The Impact of Cattle Losses on Household Food Security in Communal Areas of Mazowe District

A dissertation submitted in partial fulfilment of the requirements for the Master of Science Degree in Food Security and Sustainable Agriculture (Production)

Bindura University of Science Education

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DECLARATION

I hereby declare that the research project entitled “The impact of cattle losses on household food security in communal areas of Mazowe District” submitted to Bindura University of Science Education, Department of Agricultural Economics, Education and Extension is a record of an original work done by me under the guidance and supervision of Mr Mangwiro and this work is submitted in partial fulfilment of the requirements for the award of a Master of Science Degree in Food Security and Sustainable Agriculture. The results embodied in this thesis have not been submitted to any University or Institute for the award of any degree of diploma.

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DEDICATION

A special dedication to my Mother and daughter Rufaro.

ACKNOWLEDGEMENTS

To The Almighty I say thank you for this opportunity. To my supervisor Mr Mangwiro I say thank you for your guidance, encouragement and patience. To Mr Magwagwa, Miss Mapita and Lizzy I say thank you for your technical support. I am indebted to my employer for allowing me time to carry out my research.

ABSTRACT

A research was conducted to determine the impact caused by cattle losses on household food security. The specific objectives of the research was to determine the factors predisposing cattle to death, available cattle and food accessibility among households. Questionnaires were distributed to 50 respondents (sample) and interviews were done on agricultural extension staff, LDC members and village heads. Household Food Insecurity Access Scale was used to determine level of food insecurity. Results obtained indicated that the implementation of FMD quarantine order in 2019, available grazing land management system, lack of effective knowledge and shortage of veterinary drugs predisposed cattle to death. It was observed that 59.5% of cattle in the area was lost and 90% of the respondents reported that the loss was due to *Theilleriosis.* An average Household food insecurity access scale score of 7.5 was observed which was low (range 0-27). This indicated a mild food insecurity access. Household food insecurity prevalence reviewed a moderate food insecurity level. It was recommended that policies relating to livestock production should be reviewed, including extension services, financing and other support services to promote livestock production.

Key words: Impact, Food, Security, Accessibility, *Theilleriosis*

LIST OF ABBREVIATIONS AND ACRONYMS

Agritex -Agricultural and Technical extension services

DVS- Department of Veterinary Services

FAO- Food and Agriculture Organisation

HFIAS- Household Food Insecurity Access Scale

HFIA- Household Food Insecurity Access

IFPRI- Institutional Food Policy Research Institute

LDC- Livestock Development Committee

MLAWRR- Ministry of Lands, Agriculture, Water and Rural Resettlement

NGOs- Non Governmental Organisations

SPSS- Statistical Package for Social Scientists

TBDs- Tick Borne Diseases

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CHAPTER 1

1.1 Background of the study

Agriculture plays a very important role for most low income communities who are more vulnerable to natural disasters and less able to recover from such disasters due to economic factors such as low savings, low productivity and poor trade links. International Food Policy Research Institute (IFPRI), (2011), emphasises the significance of agriculture and particularly smallholder agriculture by emphasising that investing in agriculture and rural development, with a focus on smallholder farmers, is the best option for achieving global food security, alleviating poverty and improving living standards of the rural people. Transboundary animal diseases threaten millions of livestock's lives worldwide as they are highly contagious and easily transmitted within and between livestock populations. These diseases therefore threaten the economic health of the livestock sector, the livelihood of farmers, and ultimately food security.

Zoonotic animal diseases such as Anthrax may impede livestock production for public health reasons. The massive outbreak of Foot and mouth disease (FMD) in Great Britain in 2001, with losses estimated at around 3.1 billion, illustrates well the threat from animal diseases to livestock production and food security (Thompson *et al.* 2002). Animals are relied upon in the food supply chain and massive losses can lead to widespread food shortages. Cattle play a pivotal role in food security as they provide meat, milk and draught power in most communal households. Households that depend largely on livestock production have been affected by livestock diseases with 69% of the livestock dying due to tick borne diseases and lack of veterinary chemicals such as acaricides and vaccines (MLAWRR 2020).

The outbreak of *Theilleriosis* in the study area rocked havoc with almost all cattle owning households being affected by cattle deaths. MLAWRR (2019), reported that the outbreak impacted on cattle production through direct costs (deaths, infertility, morbidity and reduction in productivity) and indirect costs (prevention and control measures). The national beef cattle herd declined by 5,7% from 5774525 in 2018 to 5443770 cattle in 2019 with the average mortality rate increasing from 5% to 9% (MLAWRR 2019). Cattle prices have decreased and the remaining cattle are in poor body condition. The odds ratio of change in number of livestock

rearing behaviour is 6,365, indicating that households with more livestock have a significant positive impact on improving income wealth status and food security (Sansoucy *et al* 2018).

1.2 Statement of the Problem

There is a widespread death of cattle of all age groups, with whole herd losses for some households in the study area with the potential to wipe the whole herd which might cause food insecurity. In the past cattle losses used to occur in the area but the current outbreak is unique.

1.3 Objectives of the study

1.3.1 Main objective

The study seeks to determine the impact of cattle losses on household food and nutritional security.

1.3.2 Specific objectives

1. To determine the factors contributing to cattle losses.

2. To assess the number of cattle lost.

3. To determine household food accessibility.

1.4 Research Questions

1. What are the factors contributing to cattle losses?

2. Is there a change in cattle numbers?

2. Is there enough food among households*?*

1.5 Significance of the study

Livestock production is a major agricultural activity in Zimbabwe and plays an important role in the livelihoods of smallholder farmers, especially in rural areas. The ETC Group (2009), argues that despite climate change, pests, diseases, water scarcity and myriad other challenges 70% of the world's food is produced by smallholders or landless farm labourers. Own food production has more impacts on smallholder farmers since their food consumption and nutritional status is usually affected by what they produce (World Bank, 2007). Individuals and communities facing chronic food insecurity lack safety nets and are highly vulnerable to transitory problems, while an inappropriate response to crisis may weaken the base for long-term food security by weakening local markets or creating dependencies (Pingali *et al*., 2005).

The livestock sector has enormous potential for growth and could contribute to overall rural development, sustained growth and poverty reduction, but it is hindered by low productivity, high disease morbidity and mortality. Cattle are extremely important to economic development and welfare for low income communities. They act as a form of savings in the absence of banks and other assets and a form of insurance against crop failure hence the need to protect them against potential losses (parasites, drought and diseases) which have the potential to wipe the whole national herd if left uncontrolled.

With cattle playing important roles at both local, national and international levels in ensuring food security, providing meat, milk, income and raw materials for industries, there is great need for their protection against disasters. In addition to contributing directly to food supply through provision of their own products, livestock contribute indirectly by supporting crop production with inputs of manure and traction, in both cases, their contribution is greatest in developing countries (FAO, 2011). Despite the importance of cattle, their management remains highly inadequate. With machinery technology not sized to suit most of the communal farmers' production system as well as their managerial and technical skills, draught power remains the major option. Hence carrying out this study is very much important to the study area since it will identify problems, strengths, weaknesses and solutions associated to food security.

