundary livestock diseases has deprived many countries of access to the international market and exposed them to trade bans." According to self-collected reports, Ethiopian's export market lost an estimated 2.5 billion Birr due to animal diseases (Dabasa & Abunna, 2021). As a result, diseases caused significant economic and social losses to beef cattle in Ethiopia (Gumbe, 2018; Guduro & Desta, 2019). Sick animals collectively pose a significant risk to human life. According to statistics, the consumption of infected cattle products such as meat and milk caused over 54% of human infectious disease globally (Elelu et al., 2019).

Livestock were critical to pastoralists' livelihoods in Kenya as well. Beef cattle were raised in pastoral areas for the same reason as other livestock: to provide food security, income, and insurance (Kileteny & Wakhungu, 2019). Despite the critical role of beef cattle in rural livelihoods in Arid and Semi-Arid Lands, their productivity continued to be constrained by a variety of infectious diseases. According to Adaawen (2021) and Ngara-Muraya (2020), livestock diseases have continued to wreak havoc on beef cattle production and productivity in Kenya's north-eastern regions. Kenya's government initiated a number of projects aimed at increasing the production of beef cattle. Where Onyango (2021) found that the Kenyan government was disappointed by any livestock development project that failed to address the effects and mitigation of animal diseases. The same note indicated that the researcher investigated the effect of livestock diseases on Marsabit County’s beef cattle production.

2.6 Feeds supplementation and beef cattle production

Beef cattle production offered dryland communities an opportunity to increase their food and income security. Globally, demand for meat and its products was increasing

as a result of population growth and improved incomes in rural-urban trading centers (Peters, 2020). Nonetheless, inadequate feed supplementation was a significant constraint on global beef cattle farming growth and viability, particularly under pastoral management (Addis, 2019; Ketere-Lelgut, 2021). This was also supported by Mwangi at el. (2020) who, asserted that pastoralists' inability to provide high-quality feed supplements for their beef cattle was more prevalent in developing countries than in developed countries. He argued that, farmers of beef cattle in drylands around the world were unaware of the nutritional requirements of beef cattle when it came to feeding management. This was due to the diversity of cultures and farming intentions, with beef cattle primarily being kept for social security and wealth measurement.

The majority of pastoralists were nomadic and had more livestock than their land could sustain (Dolker, 2022). They grazed on natural pastures with a finite supply of available feed. This method of production did not meet the nutritional rations of beef cattle, as they required feed to store fat for meat formation. Supplement feed scarcity was exacerbated by erratic rainfall patterns, a prolonged dry season, and frequent droughts, which left many cattle hungry and even dead (Ndlovu et al., 2020). As a result, the quality of natural feeds deteriorated significantly during the dry season, becoming insufficient to meet the pastoralist's potential beef cattle production. Consistent feed supplementation was critical in the production of beef cattle (Hayek & Garrett, 2018). Also, Shinde and Mahanta (2020) argued that supplementary feeding would be beneficial in pasture-based beef cattle production in drylands. His study also indicated that beef cattle gain weight rapidly when supplement feeds were combined with natural feeding. However, apart from salt (sodium chloride) and access to salty water and halophytes (salty plants), traditional beef cattle pastoralists rarely supplemented their beef cattle's diet with supplementary feeds.

Additionally, when selecting supplementary feeds for beef cattle production, it was necessary to consider the feed's availability, nutritional value and cost (ElSayed, 2021). Beef cattle could be supplemented with feeds that contained moderate amounts of protein, such as cottonseed meal and soybean meal (Lee et al., 2020). This was supported by Yator (2018) who argued that, numerous by-product fodders, such as distillers' grains, corn gluten feed, and wheat middling's, contain excessive amounts of phosphorus were required for fat formation in beef cattle. Therefore, it was necessary to evaluate supplement feed management practices among pastoralists in Marsabit county in order to gain a healthier sympathetic of effect they have to beef cattle production. The pastoralists developed targeted intrusions to alleviate supplement feed scarcity in beef cattle production after appraising supplement feeding practices and their effects (Ebile et al., 2021). Despite increased interest in beef cattle production research over the last decade, knowledge of beef cattle feeds supplementation requirements remains limited in Marsabit County, and it was the purpose of this study to close that knowledge gap.

2.7 Market prices

Pastoralists relied on beef cattle production not only for subsistence, but also to supplement their income and meet other basic needs (Rustamani, 2021). When adopted or promoted, beef cattle production helped to strengthen an otherwise traditional livelihood while also diversifying asset portfolios (Abera et al., 2021). Numerous variables, on the other hand, affect beef cattle production. According to De Vries and Marcondes (2020) and Hobbs (2021), market structure, which dictated the relative prices of beef cattle and their products, was a major factor affecting beef cattle production. Additionally, Vorley et al. (2019) noted that, the availability of markets and market information encouraged farmers to produce goods that were in

demand, thereby increasing their confidence in the existence of a ready market that will support reasonable market prices. Pastoralists must consider beef cattle's relative market value when determining whether or not to keep beef cattle.

This related to determining the profitability of various chain actors and the effectiveness of various marketing outlets. Inconsistent markets that offered low commodity prices were unlikely to attract entrepreneurs (Winne, 2019). As with any other agro-business, beef cattle producers preferred to invest in beef cattle farming when market conditions were favorable for their product (Rubio, 2020). Ma and Sexton (2021) discovered that beef cattle farmers placed a higher premium on market price than on distance to market, which had a negative effect on both their decision to participate in markets and the percentage of output sold. According to Nkukwana (2018), there was a substantial association between commercial beef cattle production and market pricing in South Africa. Pastoralists prefer to raise more bulls when prices were favorable because revenue allowed pastoral households to develop resilience (Ameso et al., 2018).

Another study aided me in gaining an understanding of the effect of market prices on beef production. According to Nyariki and Amwata (2019) pastoralists stated that they preferred milk production over beef cattle production due to the low prices obtained from beef cattle sales in Kenyan market. Furthermore, because beef cattle were expensive to raise, market prices should be reasonably high to allow farmers to profit, according to Nyariki and Amwata (2019) analysis. Beef cattle farmers in very remote rural areas face a wedge between farm gate and market prices due to geographic isolation. Additionally, Onduso (2019) notes that beef cattle farmers desire to invest in markets that were not subject to unjust and unregulated prices.

Despite the fact that the climate conditions in ASALs were favorable for beef cattle production in Kenya, the beef cattle industry stagnated in recent years (Ngenoh, 2020). This was because the marketing system was inefficient; 60% of the time, brokers were used to determine the price to pay for such products, resulting in low production (Wangu et al., 2021). It was not uncommon to discover that beef cattle prices fluctuate significantly in certain areas of Kenya due to market imperfections. Because of the Marsabit County administration and the Kenyan government's inattention to providing information and laws to support the seamless movement of beef products from farmers to consumers, the beef business suffered from low market pricing (Mohamoud, 2021). This was supported by a different study by Mbatha (2021) which, claimed that poor pricing for beef cattle and its products were another problem that Kenyan beef cattle farmers had to deal with. It was only then that a survey of the literature revealed pastoralists to take the beef cattle market prices into account prior to making investments in their output. This study aimed to determine whether market prices affected Marsabit County's production of beef cattle.

2.4 Theoretical Framework

The following theories anchored the study which includes basic need, lively hood, diversification and resilience and fund product theory

2.4.1 Basic Needs Theory

The proponents of the Basic Human Needs Theory include John Burton and Abraham Maslow.

The Basic Needs Theory, part of Self-Determination Theory (SDT), posits that humans have three universal, innate, and psychological needs: autonomy, competence, and relatedness. These needs are essential for psychological growth, intrinsic motivation, and well-being (Ryan & Deci, 2000). Autonomy refers to the

need to feel in control of one's own behaviors and goals. Competence involves feeling effective and capable of achieving desired outcomes. Relatedness is the desire to feel connected to others, to love and care, and to be loved and cared for. The fulfillment of these needs is considered essential across all cultures and is a critical aspect of psychological development and well-being. When these needs are satisfied, individuals are more likely to experience enhanced self-motivation, well-being, and positive outcomes. Conversely, when these needs are thwarted, individuals may experience diminished motivation and well-being, potentially leading to psychological distress (Ryan & Deci, 2000; Deci & Ryan, 2008).

The theory provides a foundational framework for examining the factors affecting beef cattle production among pastoral communities in Marsabit County. This theory allows researchers to explore how social structures, cultural practices, and community dynamics influence cattle rearing practices, economic decisions, and ultimately, production outcomes. The theory suggests that decisions regarding cattle production are not solely based on individual economic benefit but are deeply embedded in the need to maintain social cohesion and mutual support. For instance, during droughts or conflicts, pastoralists may prioritize the communal need for survival over individual production goals, affecting overall cattle productivity. Traditionally where status and respect are often linked to the size and health of one's cattle herd, social basic need theory highlights how these social pressures can drive production practices (Coyne et al., 2021). For example, pastoralists might engage in overstocking or resist selling cattle even in unfavorable market conditions to maintain or enhance their social standing, which can have implications for sustainable production and resource use. The theory aids in understanding how external factors, such as government policies, market access, intercommunity conflict and climate change, intersect with social

needs. For instance, intercommunity conflicts and policies that fail to consider the social and cultural dimensions of pastoralism may inadvertently weaken traditional support systems, leading to adverse effects on beef cattle production.

Social Basic Need Theory provides a comprehensive lens to study the complex interplay of social, cultural, and economic factors affecting beef cattle production in pastoral communities. By anchoring the study in this theory, researchers can better understand the motivations behind production strategies and identify interventions that are not only effective but also culturally sensitive and socially sustainable.

2.4.2 Livelihood Diversification Theory

In the 1980s and 1990s, development economists and anthropologists were interested in how rural populations in developing nations could cope with risks like natural disasters, economic downturns, and market fluctuations. This interest led to the creation of the livelihood diversification theory. Hart (1973) introduced the concept of "the informal economy" and its role in sustaining livelihoods in the developing world, which was a significant contribution to the development of livelihood diversification theory. According to the livelihood diversification theory paradigm, individuals and communities should diversify their sources of income and resources to reduce their vulnerability to risks like natural disasters, economic downturns, and market volatility. This theory can be applied to understand how people involved in the sector may be using beef cattle production as one of several strategies to generate income and protect their livelihoods in the context of beef productivity. For example, a pastoralist who raises cattle for beef may be more resilient to risks associated with the beef cattle farming, such as market fluctuations or disease outbreaks, compared to a pastoralist who relies solely on cattle for social status.