1.6 Scope/delimitations and limitations of the study

1.6.1 Scope of the study

The scope of the research project was to determine the impact/effects of cattle losses to household food and nutritional security. The research looked at the factors contributing to cattle losses, number of cattle lost and available number of cattle. The research also looked at the level of household food accessibility.

1.6.2 Limitations of the study

The research was limited to the contribution of cattle to food security rather than the whole livestock sector. The cattle production sub sector was the one faced with a widespread loss of cattle hence the bias. Looking at the whole livestock sector's contribution to food security and

its challenges would require more time and resources. Hence the focus on the contribution of cattle only.

1.7 Organisation of the research

The research consists of five chapters. Chapter 1 outlines the background to the study, the problem statement, research questions, significance of the study, scope and limitations of the study. Chapter 2 presents the theoretical framework and the review of literature. Chapter 3 presents the research methodology (research design, sampling procedure, description of the study area, data collection and analysis. Chapter 4 outlines the results and discussion. Chapter 5 presents the summary, conclusion and recommendations.

CHAPTER 2

2.1 Theoretical framework

This research was guided by Pieters *et al*., (2013); conceptual framework which states that food and nutrition security reflects 2 dimensions that are food and nutrition status and the food stability. Food and nutrition security is defined as a state in which all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO 2006). Food security problems also arise when people lack knowledge about nutrition, food handling and preparation, lack access to clean water and sanitation or when their food supplies change and they have to deal with unfamiliar foodstuffs (FAO 2011).

Food and nutrition status of a household or individual is determined by food availability, food accessibility and food utilisation. The theory states that food availability is the extent to which food is within reach of households in terms of sufficient quantity and quality which is determined by domestic food production, commercial food imports and food aid (FAO 2011). Food production (availability) is affected by natural disasters (outbreak of pests and diseases, floods and drought) and Government policies. At a local level, food availability is strongly reliable on road and market infrastructure, the degree of market integration, and local market institutions.

The theory states that household level food access is considered to be achieved when a household has the opportunity to obtain food of sufficient quantity and quality to ensure a safe and nutritious diet. Important drivers of food access are household resources, food prices, food preferences and socio-political factors such as discrimination and gender inequality. Access to food for people who rely on market exchange of animal products for grain is constrained during climate related crisis such as drought and poor terms of trade.

Food and nutrition stability refers to vulnerability and resilience towards the state of affairs. Vulnerability is the likelihood of experiencing future loss of welfare generally weighted by the magnitude of expected welfare loss while resilience is the ability to recover from such a welfare loss (Sarris and Karfakis, 2008). Hence the study will focus on cattle deaths in relation to food and nutrition status.

2.2 Literature review

2.2.1 Introduction

Livestock production is a significant branch of agricultural production and food security and it is closely interrelated with crop production as it provides draught power for tillage and consume crop residues as food. By being renewable energy, animal power can be sustained in rural areas with little external input. The use of animal power in mixed farming systems encourages crop-livestock integration and sustainable farming practices (FAO, 2010). Smallholders integrate crop and animal production to maximize returns from their limited land and capital, minimize production risk, diversify income sources, provide food security, and increase productivity (FAO 2010). Livestock production is crucial for boosting economic growth of the agro-based economies, smallholder farming systems and sustainable livelihoods.

2.2.2 Livestock contribution to food security

It had been observed that availability of livestock products worldwide and within nations is determined by the volume of production and the scale and reach of international trade (FAO, 2011). Livestock contribute one third of the protein that people consume and low income communities depend on animal source foods especially dairy products to ensure that their diet deliver the nutrients necessary for good health. Livestock contribute around 12.9 percent of global calories and 27.9 percent of protein directly through provision of meat, milk, egg and offal, and also contribute to crop production through the provision of transport and manure (FAO, 2011).

Livestock and livestock products contribute significantly to the economy of Zimbabwe with cattle accounting for 35 to 38% of the gross domestic product share that is contribute by the agricultural sector and cattle are an important stock, providing a traditional means of saving and critical safety net during years of hardsip (FAO, 2021b). Milk from cattle and goats, is a good source of amino acids and Vitamin A and is widely consumed in all parts of the world (World Livestock, 2011).

2.2.3 Contribution of cattle to food security

In most communal farming areas cattle provide draught power for ploughing and cultivating crop lands and pulling scotch carts, manure, hides and cash through sales (Palmer and Ainslie, 2006). The use of draught power from working animals has reduced human drudgery, allowed

cropping areas to be expanded beyond what can be cultivated by hand, and made it possible to practice winter ploughing of land which gives farmers more flexibility in when they plant crops (FAO, 2010). Guthiga *et al*., (2007), reported that use of draught animal power in Central Kenya resulted in higher yields at a higher economic efficiency of smallholder maize producers. There exist a direct relationship between draft animals, labour and cropping area capacity in communal areas.

Tripathi (2006), revealed that although use of mechanical and electrical power has increased over the years, the draught cattle shall continue to be a major source of farm power in future for small and marginal farmers. Mpanduj *et al*., (2007), reported that animal traction technology is more suitable both socially and economically viable for farmers with tradition in animal keeping. Cattle are sold to obtain cash among households. The most common reason for households to sell cattle is to purchase food, and secondary reasons are to cover education costs, medication and other household expenses. Mazzeo (2011), argues that the loss of cattle threatens the sustainability of agricultural oriented livelihood system and reduces a household's adaptive capacity to recover from future crisis.

Cattle manure is a good source of organic fertiliser used by many communal farmers and in the absence of cattle crop production can be greatly affected. Manure is known to be better than artificial fertilizer for soil structure and long term fertility. Its greatest value can be seen in developing countries, where small-scale farmers report that they do not have enough manure to apply to their crops (Jackson and Mtengeti, 2005) and exchange of grain and manure occurs between settled farmers and pastoralists (Hoffman and Mohammed 2004). The relationship between manure and food production is interesting and complex. The potential of draught animals to support food security is affected by livestock losses.

2.2.4 Causes of cattle losses

There are several causes of livestock deaths, ranging from pathogenic and non-pathogenic, these include pathogens (viruses, protozoa, bacteria and fungi), metabolic disorders, poison and or nutritional deficiencies. The impact of a livestock disease depends on the virulence of the pathogen, the production system, livestock density, biosecurity routines, the capacity of veterinary services, the extent of trade in the animals and animal products, and human and wildlife population densities and their proximity to livestock (Rossiter and Hammadi, 2009).

Diseases, parasitism and death are rife and major threats to cattle production in communal areas (Kaewthamasorn and Wongsamee, 2006).

Communal farmers perceive ticks and tick borne diseases as the most important health constraint in cattle production (Hesterburg *et al*., 2007). Dold and Cocks, (2001) also indicated that communal farmers perceive ticks as the most important health constraint to cattle production. Tick borne diseases (TBDs) are responsible for huge economic losses in cattle production in most African countries where the majority of cattle owners are the resource poor communal farmers (Dold and Cocks 2001). MLAWRR (2020), reported that the national herd decreased by 4.7% from 5 774 525 in 2018 to 5 489 364 in 2019 and the deaths were due to tick borne diseases and drought. The Government initiated and co-ordinated tick control programs with farmers required to contribute funds for their sustenance. Involvement of communal farmers in design, implementation and evaluation of livestock programs, is essential for the success of these programs.

Ticks cause substantial losses in cattle production, in terms of diseases, reduced productivity and fertility and often death, and are economically the most important ecto-parasites of cattle (Rajput *et al*., 2006). Ticks are vectors transmitting a greater variety of pathogenic micro-organisms than any other arthropod vector group, and are among the most important vectors of diseases affecting animals (Jongejan, 2007). Tick-borne diseases are responsible for more than 60% of all cattle mortalities (Sungirai *et al*., 2015). Global economic losses due to ticks and tick-borne diseases have been conservatively put at US$18.7 billion annually (De Clercq *et al*., 2012). Ticks suck blood, damage hides and skins, introduce toxins and predispose cattle to myiasis, lumpy skin and dermatophilosis (Gates and Wescott, 2000). Ticks cause reduced body weight gains and milk yield and create sites for secondary invasion by pathogenic organisms (Kaufman *et al.*, 2006).

Minjauw and Mcleod (2003), also reported that losses in cattle are incurred through the direct effects of ticks as blood sucking parasites and indirect effects as disease vectors which will lead to reduced growth rate, fertility problems, decline in milk production, reduced value of hides and livestock mortalities and the costs associated with treatment and control. Tick borne diseases continue to pose a serious threat to the national herd in Zimbabwe and these include *Theilleriosis, Anaplasmosis, Babesiosis* and *Cowdriosis* (MLAWRR, 2020). The highest number of cattle deaths have been attributed to *Theilleriosis* with Mashonaland East, West and

Central and parts of Manicaland being the most affected, as the problem continued from 2017 when the dipping programme faced serious challenges due to reduced investment (MLAWRR, 2020). MLAWRR (2019), reported that dipping was erratic throughout 2018 due to critical shortage of dipping chemical with most dip tanks managing only 11 dipping sessions annually instead of the recommended 26 sessions.

Theilleriosis is a protozoal infection of the genus *Theilleria* which are tick borne parasites that are found in many species of mammals. More than a dozen of *Theilleria* species affect cattle, water buffalo, sheep and goats. Some of species circulate with no clinical signs while others cause serious illness with high morbidity and mortality rates. *Theilleria parva* and *Theilleria annulata* are the most common species which cause east coast fever and *Theilleriosis* respectively (Morrison, 2015). Ticks (*Rhipicephalus* and *Hyaloma species*) act as biological vectors of *Theilleriosis* and the disease can also be transmitted transtadially. *Theilleria* species enter the host as sporozoites in the saliva of a feeding tick and animals that recover can be carriers for some species for months or years. Transmission from dam to embryo during pregnancy has been confirmed for *Theilleria annulata*. The incubation period ranges from 1 to 3 weeks.

Clinical signs include fever, lymphadenopathy, anorexia, loss of condition, nasal discharge and hemorrhagic diarrhoea. Petechie and echimosis found on the conjunctiva and mucous membranes, corneal opacity, exophthalmia and skin lesions are present (Josh *et al*., 2017). Some animals have poor productivity (reduced milk production and abortions) after recovery and growth is stunted with a possibility of permanent loss of eye sight. At post mortem the lymph nodes, spleen and liver are usually enlarged with haemorrhagic gastrointestinal tract of the small intestines and abomasum (Josh et al., 2017). Treatment is done using a combination of parvaquone or buparvaquone and oxytetracyclines. Early diagnosis is necessary for treatment to be effective. Drug resistance is possible. Reporting of outbreaks, movement control and culling of infected animals are preventative and control measures (DVS 2020). In endemic areas exposure can be reduced through dipping and other methods of tick control such as rotational grazing.

CHAPTER 3

3.1 METHODOLOGY

3.1.1 Research design

The study employs a quantitative research methodology, with a correlational research. Research methodology clarifies the manner and way in which data is to be clarified (Creswell, 2009). Quantitative research methodology emphasises objective measurements and the statistical or numerical data analysis through questionnaires and surveys. It involves generation of data into quantitative analysis which can be subjected to rigorous quantitative analysis in a formal and rigid fashion (Ahmed 2014). The research attempts to determine the extent of a relationship between two or more variables using statistical data. Relationships between and among a number of facts are sought and interpreted. The research type is also considered as a descriptive research. The study involves a review of literature supported by secondary data analysis to provide an overview of research on the challenges, contribution, and prospects of cattle to food security.

3.1.2 Sampling procedure

Sampling is the process of choosing a sample (a portion of the entire group) from the target population to use to test hypotheses about the entire population. Ogula (2005), describes sampling as a process or technique of choosing a sub-group from a population to participate in the study in such a way that the individuals selected represent the large group from which they were selected.

Purposive sampling was done where only stock owners were selected from the 20 villages. The targeted population was all stock owners in the ward which amounted to 497 stock owners. There were 257 stock owners at Nzvimbo dip tank and 240 stock owners at Dambatsoko dip tank. A sample of 50 stock owners was selected using systematic sampling. With systematic sampling individuals are selected at regular intervals from the sampling frame. Sampling was done at dip tanks where every 10^{th} individual was selected and given a questionnaire.

3.1.3 Description of the study area

Zimbabwe is comprised of 10 administrative provinces with Mashonaland central being one of the provinces. Mashonaland Central province covers the northern mainland of the country and it stretches into the Zambezi valley and the border with Mozambique to the east (OCHA 2009). The province is comprised of 8 districts (Bindura, Shamva, Mt Darwin, Rushinga, Mazowe, Guruve, Muzarabani and Mbire) with Bindura being the provincial town. Mazowe district being one of the 7 districts is located to the north of Harare and to the south-western part of Mashonaland central between latitudes 1647'2"-1744'28"S and longitudes 3036'18"-3117'32"E (Figure 3.1). The minimum altitude is 879m, while the maximum is 1747m above sea level. The district lies in ecological region 2b receiving an average of 750-1000mm of rainfall per year. Soil types in the districts range from deep sandy soils, sand loamy to deep red and black clay soils.