The theory also suggests that participants in the beef cattle industry could increase their resilience by diversifying their markets and products, thus reducing dependence on a singular commodity or market and diminishing the risks associated with demand shifts. A beef cattle producer, for example, who markets cattle for both domestic consumption and international trade, alongside producing leather goods, could potentially safeguard against the volatility in demand for any specific product. The concept of livelihood diversification positions beef cattle production within a broader economic and social fabric, indicating that engaging in this sector could contribute to regional economic diversification, job creation, and the preservation of traditional agricultural practices.

In essence, the livelihood diversification theory provides a valuable lens for analyzing how engagement in beef cattle production can serve as a multifaceted strategy for income and resource diversification, thereby enhancing resilience to various risks and uncertainties. Promoting diversification within the beef cattle sector (Dumont et al., 2020) could pave the way toward developing economies that are both more resilient and sustainable, benefiting individuals and communities alike.

2.4.3 Resilience and Food Production Theory

In their groundbreaking work, Walker and colleagues (2004) introduced the concept of "ecosystem resilience," applying it specifically to the analysis of food production systems. This concept played a pivotal role in shaping the foundation of resilience theory within the realm of food production. By incorporating resilience and food production theories, one can better understand the dynamics of trade. "Resilience" refers to a system's ability to withstand disturbances ranging from natural calamities and economic setbacks to epidemics and to recover from them. This concept is

applicable to various systems, including both natural ecosystems and economic frameworks.

When discussing the resilience in beef cattle production and trade, it encompasses the capacity of individuals and communities within this industry to manage and bounce back from various challenges, including market volatility, health crises, and shifts in beef demand. Conversely, food production theory offers a lens to examine the factors that influence food production, encompassing resource availability, technological advancements, and market access. Within the context of beef cattle production and commerce, this theory helps understand the determinants of beef food production, such as feed supplementation, veterinary service availability, and the demand for beef products in both local and international markets which affect market price.

By applying these theories to beef cattle production and trade, one can grasp how this sector contributes to the resilience and food security of the stakeholders involved. For example, by fostering sustainable beef cattle production practices for food and other products, the sector can enhance the economic resilience of pastoralist communities and ensure food security for populations reliant on beef as a primary food source.

In summary, the concepts of resilience and food production theory offer valuable insights into how beef cattle production and trade can bolster the resilience and food security of those engaged in the sector. They also highlight the challenges that need to be addressed to cultivate a more resilient and sustainable industry (Walker et al., 2004). These theories underscore the beef cattle's adaptability in arid and semi-arid regions, such as Marsabit County, where despite harsh conditions, limited biodiversity, scarce animal care resources, and inadequate infrastructure, beef cattle

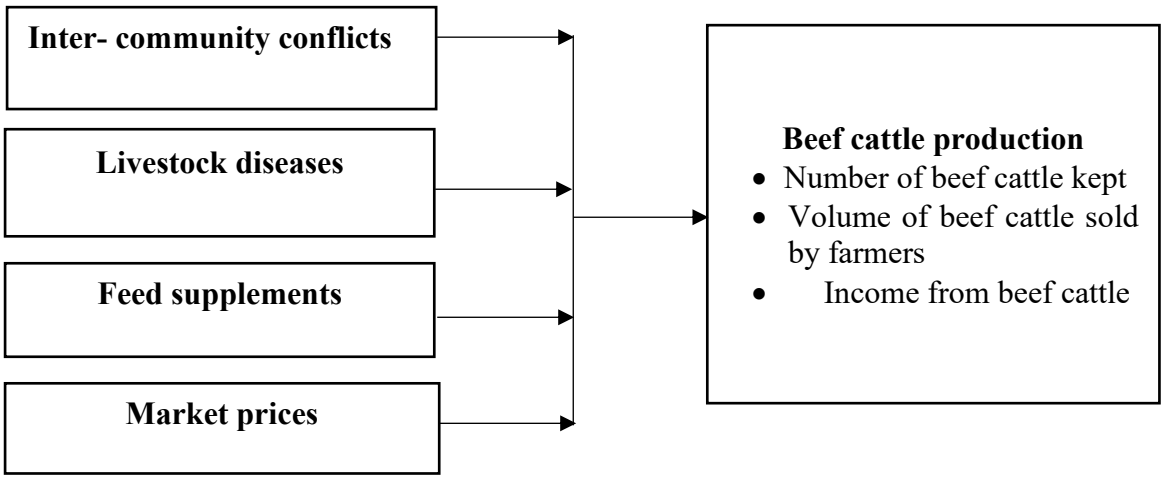
continue to provide meat and other products. This resilience is further mirrored in the communities that thrive under these conditions with minimal governmental support.

2.5 Conceptual Framework

According to Creswell and Creswell (2017), a conceptual framework was a graphic representation that depicts the relationship between dependent variable and independent variables. In this study, the independent variable was known factors under the study (Inter-Community conflicts, Livestock diseases, feeds supplementation and Market prices) while on the other hand, the dependent variable were the beef cattle production under pastoral management in Marsabit County as shown in Figure 2.1.

Figure 2.1

Conceptual Framework

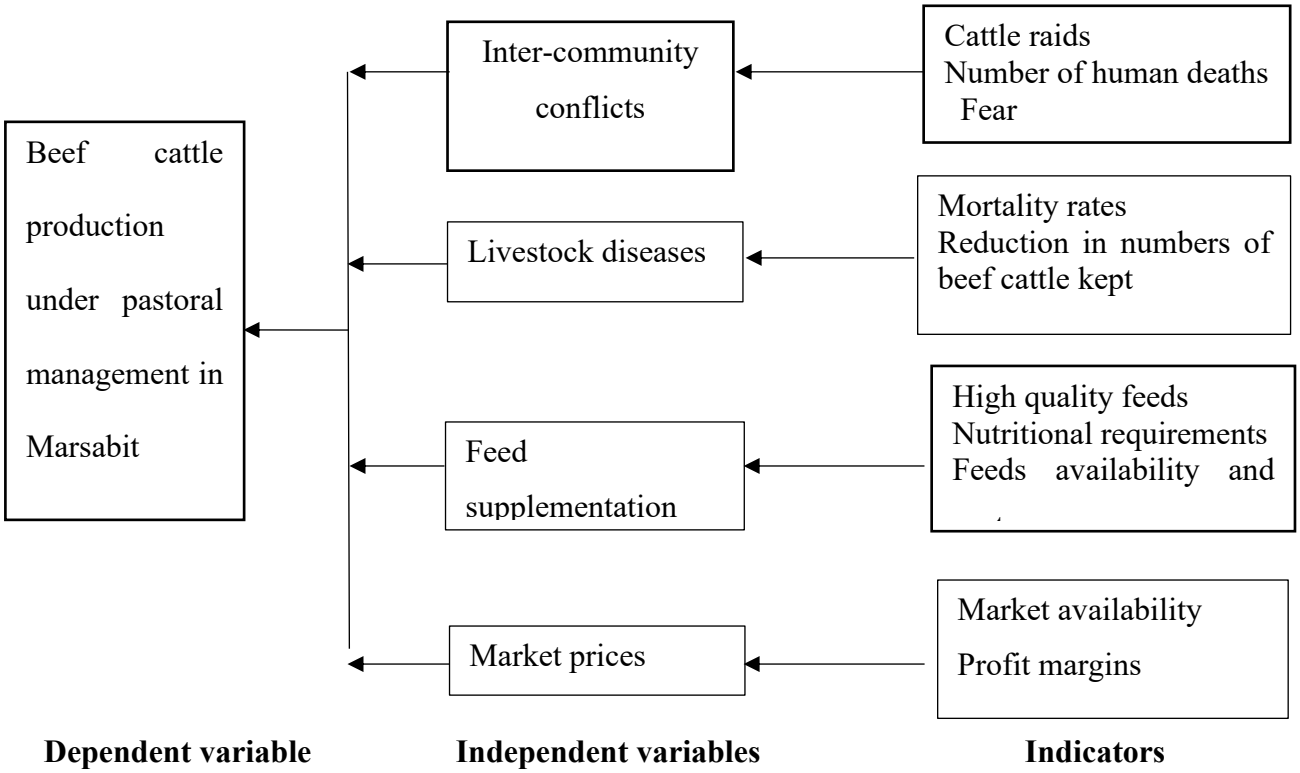


2.6 Operationalization framework

The operational framework was a set of variables that the researcher operationalized in order to empirically complete the study.

Figure 2.2

Operational Framework



CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlined the approach that was taken to the research, emphasizing the methods, instruments, and processes that were used. The study design, target population, sampling frame, sample size computation, sampling procedures to be employed, data collection methods, and pre-testing were all covered. The kind of data that was gathered, data processing and analysis techniques, and the statistical measurement model that was applied to the studies were also covered.

3.2 Research Design

According to Panke (2018) and Adner and Feiler (2019), the research design was the overall strategy or plan that united the various study components in a logical and cogent way. It gave a researcher a general idea of how to approach answering the research questions in order to successfully solve the research topic. The phrase "research design" described the structure of the research design more specifically than the entire process that included research technique (Sileyew, 2019; Rahi, 2017; Tight, 2016). Consequently, a research design offered causal choices in methodology, which helped the researcher allocate limited resources (Flynn et al., 2018; Reilly & Norton, 2016).

The study employed a descriptive survey study design. The methodology of the study allowed it to extrapolate its conclusions to the whole population that was being studied (Chandra, 2020; Schreier, 2018). This was so that the researcher could gather data on respondents' attitudes, beliefs, actions, and values related to the research question through survey research (Siegrist, 2021). Furthermore, as stated by Taguchi

(2018), the descriptive survey design allowed the researcher to use both quantitative and qualitative methods; the latter were based on the verifiability principle and necessitate systematic data collection, analysis, and interpretation in order to yield results that were applied to the target population (Jensen, 2020). Quantitative methods were based on the principle of verifiability and required the researcher to gather a significant amount of data or conduct statistical analysis.

3.3 Target Population

The target population was described as people, events, or records that have the information needed to respond to the measurement questions (Pandey & Pandey, 2021; Acharya & Porwal, 2020). Furthermore, a target population, according to Acharya and Porwal (2020), is a group of people, things, or stuff that were measured. Mugenda (2008) went on to say that the population for which information was being sought was the target population. According to previous study, target populations were defined in a variety of informal ways. For example, some defined it as "the population about which information was "asked" or the "totality" of elements under discussion and for which information was desired." Abdul (2019) agrees with this research.

The Marsabit County Agriculture and Livestock Empowerment Programme report (MCALEP, 2019) report there were 1210 beef cattle farmers with population of 118,755 beef cattle which creates our study target population. The 1210 farmers were grouped into groups. There were 200 registered agricultural groups in the four sub-counties of Marsabit County that practiced beef cattle farming as at 31st December 2020 from the county department of Agriculture, Livestock, Fisheries and Irrigation (2019). The rationale for choosing farmers organized in groups is, farmers were

exposed to commercialization of beef livestock farming for food provision, income generation (The Marsabit County Agriculture and Livestock Empowerment Programme report [MCALEP], 2019).

3.4 Sampling Frame

Elfil and Negida (2017) defined the sampling frame as the range or list of all sampling units in the survey population (Schreier, 2018) from which a sample was taken. A sampling frame was a list of the population elements from which a sample unit was selected, according to Valliant and Dever (2018). A sampling unit was a subset of the study entities that provided the material source for the generated random variable (Arocha, 2021).

A sampling frame was necessary for probability sampling because random sampling from the sampling frame would not be able to address the study issue if it was not appropriately selected from the population of interest (Wu & Thompson, 2020). It was acceptable to make generalizations "only" about the population that the sample frame defined (Maxwell, 2021; Sharma, 2017). A sample of beef cattle producers was selected for the study from the list of farmers in the Agriculture, Livestock, Fisheries, and Irrigation and Data (2021) dataset**.**

3.4.1 Sampling Techniques, Sample Design and Sample Size

According to Batty et al. (2020), a "sample" was a subset of the population that has been selected to be representative of the entire population. We chose a sizeable and representative sample because we were unable to conduct research on the complete population. Employing a representative sample reduced the expenses related to the research, the amount of time needed to conduct the study, and the number of workers

needed to finish it. Three elements contributed to the representativeness of a sample: 1) Design of sampling; 2) Sample size; and 3) Response rate.

Sampling procedures and designs were methodical and well-defined in order to get meaningful inferences from the sample (Etikan & Bala, 2017). A sample design was defined as the architecture or method for selecting research participants or responders (Kothari, 2004) with the ultimate goal of accurately representing the characteristics of the population to which it was intended to belong (Majid, 2018).

Pandey and Pandey (2021) defined sampling as the process of choosing a set of individuals so that they fairly represented the broader group from which they were taken. This subgroup was specifically selected to be representative of the complete population with respect to key attributes; the outcome was known as a sample from which more affordable generalizations about the population as a whole was drawn.

In a descriptive survey, a sample was therefore a subset of the population (Majid, 2018). This allowed a researcher to collect data and use statistical inference to generate predictions about the population (Yarkoni, 2020; Makar & Rubin, 2018). Generally speaking, the variable scores were more likely to be indicative of the population scores the larger the sample size (Pandey & Pandey, 2021).

The goal of this research was to draw findings regarding Marsabit County that were applied generally. As noted by Albine and Irene (2018), Marsabit County was deliberately chosen utilizing purposive and conviction sampling procedures, as opposed to being chosen at random from among Kenya's 47 counties. This was because, Marsabit was Mainly Pastoralism County where pastoralists practice beef cattle farming for reasons other than income generation, food security, social protection and as wealth assets. As such, the study sought to determine how inter-

community conflicts, livestock diseases, feed supplementation and market prices did affect beef production. The group population of beef cattle farmers who were registered with the Marsabit county government was 200 out of this number, I sampled 60 farm groups judgmentally since a sample size of 10-30 percent was reasonable for a descriptive survey design cite. Later, stratified the groups in their respective sub counties through stratified random sampling. Afterwards, I employed Probability Proportionate to Size formula to get population proportions in every sub-county. This ensured greater statistical efficiency and reduce sampling error. Therefore, a sample of 320 respondents altogether were selected to participate in the study.

3.5 Data Collection Instruments

To address the study topic, data collection involved obtaining information from a sample (Sheehan, 2018; Flick, 2018). Data collection, according to Mohajan (2018), is the process of gathering information from the topic of the study. Conversely, the tools used to gather data were known as data collection instruments (Zohrabi, 2013). The goal of all data collection, according to Verigin (2019), is to gather high-quality evidence that can be transformed into rich data for analysis, hence moving the truth or hypothesis closer to reality. Primary data for the project was gathered through standardized surveys. A questionnaire, which consisted of a series of questions written or typed in a certain order on a form or set of forms, allowed for the collection of a high volume of data in a comparatively short amount of time (Leevy et al., 2018). Waidi (2016) went on to say that the questions designed to elicit the necessary data were formalized in a questionnaire. The purpose of these questionnaires was to provide detailed information and increase response by allowing respondents to

express their opinions and make suggestions. They were made up of a series of specific, typically brief questions (Evans & Mathur, 2018). The questions could be answered independently by the respondent or verbally by the interviewer (Hamilton & Finley, 2019; Grassini & Laumann, 2020).

We employed a structured questionnaire because it was a cost-effective and time-efficient way to collect data compared to other approaches (Laban & Deya, 2019). The goals and research questions of the study informed the customization of the questionnaire. There were both open-ended and closed-ended questions in it. While unstructured questions allowed respondents to express themselves more pragmatically, closed-ended questions limited respondents to the variables in which the researcher was interested (Oudejans, 2018).

3.6 Data Collection Procedure

The process of gathering data from a sample in order to carry out the research was referred to as "data collection" (Bryman, 2012). To ensure that the information gathered was reliable and well-defined and that judgments made in the future based on the results were legitimate, a rigorous data collection approach was necessary (Mkandawire, 2019). De Winne and Peersman (2014) defined the data collection procedure as addressing respondents with the intention of gathering data after deciding what information needed to be gathered. The process created a benchmark for comparison and, in certain cases, an improvement target (Manzano-Bort, 2022). Establishing the parameters of the study, obtaining data through unstructured (or semi-structured) observations and interviews, documents, and visual materials, and developing a strategy for data recording were further steps in the data collection process (Creswell, 2009). Primary data was gathered via questionnaires, to which a

predetermined sequence of questions were answered by a sample of pastoralists (Zohrabi, 2013; Shen et al., 2017).

3.7 Pretesting of Research Instruments

3.7.1 Pilot Study

Pilot studies were scaled-down versions of larger research that were carried out in advance of the larger study, according to Krosnick (2018). In addition to providing precise data that may be used in the larger study, pilot studies were used to assess if the larger study can be carried out (Albers & Lakens, 2018). It was impossible to emphasize the importance of the pilot test (Ogunshola, 2019) since it helps to discover any items on the questionnaire that were confusing or ambiguous (Bragg & Weld, 2018). As a result, the questionnaire's validity and reliability were improved to an acceptable degree (Boparai et al., 2018).

To verify the validity and reliability of the instrument, a pilot test was carried out. Odhiambo et al., (2018) stated that participants in the pilot test should be similar to those in the population that would provide the sample for the full study. Isiolo County was chosen for the pretest study on purpose since it was close to Marsabit County and had similar cultural settings and practices related to raising beef cattle. To deliver high accuracy pilot research, a sample size of 1% to 10% was appropriate (Oyuga et al., 2019). Furthermore, Mugenda and Mugenda (2003) said that for piloting, 1% to 10% of the sample was enough. Participants in the pilot project were chosen from the 5% (n=16) of beef cattle keepers in Marsabit County who were selected by simple random sampling. The researcher's enumerators helped evaluate the completed surveys for applicability to the topic being studied. The results of the pilot study were then used by the researcher to fix any flaws in the data collection tools.

3.8 Instrument Reliability

According to Singh (2014) and Mohajan (2017), reliability guaranteed impartiality and dependability by increasing transparency and lowering the possibility of prejudice. According to Wahyuni (2012) and Mueller and Knapp (2019), "reliability" was the consistency of scores achieved by the same person taking the test under different conditions or at different times, form to form, item to item, or from one rater to another. Müller and Moshagen (2019) stated that a measure was deemed reliable if it consistently demonstrated minimal variation over time when re-administered, ensuring its replicability and generalizability (Wahyuni, 2012; Mohajan, 2017).

The degree to which items in a single instrument corresponded with one another, either within the test's two halves or within individual items if the instrument consisted of a single subject or substance, was referred to as internal consistency, according to Clark and Watson (2019). As a result, dependability was estimated rather than measured, and reliability did not guarantee accuracy because a scale may consistently measure something different from what was intended to be evaluated. The internal consistency of Likert scale replied and the reliability of the measurements were assessed using Cronbach's coefficient alpha (Franke & Sarstedt, 2019; Cronbach, 1951). An alpha value of 0.70 or higher was considered acceptable. Adeniran (2019) and Shrestha (2021) stated that an acceptable degree of internal consistency in this study was also indicated by a Cronbach's alpha score of 0.5 or higher.

3.9 Instrument Validity

Validity is defined by Mueller and Knapp (2019) as the degree to which an instrument genuinely measures "what it was designed to measure" or "what it purports to

measure." According to Clark and Watson (2019), determining whether a research instrument measured what it was intended to measure or whether the study findings were accurate was the goal of instrument validity. Accordingly, validity was the consistency of the conclusions reached from a research project (Daniel, 2018).

By guaranteeing impartiality and reliability, validity explained how well the data gathered represented the actual field of study, enhancing transparency and reducing bias in research (Singh, 2014). To make sure that the data analysis results appropriately depicted the phenomenon under study and that the idea being measured accurately reflected that concept, the validity of the instrument had to be tested (Pandey & Pandey, 2021).

3.10 Data Processing and Analysis

Validity explained how well the data collected represented the real field of study by ensuring impartiality and reliability, improving transparency and lowering prejudice in research (Singh, 2014). The validity of the instrument needed to be examined to ensure that the data analysis results adequately portrayed the phenomenon under research and that the concept being measured effectively reflected that idea (Pandey & Pandey, 2021).

Elliott (2018) defined data analysis as the process of assembling data for analysis, obtaining additional information from the analysis in order to better comprehend the data, portraying the data, and interpreting the data's larger meaning. Additionally, Saura (2021) noted that data analysis was the act of making sense of the data you gathered by organizing it, summarizing it, looking for trends, and utilizing statistical techniques to determine what the data means. Thus, data analysis was the act of deriving conclusions from unstructured data (Tong, 2019).