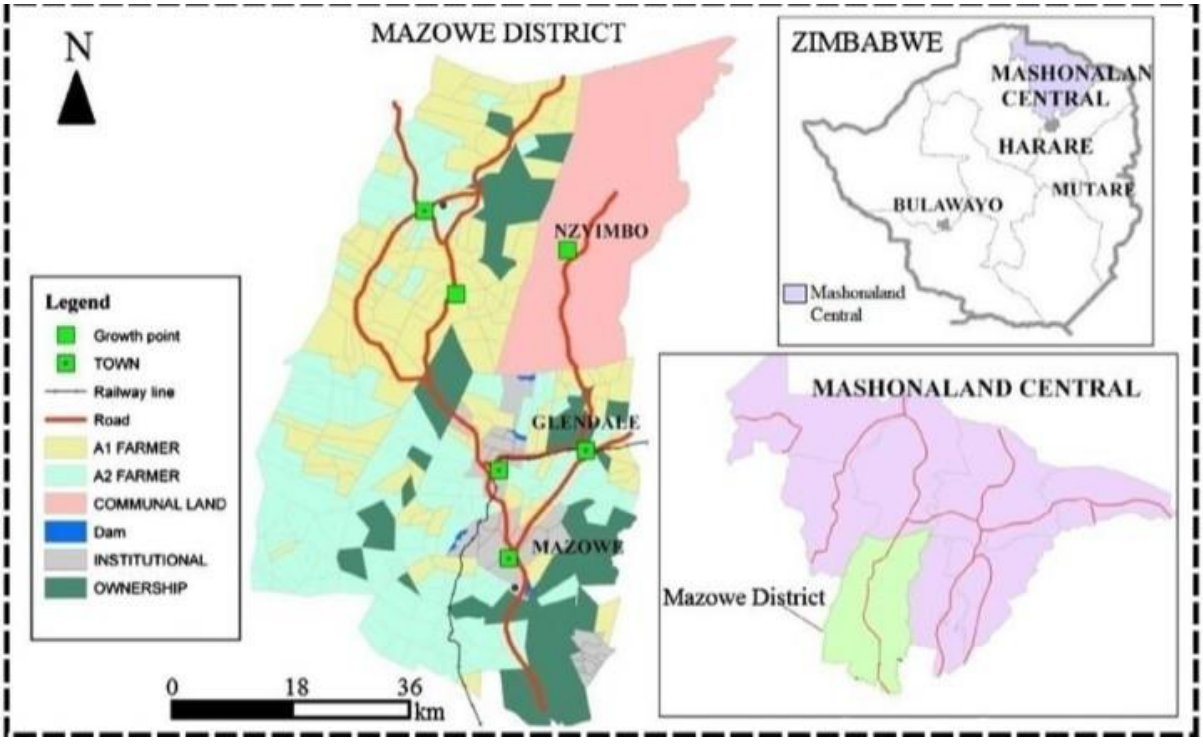

Figure 3.1: Map showing the study area. (Source: OCHA, 2009)

The district is comprised of both Commercial, A2, A1 and communal farmers. Farming in the communal sector is largely for subsistence purposes with occasional selling of surplus in times of bumper harvest and emergencies. Both livestock and crop production is practised in the area. Classes of livestock raised include cattle, goats, poultry and sheep. It is important to note,

however, that communal farmers in Zimbabwe own the majority of the cattle at more than 80% (Tavirimirwa *et al.*, 2013). Crops grown include cereals, legumes, cash crops and horticulture.

There is an increase in tobacco production opposed to maize production in the study area which had severely affected the amount of fodder available for livestock feed. There is plenty of surface water since there are many perennial rivers (Manwanzou, Kakwidibire and Chipfururwi rivers) and dams in the area making the area suitable for both livestock and crop production. The area is prone to water logging during the rainy season making it difficult for extension agencies to reach the area.

Ward 8 is comprised of 20 villages within Nzvimbo growth point and the villages are Goredema, Jenami, Kaguda, Kaseke, Katena, Kawanzaruwa, Kazunga, Kodzwa, Mukahiwa, Mutsvairo, Maodzwa, Machiti, Mashonganyika, Maponga, Muchirikuenda, Nzvimbo, Mapondera, Nhutsve, Nyamunetsa and Tenhedzi (DVS, 2020). The villages are demarcated by natural features like rivers, mountains and or roads. There is sharing of common pool resources such as grazing area, watering points and dip tanks for livestock production among these villages. Most of these villages are difficult to reach due to poor road network and land degradation especially during the rainy season. The most common mode of transport is ox drawn carts.

There is one Animal health management centre located at Nzvimbo growth point. There are two Veterinary extension staff, two Dip attendants, twenty Livestock Development Committee members, two dip tanks namely Nzvimbo (Latitude -17.07201 and Longitude 31.04081, figure 3.2) and Dambatsoko (Latitude -17.05026 and longitude 31.09995) and 497 stock owners in the study area (DVS 2020). The state of veterinary infrastructure (dip tanks and holding facilities) is poor. Holding pens and races are in poor state making it difficult for stock owners to secure their cattle during dipping sessions. Roofing material on the dip tanks have been destroyed by rust and other sheets removed allowing rain to enter during dipping sessions which can compromise the dip wash strength. There was a lot of destocking by farmers and farmers were being taken advantage of by middlemen who paid low prices. Dipping sessions were negatively affected.

Figure 3.2: Photo showing Nzvimbo dip tank

Veld condition is fair to poor, the veld is dominated by invader grass species which are less palatable and fibrous (*Sporobolus* species) as a result of overgrazing and poor veld management practices. Browse tree species (*Brachystegia* and *Acacia* species) have since disappeared as a result of deforestation. Grazing area has declined as a result of population growth (grazing area turned into cropping lands and residential areas).

3.1.4 Data collection methods

Secondary data (epidemiological data) was obtained from the Department of Veterinary Service's District database. This data provided the number of stock owners, confirmed causes of death and numbers of stock lost.

Primary data was gathered using questionnaires and interviews. A structured questionnaire was distributed to 50 selected stock owners. The questionnaire gathered demographic data, cattle statistics and household food insecurity access scale information. Household Food Insecurity Access Scale (HFIAS) was used to estimate the prevalence of food insecurity. The method was based on the idea that the experience of food insecurity (access) caused predictable reactions

and responses that can be captured and quantified through a survey and summarized in a scale. Household Food Security Survey Questionnaire asked respondents to describe behaviour and attitudes that relate to these various aspects, also called 'domains', of the food insecurity experience. Responses to the HFIAS Questionnaire were summarized in a scale to provide a continuous indicator of the degree of a household's food insecurity. Cut-off points on the scale enabled categorical classification of whether households are food secure or not. This data is used to monitor food assistance programs and to report on national prevalence of household food insecurity.

The responses from the household food insecurity (access) measure were entered into a database, SPSS. Computer tabulation is recommended for these indicators, though if necessary the data may also be tabulated by hand. Four types of indicators were calculated to help understand the characteristics of and changes in household food insecurity (access) in the surveyed population. These indicators provided summary information on: Household Food Insecurity Access-related Conditions, Domains, Scale Score and Prevalence.