To achieve the objectives of the study, the researcher employed both descriptive and inferential statistics in the analysis (Blumberg et al., 2011). To visualize the results, frequency distribution tables, histograms, and bar charts were used (Mishra, 2019). Correlation analysis and chi-square analysis assisted the researcher in exploring the relationship between the variables and making generalizations about the data. Additionally, Standard Multiple regression analysis were used to explore the variance explained by inter-community conflicts, livestock diseases, feed supplementation and market prices on beef cattle production among pastoral communities of Marsabit County.

3.11 Diagnostic tests

3.11.1 Testing of Normality

To ascertain whether the score distribution for the dependent variable was normal, the researcher applied the Shapiro-Wilk statistic. The normalcy test provided a framework for choosing between parametric and non-parametric processes and was used to assess if the dependent variable scores deviated from the assumption of normality. The results were deemed non-significant when the probability value [Sig-Value] was greater than 0.05 (P-Value>0.05), suggesting that the distribution of scores on the dependent variable was normally distributed. In contrast, the distribution was thought to be deviating from the assumption of normality when the significance value was less than 0.05. Though in bigger sample sizes, this happened quite frequently.

3.11.2 Autocorrelation Testing

To find out if the variables were auto correlated, the Durbin-Watson Test was run. The first order autocorrelation between the error and the value right before it was

found using the Durbin-Watson statistic. To ascertain whether or not the errors in several observations were related, the test was utilized.

3.11.3 Multicollinearity and Singularity

The relationship between the independent variables was meant by this. When the independent variables had a high correlation (r=.9 and above), multicollinearity was present. When one independent variable was really a composite of several independent variables, this was known as a singularity. To test for multicollinearity between independent variables (market, livestock diseases, feed supplements, and intercommunity disputes), the researcher relied on tolerance and the Variance Inflation Factor (VIF).

Using the formula 1-R squared for each variable, tolerance was a measure of how much of the variability of the designated independent was not explained by the other independent variables in the model. If this value was extremely little (less than.10), it means that there may be multicollinearity because of the significant multiple correlation with other variables. Conversely, the Variance inflation factor was simply defined as the Tolerance value inversed (1 divided by Tolerance). In this case, multicollinearity was an issue if the VIF values were greater than 10.

3.12 Ethical Considerations

The study guaranteed moral conduct. The study's conclusions therefore be consistent with the research questions. Furthermore, in order to enable me to generate a credible study, ethical research required that the methodologies I utilized be directly linked to the study's aims (Robinson, 2021). Participants in the research was only required to reply in accordance with their own consent, and no respondent was ever forced or persuaded to react to the topics we were investigating. This indicated that

participation in the research were entirely voluntary. Strict measures were taken to ensure respondents' privacy about their data. Furthermore, for the respondent's protection, no personal information such as names, ID numbers, residence locations, etc. were requested. Additionally, the researcher followed the health standards of the Ministry of Health to ensure that participants were not exposed to COVID-19 dangers (Bosire et al., 2021).

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.0 Introduction

This chapter presents the results derived from the empirical data and analysis discussed in the third chapter. It encompasses details such as the rate of response, reliability assessment, demographic overview, descriptive statistics, diagnostic test outcomes, regression and correlation analyses, and the conclusions drawn from hypothesis testing.

4.1 Response Rate of the study

Of the 320 surveys distributed to beef cattle farmers registered with the Marsabit county government, 298 were completed and returned, resulting in a response rate of 93.1%. This response rate surpasses the benchmarks recommended by Mugenda and Mugenda (2003), who suggest that a rate of 50% is sufficient for analysis and reporting, while 60% is generally considered good, and anything above 70% is excellent. Babbie (1990) similarly contends that a response rate exceeding 70% is considered very good. Therefore, according to these criteria, the response rate for this study is deemed very good and highly appropriate. The results are presented in Table 4.1.

Table 4. 1

Response Rate

	Frequency	Percent
Response	298	93.1
Non-Response	22	6.9
Total	**320**	**100**

4.2 Reliability Results

Table 4.2 shows the results of reliability analysis by Cranbach's alpha coefficient.

Table 4. 2

Summary of Cronbach's alpha Reliability Coefficient

	Cronbach's Alpha	Cronbach's Alpha on Standardized Items	N of Items
Intercommunity conflict	0.858	0.827	8
Livestock diseases	0.799	0.763	8
Feed supplement	0.811	0.729	10
Market prices	0.794	0.763	10
beef cattle production	0.818	0.802	13

From Table 4.2 the findings reveal that the values constructs used in indicating intercommunity conflict, livestock diseases, feed supplement, market price and beef cattle production were all internally consistent. This is in line with Singh and Thirusangu (2019) who indicate that Cronbach alpha values of > 0.70 are acceptable. As per the findings, the values are 0.858, 0.799, 0.811, 0.794 and 0.818 for the respective variables. The respective adjusted values are also all above 0.700.

4.3 Demographic Information

4.3.1 Age Distribution

The study further analyzed the age classes of the respondents between 20 to 35 years. The age distribution of the participants involved in the study is shown in Table 4.3.

Table 4.3

Age Distribution

		Frequency	Percent
Valid	20 - 35 years	44	14.7
	36 - 45 years	88	29.5
	46 - 55 years	81	27.1
	56 and above	85	28.7
	Total	**298**	**100.0**

From the findings in Table 4.3 majority 88 (29.5%) of respondents were aged between 36–45 years, 85 (28.7%) were aged 56 years and above, and 81 (27.1%) were aged between 46 -55 years. Furthermore, 44 (14.7%) were aged 20-35 years. the demographic profile of respondents involved in keeping beef cattle in Marsabit County, it can be deduced that beef cattle farming in the area is predominantly undertaken by individuals in the middle to older age groups. Specifically, the majority of the respondents fall within the age brackets of 36–45 years, 46–55 years, and 56 years and above, cumulatively accounting for 85.3% of the participants. This suggests that younger individuals, aged between 20-35 years, are less involved in this agricultural practice, representing only 14.7% of the respondents. This distribution might indicate a generational gap in cattle farming, potentially signaling concerns about the sustainability and transfer of knowledge and practices to younger generations.

4.3.2 Respondents' Gender

The study collected data on the gender distribution of respondents, revealing a notable difference between male and female participants. As shown in Table 4.4, 172 respondents, accounting for 57.7% of the sample, were male. Meanwhile, 126 respondents, or 42.3%, were female. This gender distribution highlights the male-

dominated nature of pastoral communities in Marsabit County. The analysis indicated that a larger proportion of respondents were male compared to female. This gender imbalance might reflect the socio-cultural dynamics of pastoral communities in Marsabit County, where men often take a more active role in livestock management and related activities. Understanding this gender distribution is crucial for tailoring interventions and policies that aim to enhance beef cattle production in these communities.

Table 4.4

Gender

		Frequency	Percent
Valid	Male	172	57.7
	Female	126	42.3
	Total	**298**	**100.0**

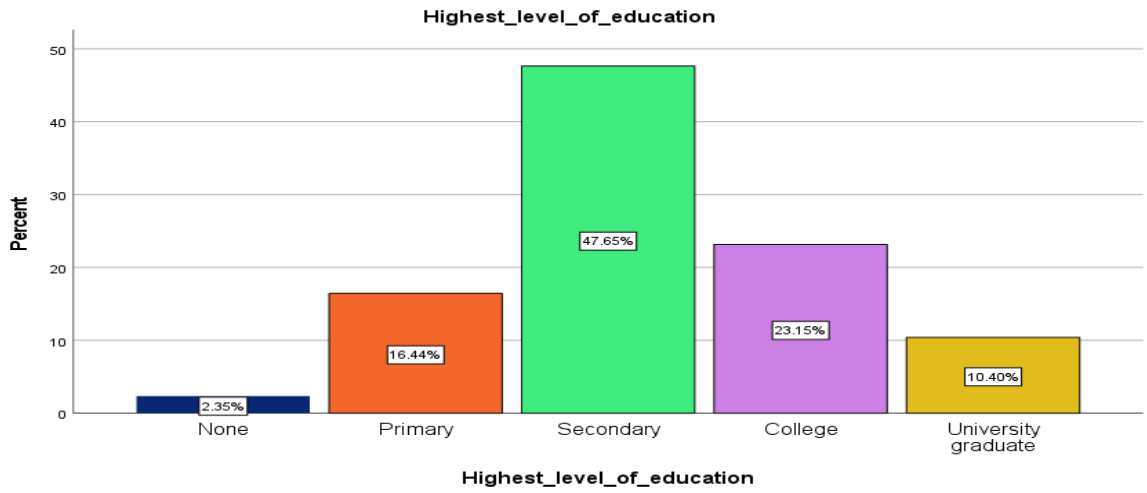
4.3.3 Highest level of education

The study assessed the highest level of education among respondents, as presented in figure 4.1. The findings indicated that 47.7% of the respondents had attained a secondary level of education, making it the most common educational level among the participants. This was followed by 23.2% who had reached college level, and 16.4% who had completed primary education. A smaller proportion, 10.4%, were university graduates, while only 2.3% had no formal education. These results highlight the varying educational backgrounds within the pastoral communities of Marsabit County, which could influence the adoption of modern beef cattle

production practices. Understanding the educational distribution is essential for designing effective training and extension services aimed at improving cattle production efficiency.

Figure 4.1

Highest level of education



4.3.4 Reason for maintaining beef cattle

The study explored the reasons for maintaining beef cattle among respondents, as detailed in Table 4.5. The findings revealed that a significant majority, 83.9%, kept beef cattle for commercial purposes, highlighting the economic importance of cattle in these communities. Meanwhile, 9.7% of the respondents-maintained cattle for beef products, and 4.7% did so for social security reasons. Five (1.7%) of the respondents indicated that they keep beef cattle for reasons not indicated in the questionnaire which included source of food and nutrition, source of manure for farming and transportation of farm produce using Ox cart.

These results underscore the predominance of commercial motivations in beef cattle production among pastoral communities in Marsabit County, while also acknowledging the roles of subsistence and social factors. Understanding these

motivations is crucial for developing strategies that support the economic sustainability and resilience of these communities.

Table 4.5

Reason for maintaining beef cattle

		Frequency	Percent
Valid	Beef products	29	9.7
	for commercial purpose	250	83.9
	Social security	14	4.7
	Others	5	1.7
	Total	**298**	**100.0**

4.3.5 Offered an alternative source of income, would you still keep beef animals?

The study examined whether respondents would continue to keep beef animals if offered an alternative source of income, as presented in Table 4.6. The findings showed that 72.5% of the respondents indicated they would still maintain beef cattle, while 27.5% stated they would not. This suggests a strong cultural and possibly practical attachment to cattle rearing among the majority of the pastoral community members in Marsabit County. Despite potential alternative income opportunities, the majority's preference to continue cattle rearing highlights the deep-rooted significance of this practice in their livelihoods and traditions. Understanding this attachment is vital for designing income diversification programs that respect and integrate cultural practices.

Table 4.6

Offered an alternative source of income, would you still keep beef animals

		Frequency	Percent
Valid	Yes	216	72.5
	No	82	27.5
	Total	**298**	**100.0**

4.4 Inter-Community Conflicts

The study evaluated the impact of inter-community conflicts on beef cattle production, as summarized in Table 4.7. The results revealed substantial concerns among respondents regarding various aspects of these conflicts.

The safety of livestock and humans was a significant issue, with a mean score of 4.0638 and a standard deviation of 1.29982. This high mean score indicates a strong perception among the respondents that safety concerns, both for themselves and their livestock, adversely affect beef cattle production. The fear of losing beef cattle due to inter-community conflicts further emphasized this concern, with a mean score of 4.0268 (SD = 1.31270). Farmers expressed considerable anxiety about their cattle being stolen or killed during conflicts, which directly impacts their willingness and ability to engage in cattle rearing. The fear of human life loss during inter-community conflicts also significantly affected beef cattle production, with a mean score of 3.4698 and a standard deviation of 1.44743. While this score is slightly lower than others, it still reflects a substantial concern about the risk to human lives, which indirectly influences cattle production by deterring farmers from fully committing to cattle rearing due to safety concerns.

Frequent raids were identified as another major factor impacting beef cattle production, with a mean score of 4.0805 (SD = 1.31306). The high frequency of these

raids not only leads to the direct loss of cattle but also creates an environment of constant fear and instability. Human killings during these conflicts had an even higher impact, with a mean score of 4.1879 (SD = 1.25190). This highlights the severe disruptions caused by such violence, as the loss of human life has profound implications on the community's social structure and economic activities.

The perception of conflicts by pastoralists also played a crucial role, with a mean score of 3.7919 (SD = 1.48970). This reflects how the general atmosphere of fear and tension influences cattle production, even if direct incidents are not occurring frequently. The inability to recover stolen stock was another critical issue, with a mean score of 3.9362 (SD = 1.42582). The economic losses from stolen cattle that are never recovered significantly impact the livelihoods of pastoralists, discouraging investment and effort in cattle rearing.

Inefficient resource utilization due to inter-community conflicts was identified as the most critical issue, with a mean score of 4.2785 and a standard deviation of 1.20309. Conflicts often lead to restricted access to essential resources such as pasture and water, which are vital for cattle production. The inability to effectively use these resources due to the fear of conflict results in lower productivity and increased costs for pastoralists. These findings illustrate the profound negative impact of inter-community conflicts on beef cattle production in Marsabit County. The multifaceted nature of these impacts, ranging from direct violence and theft to broader socio-economic disruptions and resource inefficiencies, underscores the urgent need for interventions that address both the root causes and the consequences of these conflicts to support and stabilize cattle production in these communities.

Table 4.7

Inter-Community Conflicts

	N	Min	Max	Mean	Std. Deviation
Safety of livestock and humans affect the beef cattle production	298	1.00	5.00	4.0638	1.29982
Fear of beef cattle loss by farmers due to Inter-community conflicts affect beef cattle production affects its production	298	1.00	5.00	4.0268	1.31270
Fear of human live loss due to Inter-community conflicts affect beef cattle production	298	1.00	5.00	3.4698	1.44743
Frequent raids affect beef cattle keeping	298	1.00	5.00	4.0805	1.31306
Human killing during Inter-community conflicts affect beef cattle production	298	1.00	5.00	4.1879	1.25190
Inter-community conflicts perception by pastoralists affects beef cattle production	298	1.00	5.00	3.7919	1.48970
Failure to recover stolen stock influence the beef cattle production	298	1.00	5.00	3.9362	1.42582
Inefficient resource utilization (pasture, water) due to Inter-community conflicts affect beef cattle production	298	1.00	5.00	4.2785	1.20309
Valid N (listwise)	298				

The study delves deeply into the multifaceted impact of inter-community conflicts on beef cattle production among pastoral communities in Marsabit County. The findings, as summarized in Table 4.7, paint a vivid picture of the myriad challenges faced by respondents. Notably, concerns about safety, both for humans and livestock, emerge as paramount, with respondents expressing a strong perception of the adverse effects of safety concerns on beef cattle production. This sentiment is mirrored in the literature, which emphasizes how conflicts disrupt traditional pastoralist practices and jeopardize the well-being of both communities and their livestock (Said, 2020; Nyariki & Amwata, 2019). Moreover, the fear of cattle loss during conflicts looms large, with respondents expressing considerable anxiety about the susceptibility of their herds to theft or harm. This fear resonates with historical accounts of cattle raiding as a pervasive threat to pastoralist livelihoods on the broader and cultural heritage (Regassa & Korf, 2018; Wild et al., 2018).

The study sheds light socio-economic ramifications of conflicts on beef cattle production. Frequent raids, often accompanied by violence, not only result in direct cattle losses but also engender an environment of fear and instability. Such disruptions have far-reaching implications for pastoralist communities, as evidenced by respondents' concerns about the impact of conflicts on human lives and the community's social fabric. These findings align with literature that underscores the cyclical nature of violence in pastoral regions and its detrimental effects on community cohesion and well-being (Mayik, 2021; Waldman, 2019). Furthermore, conflicts hinder pastoralists' access to essential resources such as pasture and water, exacerbating livestock health issues and impeding productivity. This resonates with broader discussions on the nexus between resource scarcity, conflict, and pastoralist livelihoods, highlighting the urgent need for holistic interventions to address these

complex challenges (Furholt, 2021; Opiyo et al., 2014). In sum, the study's findings provide valuable insights into the intricate dynamics of inter-community conflicts and their profound impact on beef cattle production in Marsabit County, underscoring the imperative for comprehensive strategies to promote peace and stability in pastoralist landscapes.

4.5 Livestock diseases on beef cattle production

The study investigated the impact of livestock diseases on beef cattle production among pastoral communities in Marsabit County, as presented in Table 4.8. The findings revealed significant concerns regarding various aspects of disease management and its repercussions on cattle production. One of the primary concerns was the cost of medicament for treating livestock diseases, which had a mean score of 4.0671 and a standard deviation of 1.33416. This high score indicates that the expenses related to treating diseased cattle significantly influence production, as high treatment costs can deter farmers from maintaining large herds.

The risk of livestock diseases being transmitted to humans after consuming sick animals was another major concern, with a mean score of 3.9899 (SD = 1.39138). This highlights the health risks associated with livestock diseases, which can impact not only cattle production but also human health and safety, further complicating the management of livestock health.

Awareness of livestock diseases among the respondents was notably high, with a mean score of 4.2517 (SD = 1.16937). This indicates that the majority of farmers are well-informed about the diseases that affect their cattle. Despite this awareness, the cost of diseases still discourages many from keeping beef cattle, as reflected by a mean score of 3.8121 (SD = 1.53903). This suggests that while farmers are

knowledgeable about livestock diseases, the economic burden of managing these diseases remains a significant deterrent. Livestock mortality due to diseases was also a critical factor affecting beef cattle production, with a mean score of 4.0101 (SD = 1.38166). High mortality rates can lead to substantial economic losses for farmers, reducing the profitability and sustainability of cattle production.

These findings highlight the profound impact of livestock diseases on beef cattle production in Marsabit County. The high costs of treatment, the risk of zoonotic diseases, and the significant mortality rates all contribute to the challenges faced by pastoralists in maintaining healthy and productive herds. Addressing these issues through improved disease management practices, affordable veterinary services, and enhanced farmer education could help mitigate the negative effects of livestock diseases on cattle production in these communities.

Table 4.8

Livestock diseases on beef cattle production

	N	Min	Max	Mean	Std. Deviation
Cost of beef cattle medicament due to livestock disease influence its production	298	1.00	5.00	4.0671	1.33416
Livestock diseases infect human after consuming sick animals	298	1.00	5.00	3.9899	1.39138
Am aware of livestock diseases that affect beef cattle	298	2.00	5.00	4.2517	1.16937
Cost of diseases discourage farmers from keeping beef cattle	298	1.00	5.00	3.8121	1.53903
Livestock mortality affect beef cattle production	298	1.00	5.00	4.0101	1.38166
Valid N (listwise)	298				

The findings from the study underscore the significant impact of livestock diseases on beef cattle production among pastoral communities in Marsabit County, reflecting widespread concerns regarding disease management and its repercussions. Notably, the high costs associated with treating livestock diseases emerge as a primary concern among respondents, with these expenses significantly influencing cattle production (Table 4.8). This finding aligns with existing literature highlighting the negative impact of infectious diseases on beef cattle productivity (Espinosa et al., 2020). Diseases such as foot and mouth disease (FMD), trypanosomiasis, and East Coast fever (ECF) pose significant challenges to cattle health and production, resulting in decreased meat production, weight loss, and increased mortality rates (Ikiror et al., 2020; Muzzo & Provenza, 2018). The economic burden of managing these diseases often deters farmers from maintaining large herds, thereby affecting beef cattle production and livelihoods (Arseneault, 2018; Okello, 2020).

Furthermore, the study highlights the health risks associated with livestock diseases, including the transmission of zoonotic diseases to humans through the consumption of infected animals. This aspect of the findings resonates with literature emphasizing the complex consequences of livestock diseases on human health and safety (Hoque et al., 2022; Elelu et al., 2019). The inability to slaughter infected beef for human consumption or export further exacerbates the economic losses associated with livestock diseases, restricting access to international markets and depriving communities of vital income sources (Adekunle & Filson, 2020; McLean, 2013). In Kenya's arid and semi-arid lands, where beef cattle play a crucial role in rural livelihoods, the productivity of these herds continues to be constrained by infectious diseases, posing significant challenges to beef cattle production and food security (Kileteny & Wakhungu, 2019; Adaawen, 2021). The study's findings, coupled with

existing literature, underscore the urgent need for comprehensive strategies to address livestock diseases and enhance beef cattle production in pastoralist regions like Marsabit County.