Coates *et al*., (2007) said a mildly food insecure (access) household worries about not having enough food sometimes or often, and/or is unable to eat preferred foods, and/or eats a more monotonous diet than desired and/or some foods considered undesirable, but only rarely. It does not cut back on quantity nor experience any of three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating). A moderately food insecure household sacrifices quality more frequently, by eating a monotonous diet or undesirable foods sometimes or often, and/or has started to cut back on quantity by reducing the size of meals or number of meals, rarely or sometimes. But it does not experience any of the three most severe conditions (Coates *et al*., 2007).

A severely food insecure household has graduated to cutting back on meal size or number of meals often, and/or experiences any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating), even as infrequently as rarely. In other words, any household that experiences one of these three conditions even once in the last four weeks (30 days) is considered severely food insecure (Coates *et al.*, 2007).

Interviews were done with, Extension services staff, village heads, and Lead farmers. Focus group discussions were done with Livestock Development Committee (LDC) members for the 2 dip tanks on their tick control approach, the role of government extension staff, problems faced and possible solutions.

3.1.5 Data analysis

Statistical Package for Social Scientist (version 20) was used to analyse data. Descriptive statistics were run to assess the percentage change in cattle numbers, causes of livestock death and number of respondents who attended extension services training. Computer cross tabulation was done to calculate HFIAS indicators which provided summary information on: Household Food Insecurity Access-related Conditions, Domains, Scale Score and Prevalence.

3.1.6 Ethical considerations

The researcher avoided harm of participants in any ways whatsoever. The researcher treated the participants according to their social standings. Full consent was obtained from participants prior to research. The researcher explained the objectives of the research to the participants prior to data collection and full consent was obtained. Deception and exaggeration of the aims and objectives of the research was avoided.

CHAPTER 4

4.1 Results

4.1.1 Factors predisposing cattle to death

Focus group discussions with LDC members and interviews with Veterinary extension staff reviewed four factors as the major factors contributing to cattle losses. These factors promoted the multiplication and spread of vectors and pathogens causing cattle diseases and death.

Table 4.1: Factors predisposing cattle to death

Implementation of quarantine order for FMD in 2019.
Shortage of veterinary medicines.
Available grazing land management systems.
Lack of effective knowledge.

4.1.2 Availability of cattle

The researcher observed that there was a great decrease in the number of cattle per household. This is supported by the finding there was a 59.5% loss of cattle and 88% of the respondents were left with less than six cattle.

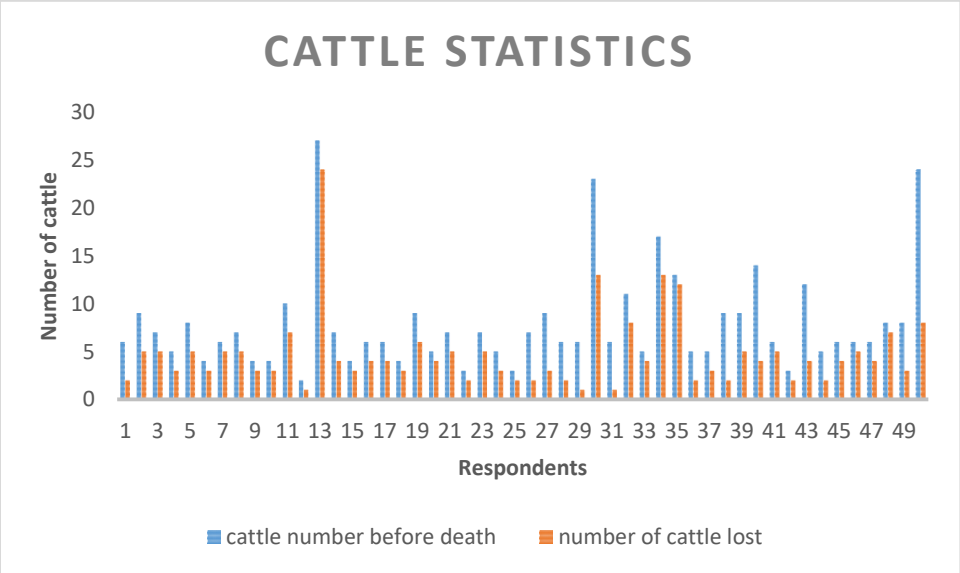

Figure 4.1: Cattle number before death and number of cattle lost

Theilleriosis emerged to be the major killer of cattle with 90% of the respondents reporting that they lost their cattle to *Theilleriosis*, 6% reported Lumpy skin and 4% reported other causes. Other causes represented unspecified causes of cattle death.

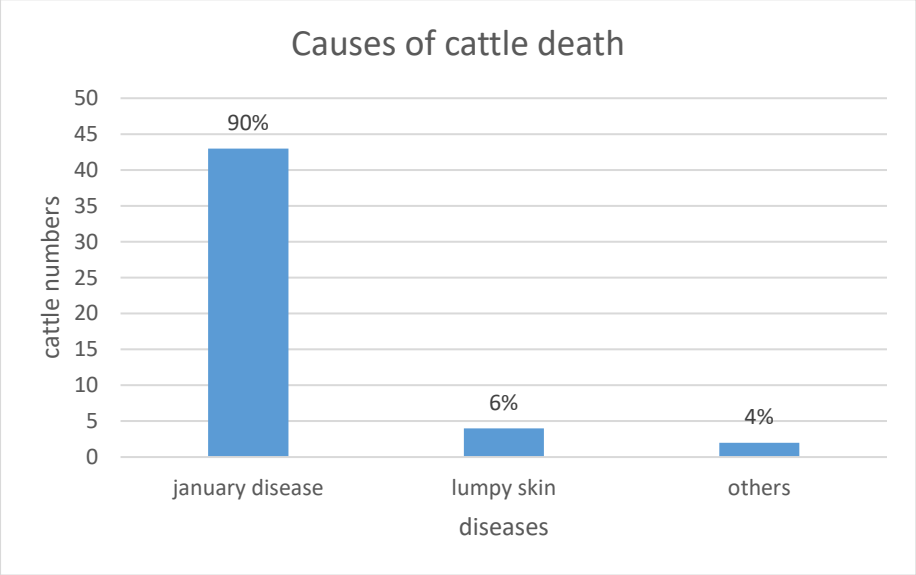

Figure 4.2: Different causes of animal death

4.1.3 Household food insecurity access scale.

The results reviewed that most of the respondents were affected by conditions 1, 2, 3, 4 and 5 which meant they experienced these conditions at any time during the recall period. The frequency of experiencing these conditions was rarely for most of the respondents for all the conditions. The frequency of occurrence questions assessed the severity of the conditions experienced (rarely, sometimes or often). Rarely meant the condition was experienced once or twice, sometimes (three or ten times) and often (more than ten times) in the past four weeks.