4.6 Feed supplementation on beef cattle production

The study examined the effects of feed supplementation on beef cattle production among pastoral communities in Marsabit County, as outlined in Table 4.9. The findings shed light on various factors related to feed supplementation and their impact on cattle production.

One of the key findings was regarding the shortage of feed supplements, which was identified as a significant challenge affecting beef production, with a mean score of 3.3893 and a standard deviation of 1.69257. This indicates that the availability of feed supplements is often limited, posing a constraint on cattle nutrition and overall productivity. The quality of feed supplements emerged as another crucial factor, with a mean score of 4.2919 (SD = 1.24398). This highlights the importance of ensuring that the available supplements meet the nutritional needs of beef cattle adequately. Poor-quality supplements can negatively impact cattle health and productivity, emphasizing the need for access to high-quality feed sources. The cost of feed supplements also significantly influences beef cattle production, as indicated by a mean score of 3.1711 (SD = 1.67801). High costs can pose financial challenges for farmers, particularly small-scale producers, limiting their ability to invest in necessary supplements to enhance cattle productivity.

The nutritional requirements of beef cattle were identified as a critical factor influencing production, with a mean score of 4.1611 (SD = 1.40976). Meeting these

nutritional needs is essential for ensuring optimal growth, reproduction, and overall health of the cattle herd. The availability of feed supplements was found to influence beef cattle production, with a mean score of 3.3960 (SD = 1.66290). This underscores the importance of ensuring consistent access to feed supplements to support cattle growth and productivity throughout the year. The findings highlight the multifaceted nature of feed supplementation and its impact on beef cattle production in Marsabit County. Addressing challenges related to the availability, quality, and cost of feed supplements is essential for improving cattle nutrition, health, and overall productivity in pastoral communities.

Table 4.9

Feed supplementation on beef cattle production

	N	Min	Max	Mean	Std. Deviation
Shortage of feed supplements affects beef production	298	1.00	5.00	3.3893	1.69257
Quality of feed supplement affects beef production	298	1.00	5.00	4.2919	1.24398
Cost of feed supplements influence beef cattle production	298	1.00	5.00	3.1711	1.67801
Nutritional requirements influence beef cattle production	298	1.00	5.00	4.1611	1.40976
Beef cattle was influenced by feed supplements availability	298	1.00	5.00	3.3960	1.66290
Valid N (listwise)	298				

The study's examination of feed supplementation's effects on beef cattle production among pastoral communities in Marsabit County reveals critical insights into the challenges and implications associated with this practice. Notably, the findings underscore the significance of various factors related to feed supplementation and their impact on cattle production. For instance, the shortage of feed supplements emerges as a substantial challenge, hindering beef production by limiting cattle nutrition and overall productivity. This finding resonates with existing literature highlighting inadequate feed supplementation as a significant constraint on global beef cattle farming growth, particularly under pastoral management (Addis, 2019; Ketere-Lelgut, 2021).

The study emphasizes the importance of addressing challenges related to the quality, cost, and availability of feed supplements to enhance beef cattle production. Literature supports this perspective, indicating that consistent feed supplementation is critical for beef cattle production, especially in pasture-based systems in drylands, where natural pastures may not meet nutritional requirements (Shinde & Mahanta, 2020; Ndlovu et al., 2020). However, traditional pastoralists often face difficulties in accessing and utilizing supplementary feeds effectively, exacerbating the challenge of meeting cattle nutritional needs (ElSayed, 2021; Yator, 2018).

The study underscores the need for targeted interventions to alleviate supplement feed scarcity and enhance feed management practices among pastoralists. While there is increased interest in beef cattle production research, knowledge gaps persist regarding feed supplementation requirements in Marsabit County and similar regions. This aligns with the study's objective of contributing to closing this knowledge gap by providing insights into the effects of feed supplementation on beef cattle production. By correlating the study's findings with existing literature, a comprehensive

understanding of the challenges and opportunities associated with feed supplementation in beef cattle production emerges, highlighting the importance of tailored interventions to improve cattle nutrition, health, and overall productivity in pastoralist communities.

4.7 Market prices on beef cattle production

The study examined the influence of market prices on beef cattle production among pastoral communities in Marsabit County, as summarized in Table 4.10. The findings provide insights into various factors related to market dynamics and their impact on cattle production. Market prices were found to play a significant role in determining the sales volume of beef cattle, with a mean score of 3.9295 and a standard deviation of 1.43726. This suggests that fluctuations in market prices directly influence farmers' decisions regarding the sale of their cattle, reflecting the economic considerations that drive production decisions. Additionally, the sales of beef cattle were observed to increase with favorable market prices, as indicated by a mean score of 3.8188 (SD = 1.51781). This highlights the importance of market conditions in driving sales and revenue generation for cattle farmers in the region.

Conversely, low prices were identified as a deterrent to beef cattle production in Marsabit County, with a mean score of 4.1242 (SD = 1.31861). This suggests that unfavorable market conditions, such as low prices, can negatively impact farmers' incentives to invest in cattle production, potentially leading to reduced production levels. Profit margins from beef cattle sales also emerged as a significant factor influencing production decisions, with a mean score of 3.8188 (SD = 1.49996). This underscores the economic considerations that drive cattle production, as farmers seek to maximize profits in response to market conditions. Market accessibility was

identified as another important factor affecting beef cattle production, with a mean score of 3.6409 (SD = 1.58122). This highlights the logistical challenges faced by farmers in accessing markets, which can impact their ability to sell cattle and generate income. The distance between marketplaces and ranches was also found to influence beef cattle production, with a mean score of 3.8624 (SD = 1.48999). This suggests that proximity to markets can affect production efficiency and transportation costs, influencing farmers' decisions regarding cattle management.

The method of transporting beef cattle to marketplaces was identified as a factor influencing productivity, with a mean score of 3.8591 (SD = 1.50429). Efficient transportation methods can reduce stress on cattle and minimize losses during transit, contributing to overall production efficiency. The availability of beef cattle traders was found to impact production in Marsabit County, with a mean score of 4.1040 (SD = 1.33809). This underscores the role of market intermediaries in facilitating cattle sales and influencing market dynamics. The findings highlight the complex interplay between market prices, accessibility, transportation, and trader availability in shaping beef cattle production in Marsabit County. Addressing these market-related challenges is essential for supporting the economic viability and sustainability of cattle farming in pastoral communities.

Table 4.10

Market prices on beef cattle production among

	N	Min	Max	Mean	Std. Deviation
Market prices determine the sales volume of beef cattle	298	1.00	5.00	3.9295	1.43726
Beef cattle sales increase with good relative market prices	298	1.00	5.00	3.8188	1.51781
Low prices determine production of beef cattle production in Marsabit county	298	1.00	5.00	4.1242	1.31861
Profit margins from beef cattle sales affect its production	298	1.00	5.00	3.8188	1.49996
Market accessibility affect the beef cattle production in Marsabit county	298	1.00	5.00	3.6409	1.58122
The distance between the market place/gate and ranches affects beef cattle production in Marsabit county	298	1.00	5.00	3.8624	1.48999
Method of transporting beef cattle to market place influence its productivity in Marsabit county	298	1.00	5.00	3.8591	1.50429
Availability of beef cattle traders affect beef cattle production in Marsabit county	298	1.00	5.00	4.1040	1.33809
Valid N (listwise)	298				

The study's investigation into the influence of market prices on beef cattle production among pastoral communities in Marsabit County unveils critical insights into the

intricate relationship between market dynamics and cattle farming. Notably, the findings underscore the pivotal role of market prices in shaping production decisions and outcomes. For instance, fluctuations in market prices were found to significantly impact sales volume, with favorable prices driving increased sales and revenue generation for cattle farmers. This aligns with existing literature, which highlights the importance of market structure and relative prices in influencing beef cattle production decisions (De Vries & Marcondes, 2020; Hobbs, 2021). Moreover, low prices were identified as a deterrent to beef cattle production, reflecting the economic considerations that drive farmers' decisions regarding cattle investment and management (Rubio, 2020; Ma & Sexton, 2021).

The study sheds light on the challenges posed by market accessibility and transportation logistics, which can impact farmers' ability to sell cattle and generate income. This resonates with literature emphasizing the importance of efficient markets and market information in encouraging production and supporting reasonable market prices (Vorley et al., 2019). The study's findings also highlight the complexities of market dynamics in remote rural areas, where geographic isolation and inefficient marketing systems contribute to price fluctuations and low production levels (Wangu et al., 2021; Mohamoud, 2021). Furthermore, pastoralists' preference for milk production over beef cattle production due to low market prices underscores the significant influence of market conditions on production choices and livelihood strategies (Nyariki & Amwata, 2019).

The study's correlation with existing literature provides a comprehensive understanding of the multifaceted challenges and opportunities associated with market prices in beef cattle production. By highlighting the importance of addressing market-

related constraints and inefficiencies, the study underscores the need for targeted interventions to support the economic viability and sustainability of cattle farming in pastoralist communities.

4.8 Cattle Production

The study examined the influence of market prices on beef cattle production among pastoral communities in Marsabit County, as summarized in Table 4.11. The findings provide insights into various factors related to market dynamics and their impact on cattle production. Market prices were found to play a significant role in determining the sales volume of beef cattle, with a mean score of 3.9295 and a standard deviation of 1.43726. This suggests that fluctuations in market prices directly influence farmers' decisions regarding the sale of their cattle, reflecting the economic considerations that drive production decisions. The sales of beef cattle were observed to increase with favorable market prices, as indicated by a mean score of 3.8188 (SD = 1.51781). This highlights the importance of market conditions in driving sales and revenue generation for cattle farmers in the region.

Conversely, low prices were identified as a deterrent to beef cattle production in Marsabit County, with a mean score of 4.1242 (SD = 1.31861). This suggests that unfavorable market conditions, such as low prices, can negatively impact farmers' incentives to invest in cattle production, potentially leading to reduced production levels. Profit margins from beef cattle sales also emerged as a significant factor influencing production decisions, with a mean score of 3.8188 (SD = 1.49996). This underscores the economic considerations that drive cattle production, as farmers seek to maximize profits in response to market conditions.

Market accessibility was identified as another important factor affecting beef cattle production, with a mean score of 3.6409 (SD = 1.58122). This highlights the logistical challenges faced by farmers in accessing markets, which can impact their ability to sell cattle and generate income. The distance between marketplaces and ranches was also found to influence beef cattle production, with a mean score of 3.8624 (SD = 1.48999). This suggests that proximity to markets can affect production efficiency and transportation costs, influencing farmers' decisions regarding cattle management.

The method of transporting beef cattle to marketplaces was identified as a factor influencing productivity, with a mean score of 3.8591 (SD = 1.50429). Efficient transportation methods can reduce stress on cattle and minimize losses during transit, contributing to overall production efficiency. The availability of beef cattle traders was found to impact production in Marsabit County, with a mean score of 4.1040 (SD = 1.33809). This underscores the role of market intermediaries in facilitating cattle sales and influencing market dynamics.

The findings highlight the complex interplay between market prices, accessibility, transportation, and trader availability in shaping beef cattle production in Marsabit County. Addressing these market-related challenges is essential for supporting the economic viability and sustainability of cattle farming in pastoral communities.

Table 4.11

Cattle Production

	N	Min	Max	Mean	Std. Deviation
Conflicts between communities prevent me from adopting beef cattle production.	298	1.00	5.00	3.8859	1.44730
Number of beefs kept was influenced by livestock diseases	298	1.00	5.00	3.6678	1.57432
I don't keep many beef animals due to availability of feed supplements	298	1.00	5.00	3.9329	1.42920
I don't keep many beef animals due to cost of feed supplements	298	1.00	5.00	3.5671	1.58184
market prices affect the number of beef cattle I keep	298	1.00	5.00	3.3188	1.62132
Owing of high death rates due to livestock diseases, I only sell a small number of beef cattle.	298	1.00	5.00	3.7181	1.52678
Frequent raids in my area affects the number of beefs kept	298	1.00	5.00	3.8591	1.50429
Frequent raids in my area affects the gross income from beef cattle	298	1.00	5.00	3.9597	1.44660
Valid N (listwise)	298				

4.9 Diagnostic Tests

The diagnostic tests conducted included Multicollinearity Test, Test for Heteroscedasticity and Normality Test.

4.9.1 Multicollinearity Test

A multicollinearity examination was performed to assess whether two or more predictor variables (independent variables) within the regression model exhibited a high correlation. The variance inflation factor (VIF) served as the criterion for evaluating multicollinearity, with a VIF below 10 being considered within acceptable thresholds. Should the VIF values for the variables under investigation exceed 10, these variables would be considered to exhibit significant collinearity.

Table 4.12

Multicollinearity Test Using Tolerance and VIF

		Tolerance	VIF
Valid	Intercommunity conflict	0.287	3.603
	Livestock diseases	0.363	3.054
	Feed supplement	0.291	3.168
	Market prices	0.387	3.004

From the findings above, all the variables had tolerance values >0.2 and VIF values <10, as shown in Table 15. Thus, Myres (2015) indicated that where VIF ≥ 10 indicates the presence of Multicollinearity, there was no multicollinearity among the independent variables.

4.9.2 Test for Heteroscedasticity

Heteroscedasticity refers to the situation where the variability of a variable is not consistent across the range of values of a second variable that predicts it. Not accounting for heteroscedasticity when running a regression model can result in biased parameter estimates. To check for heteroscedasticity, the Breusch-Pagan/Godfrey test was used. This test examines whether the error terms are

correlated across observations in the cross-sectional data (Long & Ervin, 2000). The hypothesis tested was:

H1: The data is Homoscedastic.

If the p-value is less than 0.05, the hypothesis is rejected. The results of the Breusch-Pagan test are presented in Table 4.13.

Table 4.13

Heteroscedasticity Results

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity			
Ho: Constant variance			
Variables: fitted values of Performance			
Valid	chi2(1)	=	76.38
	Prob > chi2	=	0.054

Results in Table 4.13 show that the p-value is greater than the 5%. Then the hypothesis was not rejected at a critical p value of 0.05 since the reported Chi2 (1) = 76.38and p-value was 0.054>0.05 and thus the data did not suffer from heteroscedasticity.

4.9.3 Normality Test

To assess whether the data follows a normal distribution, a normality test was conducted. The Shapiro-Wilk test, known for its superior power in testing normality, was utilized to examine the variables' distribution. This test operates under the hypothesis, evaluated at a significance level of 0.05, that we should reject the null hypothesis (H0) if the probability (P) value is below 0.05; otherwise, we retain H0. For the analyses employing a multiple regression model, it is essential for the dependent variable to exhibit a normal distribution, as the model's assumptions

include the requirement of normally distributed variables (Quataroli & Julia, 2012). The hypothesis posited was:

H1: The dataset is normally distributed.

The findings related to the dataset's normality are presented in Table 4.14.

Table 4.14

Normality Outputs

Shapiro-Wilk				
		Statistic	df	Sig.
Valid	Intercommunity conflict	0743	298	0.057
	Livestock diseases	0.836	298	0.068
	Feed supplement	0.724	298	0.059
	Market prices	0.832	298	0.063
	Beef cattle production	0.925	298	0.072
	a Lilliefors Significance Correction			

The results indicated that using the Shapiro-Wilk test of normality, the data is normal since the p- values are above 0.05 for all the variables and thus we do not reject the alternative hypothesis (H1). Therefore, the variables on intercommunity conflict, livestock diseases, feed supplement and market prices and beef cattle production are normal in distribution and hence subsequent analysis can be carried out.

4.10 Inferential analysis

4.10.1 ANOVA with Friedman's Test

Table 4.14 presents the results of the ANOVA with Friedman's Test, which was conducted to assess the differences among respondents' perceptions regarding various factors influencing beef cattle production. The analysis examined both between-people and within-people variations.

Between people, the sum of squares was 45750.306 with 297 degrees of freedom, resulting in a mean square of 154.041. This led to a Friedman's Chi-Square value of 846.605, which was statistically significant ($p < .000$), indicating significant differences among respondents. Within people, between items, the sum of squares was 49940.872 with 4 degrees of freedom, resulting in a mean square of 12485.218. This contributed to the overall Friedman's Chi-Square value. The residual sum of squares within people was 20374.728 with 1188 degrees of freedom, resulting in a mean square of 17.150.

The total sum of squares across all factors was 70315.600 with 1192 degrees of freedom. The grand mean, calculated as the total sum of squares divided by the total number of observations, was 26.2886. Additionally, Kendall's coefficient of concordance W was calculated as .430, indicating moderate concordance among respondents' rankings of the factors influencing beef cattle production.

The results suggest significant differences in respondents' perceptions of various factors related to beef cattle production, both among individuals and across different factors.

Table 4.15

ANOVA with Friedman's Test

		Sum of Squares	df	Mean Square	Friedman's Chi-Square	Sig
Between People		45750.306	297	154.041		
Within People	Between Items	49940.872[a]	4	12485.218	846.605	.000
	Residual	20374.728	1188	17.150		
	Total	70315.600	1192	58.990		
Total		116065.906	1489	77.949		

Grand Mean = 26.2886

a. Kendall's coefficient of concordance W = .430.

4.10.2 Correlations

Table 4.16 presents the correlations between different factors influencing beef cattle production among pastoral communities in Marsabit County. There is a strong positive correlation between inter-community conflicts and livestock diseases ($r = 0.766$, $p < 0.01$), indicating that areas experiencing higher levels of inter-community conflicts also tend to have more prevalent livestock diseases. Similarly, there is a moderately strong positive correlation between inter-community conflicts and feed supplements ($r = 0.604$, $p < 0.01$), suggesting that conflicts may also impact the availability or effectiveness of feed supplements for cattle.

Livestock diseases are significantly correlated with both feed supplements ($r = 0.415$, $p < 0.01$) and market prices ($r = 0.660$, $p < 0.01$). This suggests that areas with higher incidences of livestock diseases may struggle with accessing adequate feed

supplements, and the prevalence of diseases may also affect market prices for beef cattle.

Furthermore, there is a positive correlation between feed supplements and market prices ($r = 0.504$, $p < 0.01$), indicating that areas with better access to feed supplements may also experience higher market prices for beef cattle. Lastly, both market prices and livestock diseases show moderate positive correlations with cattle production ($r = 0.647$, $p < 0.01$ and $r = 0.660$, $p < 0.01$, respectively), while the correlation between feed supplements and cattle production is slightly lower but still significant ($r = 0.468$, $p < 0.01$). This suggests that these factors collectively play a crucial role in influencing beef cattle production in the region.

These correlations highlight the interconnectedness of various factors impacting beef cattle production in Marsabit County, emphasizing the need for holistic approaches to address the challenges faced by pastoral communities in sustaining cattle production.

Table 4.16

Correlations

		inter community conflicts	livestock diseases	feed supplements	market price	Beef Cattle Production
Inter community conflicts	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	298				
livestock diseases	Pearson Correlation	.766	1			
	Sig. (2-tailed)	.000				
	N	298	298			
feed supplements	Pearson Correlation	.604**	.415**	1		
	Sig. (2-tailed)	.000	.000			
	N	298	298	298		
market price	Pearson Correlation	.647**	.660**	.504**		
	Sig. (2-tailed)	.000	.000	.000	1	
	N	298	298	298	298	
Beef Cattle Production	Pearson Correlation	.622**	.660**	.468**	.578**	1
	Sig. (2-tailed)	.000	.000	.000	.001	
	N	298	298	298	298	298

**. Correlation is significant at the 0.01 level (2-tailed).

4.10.3 Model Summary

Table 4.17 presents the model summary for the regression analysis conducted to assess the relationship between various predictors (market price, feed supplements, livestock diseases, and inter-community conflicts) and beef cattle production among pastoral communities in Marsabit County.

The model's overall goodness of fit is represented by R (correlation coefficient) and R Square (coefficient of determination). The correlation coefficient (R) is 0.950, indicating a strong positive relationship between the predictors and beef cattle production. The coefficient of determination (R Square) is 0.902, suggesting that approximately 90.2% of the variance in beef cattle production can be explained by the predictors included in the model. The adjusted R Square, which considers the number of predictors and sample size, is 0.901. This adjusted value provides a more accurate estimate of the model's explanatory power when compared to the R Square.