Table 4.2: Household Food Insecurity Access related Conditions

Households experiencing condition at any time during the recall period	Percentage of households that responded Yes to question 1/2/3/4/5/6/7/8/9. Example; Number of households with response = 1toQ1 X 100 Total number of households responding to question 1 = 33 X100 = 66% 50								
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
	66%	96%	92%	96%	66%	34%	2%	0%	0%
Households experiencing condition at a given frequency	Percentage of households that run out of food rarely, sometimes or often. Number of households with response 3 to Q1a X 100 Total number of households responding to Q1 = 4 x 100 = 8% 50								

Q1a			Q2a			Q3a			Q4a			Q5a			Q6a			Q7a			Q8a			Q9a		
1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
32	26	8	38	38	20	24	48	20	46	38	12	50	10	6	26	8	0	2	0	0	0	0	0	0	0	0

Household Food Insecurity Access related Domains

The results reviewed that 66% of the respondents were affected by the domain in question 1. This meant that in the past four weeks the respondents worried that their households would not have enough food because of lack of resources. 0% was affected by the domain in question 8 and 9. It meant that none of the respondents went to sleep at night hungry and none of the family members go a whole day and night without eating anything because there was not enough food in the past four weeks. This meant that food was available but none is said about the quality, quantity or diversity of the food.

Table 4.3: Household Food Insecurity Access related Domains

Households experiencing any of the conditions at level of severity in each domain	Percent of households responded Yes to each of the 9 questions:								
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
	66%	96%	92%	96%	66%	34%	2%	0%	0%

Average Household Food Insecurity Access Scale Score

This is an average score calculated for all the respondents. The score ranges from (0-27) and a score of 7.5 was observed which was low. The higher the score, the more food insecurity (access) the household experienced. The lower the score the less food insecurity (access) the household experienced. This showed that the respondents' experienced food insecurity (access) at a low level.

Table 4.4: Average Household Food Insecurity Access Scale Score

HFIAS Score (0-27)	Sum of the frequency of occurrence during the past 4 weeks for the 9 food insecurity related conditions (Q1+Q2+Q3+Q4+Q5+Q6+Q7+Q8+Q9)
Average HFIAS Score	Sum of HFIAS scores in the sample =1+2+3…50 Number of HFIAS scores (households) in the sample 50 = 375 50 = 7.5

Household Food Insecurity Prevalence

The results reviewed that none (0%) of the respondents was food secure, 6% was mildly food insecure, 86% was moderately food insecure and 8% was severely food insecure. The results reviewed a moderate food insecurity (access). The indicator categorises households into 4 levels of household food insecurity (access): food secure and mild, moderately and severely food insecure. It defines a food secure household as experiencing none of the food insecurity (access) conditions, or just experiences worry, but rarely (Coates *et al.*, 2007).

Table 4.5: Prevalence of different levels of household food insecurity (access)

HFIA Prevalence	Percentage of households that fall in each food insecurity (access) category. For example percentage of moderately food insecure (access) households: Number of households with HFIA category = 4 x 100 = 43 x 100 = 86% Total number of households with a HFIA 50			
	Category 1	Category 2	Category 3	Category 4
	0%	6%	86%	8%

4.2 Discussion

4.2.1 Implementation of quarantine order for FMD in 2019

Ministry of Lands Agriculture Water and Rural Resettlement (2020), reported the outbreak of FMD in 2019 and implementation of quarantine order. The FMD outbreak posed some restrictions in animal movement and herding practices. There was quarantine of herds were farmers were ordered to isolate their cattle to prevent and control the spread of the disease. This was in accordance with the Animal Health Regulations (FMD) (1994), which states that it is unlawful for any person to move any animal out of the area lying within a radius of five miles

from the place of the suspected outbreak or along, over or across a highway, road or lane in such area. Farmers were expected to graze their cattle as individuals.

Government dipping sessions were abandoned and farmers were encouraged to carry out tick control as individuals. The researcher observed that most farmers failed to achieve effective tick control as a result of several factors including lack of expertise, attitude, ignorance and high costs of acaricides. It seems the issue of dependency syndrome was also at play since most farmers were used to the government providing the acaricide. This promoted the multiplication and spread of ticks (particularly brown ear ticks) which spread *Theilleriosis.* Knowledge and expertise is required in tick control to ensure correct mixing and application of acaricide and ensuring thorough wetting of the animals. With the lapse of FMD quarantine order dipping sessions were resumed but farmers were still sticking to the FMD quarantine order and were reluctant to bring their cattle for dipping. This calls for effective communication and communication channels between Veterinary extension staff and farmers.

4.2.2 Shortage of Veterinary medicines.

Veterinary medicines are essential for ensuring and maintaining good animal health. The shortage of acaricide affected dipping intervals with cattle going for months without dipping. The DVS had challenges to supply dipping chemicals and some farmers were unable to purchase the chemical for themselves citing high prices. This is supported by MLAWRR (2020), which reported that dipping sessions in 2019 averaged 8 to 12 across the country instead of the recommended 26 to 32 owing to shortages of foreign currency to purchase dipping chemicals. Some of those farmers who managed to purchase the chemical had challenges achieving correct mixing and thorough wetting of cattle during dipping sessions which predisposed cattle to tick infestation and tick borne diseases.

De Menegh *et al*., (2016), outlines dipping as an efficient, practical and convenient means of applying acaricide to a herd of livestock (plunge dipping). It requires specially trained personnel to ensure proper management (initial charging, timely and replenishment of acaricide and accurate recording of the animals dipped). The costs of the drugs required to treat *Theilleriosis* was beyond the reach of many households with a single adult cow costing US$10 to treat and most farmers struggle to raise the forex especially who had large herds. Mbati *et al*., (2002) and Hesterburg (2007), conquers that the costs of veterinary drugs is beyond the reach of the many of communal farmers who end up resorting to traditional medicines to control ticks. Poor tick control methods promotes breeding and multiplication of brown ear and

eye ticks which spread *Theilleriosis*. This resulted in the spread of these ticks from one village to another, resulting in the whole area being tick infested.

4.2.3 Available grazing land management systems

It was observed grazing land is a common pool resource in the study area, in which no one owns it, which made it difficult to implement controlled grazing and isolate herds. Mixing of different herds encouraged transmission of parasites and diseases resulting in poor livestock production and possible losses. This is supported by Bester *et al.*, (2003), who observed that if there is limited range management, it will result in rangeland degradation and poor cattle body condition especially during winter. This calls for a change in livestock management practices and adopt cut and carry, forage improvement and creation of individual forage banks to improve feed availability.

Land pressure as a result of change in land use and forced migration affects agricultural activities, livestock production in particular is more affected (reduced carrying capacity and poor disease and parasite control). People were settled on those areas which were designated for animal grazing resulting in reduced grazing area and land degradation (due to overstocking) making it difficult to isolate herds, implement veld management principles (set stocking, paddocking and rotational grazing) and implement and maintain quarantine orders. This is supported by the findings of Gorg (2017), who observed that growth in human population affects the global land use pattern and land available for agriculture and forest cover.