The standard error of the estimate is 2.32702, representing the average deviation of the observed values from the predicted values by the regression model. In terms of change statistics, the R Square Change indicates the change in R Square when predictors are added to the model. In this case, the addition of the predictors (market price, feed supplements, livestock diseases, and inter-community conflicts) led to a considerable increase in R Square (0.902), demonstrating the predictive utility of these variables in explaining beef cattle production. The F Change statistic assesses the overall significance of the regression model. The obtained value is 677.188, which is statistically significant ($p < 0.05$), indicating that the regression model as a whole provides a good fit for predicting beef cattle production based on the included predictors. Overall, the model summary suggests that the combination of market price,

feed supplements, livestock diseases, and inter-community conflicts significantly influences beef cattle production among pastoral communities in Marsabit County.

Table 4.17

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	df1
1	.950[a]	.902	.901	2.32702	.902	677.188	4

a. Predictors: (Constant), market price, feed supplements, livestock diseases, inter community conflicts

4.10.3 ANOVA

Table 4.18 presents the analysis of variance (ANOVA) results for the regression model used to predict beef cattle production among pastoral communities in Marsabit County. In the ANOVA table, the regression model's performance is assessed by comparing the sum of squares between the regression (explained variance) and residual (unexplained variance) components.

For the regression component, the sum of squares is 14667.952 with 4 degrees of freedom, resulting in a mean square of 3666.988. This indicates that the predictors included in the model collectively explain a significant amount of variance in beef cattle production. The F statistic, calculated as the ratio of mean square regression to mean square residual, is 677.188, which is highly significant ($p < 0.05$). This suggests that the regression model as a whole is a good fit for predicting beef cattle production based on the included predictors.

The residual sum of squares, representing the unexplained variance not accounted for by the regression model, is 1586.602 with 293 degrees of freedom. This provides an

estimate of the variability in beef cattle production that remains unexplained after considering the predictors included in the model.

The total sum of squares, representing the total variability in beef cattle production, is 16254.554 with 297 degrees of freedom. The ANOVA results support the conclusion that the regression model, including market price, feed supplements, livestock diseases, and inter-community conflicts as predictors, significantly contributes to explaining variability in beef cattle production among pastoral communities in Marsabit County.

Table 4.18

ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	14667.952	4	3666.988	677.188	.000[b]
	Residual	1586.602	293	5.415		
	Total	16254.554	297			

a. Dependent Variable: Cattle Production

b. Predictors: (Constant), market price, feed supplements, livestock diseases, inter community conflicts

4.10.4 Coefficients

Table 4.19 provides the coefficients for the predictors in the regression model used to predict beef cattle production among pastoral communities in Marsabit County. The coefficients represent the estimated effects of each predictor (inter-community conflicts, livestock diseases, feed supplements, and market price) on beef cattle production, holding all other predictors constant.

For the intercept (Constant), the coefficient is 3.299, indicating the estimated value of beef cattle production when all predictor variables are zero. The coefficient for inter-

community conflicts is -0.024, with a standard error of 0.033. However, this coefficient is not statistically significant (p = 0.455), suggesting that inter-community conflicts do not have a significant effect on beef cattle production after accounting for other predictors in the model.

Livestock diseases have a coefficient of -0.112, with a standard error of 0.045. This coefficient is statistically significant (p = 0.014), indicating that increases in livestock diseases are associated with beef cattle production. The coefficient for feed supplements is 0.022, with a standard error of 0.041. However, this coefficient is not statistically significant (p = 0.593), suggesting that feed supplements do not have a significant effect on beef cattle production after accounting for other predictors in the model.

Market price has a coefficient of 0.820, with a standard error of 0.023. This coefficient is highly statistically significant (p < 0.001), indicating that increases in market price are strongly associated with increases in beef cattle production. These coefficients provide insights into the relative importance of different predictors in explaining variability in beef cattle production among pastoral communities in Marsabit County.

Table 4.19

Coefficients

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	Std. Error	Beta		
1	(Constant)	3.299	.690		4.779	.000
	inter community conflicts	-.024	.033	-.025	-.747	.455
	livestock diseases	-.112	.045	.075	2.464	.014
	feed supplements	.022	.041	-.013	-.536	.593
	market price	.820	.023	.921	35.242	.000

a. Dependent Variable: Beef Cattle Production

CHAPTER FIVE

SUMMARY, CONCUSSION AND RECOMMENDATIONS

5.0 Introduction

The chapter presents summarized results related factors affecting beef cattle production among pastoral communities of Marsabit County, Kenya.

5.1 Summary of findings

The study's first objective investigated the ramifications of inter-community conflicts on beef cattle production in Marsabit County, revealing significant apprehensions among respondents. Safety concerns, evidenced by a mean score of 4.0638, emphasized the perceived threat to both livestock and human well-being during conflicts, undermining farmers' confidence in cattle rearing. The fear of cattle theft (mean score: 4.0268) and the potential loss of human life (mean score: 3.4698) further exacerbated these concerns, impacting production decisions. Additionally, the frequency of raids (mean score: 4.0805) underscored the persistent disruption caused by conflicts, instilling an atmosphere of fear and instability. These findings illuminate the multifaceted challenges posed by inter-community conflicts, emphasizing the urgent need for interventions to safeguard both livelihoods and beef cattle production in Marsabit County.

The study's second objective focused on assessing the impact of livestock diseases on beef cattle production in Marsabit County, revealing significant implications for cattle health and productivity. High treatment costs (mean score: 4.0671) posed a financial burden on farmers, affecting their ability to maintain healthy herds. The risk of disease transmission to humans (mean score: 3.9899) highlighted the health hazards associated with diseased animals, further complicating disease management. Despite high awareness of livestock diseases (mean score: 4.2517), the economic burden of disease

management (mean score: 3.8121) remained a deterrent to cattle rearing. Moreover, high mortality rates (mean score: 4.0101) emphasized the severe economic losses incurred by farmers due to disease outbreaks. These findings underscore the critical need for improved disease management practices and affordable veterinary services to mitigate the negative impact of livestock diseases on beef cattle production in the region.

The third objective of the study aimed to examine the influence of feed supplementation on beef cattle production in Marsabit County. The findings revealed several key insights into the factors affecting feed supplementation and its impact on cattle productivity. Challenges such as shortage of feed supplements (mean score: 3.3893) and the high cost of supplements (mean score: 3.1711) were identified as significant constraints on beef cattle production. Quality of feed supplements (mean score: 4.2919) emerged as a critical factor affecting cattle health and productivity, emphasizing the importance of ensuring access to high-quality feed sources. Additionally, addressing nutritional requirements (mean score: 4.1611) and optimizing resource utilization (mean score: 4.2785) were identified as essential strategies for enhancing beef cattle production in the region. These findings underscore the need for interventions to improve the availability, affordability, and quality of feed supplements to support sustainable beef cattle production in Marsabit County.

The fourth objective of the study aimed to investigate the impact of market prices on beef cattle production in Marsabit County. The findings highlighted the significant role of market dynamics in shaping cattle production decisions among pastoral communities. Market prices were found to have a direct influence on the sales volume of beef cattle, with fluctuations affecting farmers' decisions regarding cattle sales. Favorable market prices were associated with increased beef cattle sales, while low

prices acted as a deterrent to production. Market accessibility and transportation methods were identified as important factors influencing productivity, highlighting the logistical challenges faced by farmers in accessing markets. Additionally, the availability of beef cattle traders played a crucial role in facilitating cattle sales and influencing market dynamics. These findings emphasize the importance of addressing market-related challenges to support the economic viability and sustainability of beef cattle production in Marsabit County.

5.2 Conclusions to the Study

The study revealed that inter-community conflicts pose insignificant challenges to beef cattle production in Marsabit County. Safety concerns for both livestock and humans, fear of cattle theft or killings during conflicts, and frequent raids were identified as major issues. These conflicts not only directly impact cattle numbers but also create an environment of fear and instability, hindering investment and effort in cattle rearing. Addressing the root causes of conflicts and implementing measures to enhance security and stability are essential to support beef cattle production in the region.

The findings underscored the substantial negative impact of livestock diseases on beef cattle production in Marsabit County. High treatment costs, the risk of zoonotic diseases, and significant mortality rates were identified as key challenges. Despite farmers' awareness of these diseases, the economic burden of managing them remains a significant deterrent to cattle rearing. Improved disease management practices, affordable veterinary services, and enhanced farmer education are essential to mitigate the negative effects of livestock diseases on beef cattle production.

The study highlighted the multifaceted nature of feed supplementation and its impact on beef cattle production. Challenges related to the availability, quality, and cost of

feed supplements were identified, emphasizing the importance of addressing these issues to improve cattle nutrition and overall productivity. Ensuring consistent access to high-quality feed sources and implementing effective feed management practices are essential for enhancing beef cattle production in pastoral communities.

Market dynamics significantly influence beef cattle production in Marsabit County, with market prices playing a central role. Fluctuations in prices directly affect sales volume and production decisions among farmers. Addressing challenges related to market accessibility, transportation, and trader availability is crucial for supporting the economic viability and sustainability of beef cattle production. Enhancing market infrastructure and information dissemination can help improve market conditions and stimulate beef cattle production in the region.

5.3 Recommendation to the Study

The study recommends several strategies to address the challenges identified and enhance beef cattle production in Marsabit County.

There is a need for proactive measures to mitigate inter-community conflicts, including conflict resolution initiatives, community dialogues, and improved security measures to safeguard both livestock and human lives. Strengthening local governance structures and promoting peaceful coexistence among different community groups can also contribute to reducing conflict risks.

There is a need for increased investment in veterinary services, disease surveillance, and farmer education programs. Providing farmers with access to affordable and effective veterinary treatments, as well as training on disease prevention and management practices, can help reduce disease incidence and improve cattle health outcomes.

Addressing feed supplementation challenges requires concerted efforts to improve feed availability, quality, and affordability. This can be achieved through promoting sustainable pasture management practices, introducing alternative feed sources, and supporting local feed production initiatives. Additionally, farmer training programs on optimal feeding practices and nutrition management can help enhance the nutritional status of cattle herds.

Address market-related constraints, interventions should focus on improving market infrastructure, enhancing market information systems, and facilitating access to markets for pastoralists. Strengthening market linkages, supporting value addition initiatives, and promoting collective marketing strategies can help enhance farmers' bargaining power and improve market prices for beef cattle products.

5.4 Recommendation for further Studies

Exploring alternative marketing channels, such as digital platforms and cooperative marketing arrangements, could help expand market access for pastoralists and improve their competitiveness in the beef cattle value chain.

Conducting further studies in these areas can contribute to the development of evidence-based policies and interventions aimed at promoting sustainable beef cattle production and enhancing the resilience of pastoral communities in Marsabit County.

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