This calls for a shift in livestock production system and adopt practices like cut and carry, improvement of crop residues and individual forage banks (hay and silage making). With cut and carry forage can be obtained from areas which are inaccessible with grazing and provided to animals. Crop residues such as maize stalks, groundnut and soyabean hauls can be stored and treated with salt and fed to cattle in times of feed shortage as supplements. Hay and silage making process preserves the nutritive value of the feed and preserves feed for use in future thus enhancing animal productivity.

4.2.4 Lack of effective knowledge

Interviews Veterinary extension staff and focus group discussions with LDC members reviewed lack of effective knowledge among farmers as a contributing factor to cattle losses. Lack of effective knowledge on implementing quarantine orders, tick control, grazing land management and drug administration has contributed to cattle losses. It seems farmers failed

to understand the meaning of quarantine order and its benefits. It appears they took it as a punishment. Quarantine entails restriction of animal movement and has the benefit of reducing and controlling disease spread by avoiding mixing of different herds. This was in tandem with the findings of Dold and Cocks (2001), who said communal farmers have limited access to veterinary care in terms of support services information about the prevention and treatment of livestock diseases and therapeutic veterinary medicines.

There was lack of effective knowledge among most of the farmers in relation to identification of vectors, causative organism, prevention and control of *Theilleriosis* in cattle. Knowledge of these issues is crucial in ensuring good animal health. It seems there is a breakdown in communication or misplaced priorities between farmers and extension agents on dissemination of agricultural information. Considering that the country have good tele-mobile services, good radio coverage and good television coverage where programs like Talking farming are presented to give information on crop and livestock issues farmers and extension staff should have up-to date information.

It was observed 95% of the farmers used a 50ml vial of butachem to treat ten or more cattle which could have resulted in ineffective doses which could not cure the animal. The recommended dosage of butalex is 1ml per 20kgs body weight (Fivet 2021). Adequate drug dosage is crucial if recovery is to be achieved. Attitude could also have contributed to the problem since veterinary extension staff are restricted due to limited funding, limited transport and large area to be covered by a single extension worker. It was also observed that farmers failed to recognise livestock production as a business (with inputs and outputs) where they can sale a single beast to save the rest of the herd.

The complexity of cattle ownership in most households, makes it difficult to dispose a single beast. The ownership pattern is such that a cattle herd of five beast may have three owners and none will be willing to dispose his/her beast to acquire drugs or some of the beasts might have social or cultural values attached to them such that selling them is impossible. By disposing a single beast farmers can afford to by medicines required to treat their herds. This is supported by the finding of the research where respondent number thirteen lost 24 cattle out of 27 citing cost of drugs. Effective knowledge is key to success.

4.2.5 Loss of cattle

Having discussed lack of knowledge, shortage of veterinary medicines and available grazing land management systems above, now faced with loss of cattle. There was a 59.6% loss of cattle which was a great loss to the area and the country as a whole with 88% of the respondents left with less than 6 cattle per households. More than half of the cattle was lost which was a great loss in terms of availability of food, manure and draught power which is a key component of agricultural production. This is supported by Tripathi (2006), who revealed that although use of mechanical and electrical power has increased over the years, the draught cattle shall continue to be a major source of farm power in future for small and marginal farmers. Mpanduj, *et al* (2007), reported that animal traction technology is more suitable both socially and economically viable for farmers with tradition in animal keeping.

The national herd decreased by 4.7% in 2019 due to tick borne diseases and drought (MLAWRR 2020). *Theilleriosis* emerged to be the major cause of death with 90% of the respondents reporting that they lost their cattle to the disease. This is in agreement with the findings of MLAWRR (2020), which reported that the highest number of cattle deaths have been attributed to *Theilleriosis* in Mashonaland central and Mashonaland west provinces. MLAWRR (2019), reported that the highest cause of cattle death was diseases which contributed 44% of cattle deaths. Cattle loses meant reduced availability of draught power and manure and consumption of animal products (meat, milk and other by-products) which can predispose people to malnutrition. FAO (2021), also noted that *Theilleriosis* disease was a key driver to livestock mortality and animal health related issues as a result of lack of dipping chemicals.

Reduced draught power and manure affects crop production for both cattle owning and non-cattle owning households. This is supported by Jackson and Mtengeti, (2005) who observed that the greatest value of manure can be seen in developing countries, where small-scale farmers reported that they do not have enough manure to apply to their crops. Hoffman and Mohammed (2004) also observed that exchange of grain and manure occurs between settled farmers and pastoralists. This means manure can be battered for grain which gives advantage to both parties in terms food security. Shortage of draught power affected transportation of inputs and outputs to and from production areas. Most of the households used cattle pulled carts to collect food staffs from fields and market places and with the reduction in cattle holdings this became difficult.

Most of the households suffered because ox-drawn carts were their means of transport to reach growth points for different transactions especially the elderly, sick, disabled, women and children. This affected the trade potential of most households as a process of accessing food. As mentioned earlier most of the villages in the study area are difficult to access with motor vehicles due poor road network and water logging especially during the rainy season making ox drawn carts the transport solution. This is supported by the findings of World livestock (2011) which observed that draught animals play important roles in the lives and livelihoods of many families, particularly those that are poor or live in remote or hilly areas.

FAO (2010), observed that although food security and self-reliance are important goals, urban based planners and politicians often ignore the importance of animal power to rural people, as governments tackle the issues of modernisation and urbanisation. This affects agricultural production especially animal production. As women farmers and traders are freed from limitations of head loading, more food is produced and traded, increasing profits and rural economic growth (FAO 2010). The use of manual labour reduces quantity produced and or carried to the market.

4.2.6 Food access

Coates *et al*., (2007), defined food security as a state in which "all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life. The Household Food Insecurity Access Scale uses 9 questions to assess the level of food insecurity. FAO (2006a), defines food access as access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live (including traditional rights such as access to common resources). So lack of resources affects food access. For most communities, cattle is one of the most important resources for acquiring food and store of value.

In the past four weeks did you worry that your household would not have enough food (1)? In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food (5)?

66% of the respondents were affected by conditions 1 and 5. In condition 1 the households had anxiety or worry of food shortage and 32% of the respondents experienced the condition rarely.

In condition 5 the households had to eat a smaller meal than needed because there was not enough food and resources. This indicated that food availability was reduced thereby affecting accessibility of food. Reducing meal size is a coping strategy adopted in times of food shortage (FAO 2021b).

In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of lack of resources (2)? In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of lack of resources to obtain other types of food (4)?

A large proportion of the respondents (96%) of the respondents were affected by conditions 2 and 4. In condition 2 households members were not able to eat the kinds of foods they preferred and in condition 4 some households ate food which they did not want to eat because of lack of resources. This indicated that the households had no enough access to preferred food resulting in some household members consuming some foods that they did not want to eat (limited choice). The households had a limited choice of food stuffs due to limited resources which indicated food insecurity (access).

In the past four weeks, did you or any household member have to eat a limited variety of foods due to lack of resources (3)?

92% of the respondents was affected by condition 3, the households had to eat a limited variety of foods due to lack of resources. There was a reduced capacity to acquire other foods among households. Households had to depend on readily or locally available food stuffs. The loss of cattle and efforts to save cattle could have resulted in reduction of household savings and forced spending (cash and assets) and loss of small stock in an effort to save cattle. Costales *et al* (2005), observed that small livestock are a convenient buffer against shocks for as they require lower capital investment, easy to dispose, death of one is less damaging, they grow and breed faster, and they are hardy.

Often these small livestock owned by women are sold at short notice to cover periods of income deficit. There was a reduction of the value of savings. Farmers usually buy cattle when they have excess cash that they wish to save and sale cattle when they need cash for family use, food, school fees, hospital bills and agricultural inputs. This is supported by Masendeke and Shoko (2013) who reported smaller livestock like chickens and goats are sold first while cattle are sold last in times of crisis. Cattle could be bartered for maize or agricultural inputs among

households during times of crisis (UNEP 2002). Consumption of limited variety of food can predispose households to malnutrition.

In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food (6)?

34% of the respondents were affected by condition 6 which meant the respondents had to eat fewer meals in a day because there was not enough food and 26% of the respondents experienced the condition rarely, 8% sometimes and none experienced the condition often. Reducing the number of meals per day is a coping strategy to food insecurity which is adopted by many households in times of food shortage. Mjonono (2008) also reported that food insecure households may try to cope with food insecurity by reducing meal sizes, skipping meals or going without food for one or more days. Having some households reporting reduced number of meals per day and considering the time the survey was done that could be a sign of impending food crisis.

In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food (7)?

2% of the households were affected by condition 7 where the respondents had no food to eat in the recall period rarely because of lack of resources to get food. This condition was experienced rarely which could be once or twice in the past 4 weeks. Most of the respondents affected by conditions 1 to 7 experienced the conditions rarely (once or twice in the past 4 weeks) which shows a low level of food inaccessibility.

In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food (8)? In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food (9)?

None of the respondents were affected by conditions 8 and 9 which meant no household member(s) slept hungry or spend the whole day and night without eating anything because there was no enough food. This indicated that food was available and accessible but with choice and variety sometimes limited as indicated by conditions 2, 3 and 4. This can be attributed to the time of survey (April to May). The survey was carried during the harvesting period where most households could be still having agricultural produce hence accessibility. This is

supported by WFP (2009) which stated that food insecurity severity fluctuates overtime either seasonally or owing to shock. This does not conclude that the households were food secure or does it conclude that the households were food insecure.

Average Household Food Insecurity Access score

An average Household Insecurity Access score of 7.5 was obtained. This score was low as it ranges from 0 to 27. The higher the score, the more food insecure (access) the household experienced. The lower the score the less food insecure (access) the household experienced. This indicated a mild food insecurity access. This is supported by Coates *et al.*,(2007), who said a mildly food insecure (access) household worries about not having enough food sometimes or often, and/or is unable to eat preferred foods, and/or eats a more monotonous diet than desired and/or some foods considered undesirable, but only rarely.

Household food insecurity (access) Prevalence

The results reviewed a moderate food insecurity (access) prevalence. This reviewed that access to food was affected among the respondents. This is supported by the finding that 86% of the respondents were moderately food insecure. The score does not cut back on quantity nor experience of any of three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating). Relating the results to the definition of food security, the respondents' access to food was negatively affected (they were food insecure in terms of food access).

The absence of a household member(s) going to sleep at night hungry and spending the whole day and night without eating anything because there was not enough food indicated the presence of food but of unknown quantity and quality. This could be so because of the season in which the research was carried out. Data collection was done during the harvesting period where households tend to have some food stuffs. During this period there are less chances of somebody going to sleep at night hungry or spending the whole day and night without eating anything. This brings in the issue of choice of surveying period.

CHAPTER 5

Summary, Conclusion and Recommendations

5.1 Summary

There are several factors affecting cattle production sector despite its significant contribution to household food and nutritional security. Cattle contribute to food security directly (providing meat and milk) and indirectly (providing draught power, raw materials, cash and manure). Four factors were identified as affecting cattle production and there is need to develop lasting solutions to the problems. A greater proportion of cattle 59.5% was lost, with *Theilleriosis* being the greatest cause of death. The main objective of this research was to assess the impact of cattle losses on household food and nutrition security. This was achieved through assessing the factors contributing to cattle losses, determining the total number of cattle lost and assessing the state of food accessibility in the study area. The researcher succeeded in achieving the objectives of the research.

5.2 Conclusion

Livestock sector is a crucial component of the food supply chain and food security, with cattle playing a crucial role in ensuring food security through the provision of draught power, meat, milk and other by-products. It is quite evident that current policies and approaches have failed to address the current challenges facing the cattle sub sector and it can be concluded that food security (access) have been affected negatively. Although the consumption (offtake) of beef and other beef products is low in communal areas the roles performed by cattle in these areas are crucial but under estimated in ensuring food security. The loss of cattle in the study area had a low Average Household Food Insecurity Access Score of 7.5 and the prevalence of household food insecurity (access) was moderate within the research period. This could be attributed to the season of survey. It had been concluded that communal farmers lack effective technical knowledge, resources and motivation such that real achievement in efficient cattle production cannot be attained since the animal owner lacks thorough knowledge in this area. Better and improved animal production techniques are necessary for communal farmers to achieve food security.

5.3 Recommendations

Policies relating to livestock production needs to be evaluated and support programs needs to be put in place at local and national level. Policy makers should encompass animal power within development strategies relating to food security since it is renewable and affordable by many rural households. This will help to improve livestock production in terms of breeding, nutrition, disease and parasite management and marketing channels.

Extension staff and Farmer training programmes should be enhanced to raise their level of awareness, knowledge and understanding of issues related to livestock production. Extension staff needs to be well knowledged with new extension approaches and techniques in relation to the changing world. Farmers need to be educated on animal production issues (disease and parasite prevention and control, veld management and fodder preservation practices and agricultural economics). National budgets should prioritise farmer training programs if national policies are to yield the expected results.

There is need for construction, maintenance and repair of veterinary infrastructure such as dip tanks and other handling facilities for effective dipping. The Government, Non- Governmental Organisations (NGO's), the Private sector and the Corporate world, to join hands together in the maintenance and repair of roofs, races, holding pens of dip tanks and the dip tank itself to promote efficient and effective tick control since most of the dip tanks are dilapidated.

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Appendices

QUESTIONNAIRE PRESENTED BY CHIPONDENI TINASHE, POST GRADUATE STUDENT IN FOOD SECURITY AND SUSTAINABLE AGRICULTURE AT BINDURA UNIVERSITY OF SCIENCE EDUCATION.

I am carrying out an evaluation on the impact of cattle losses on household food security in Mazowe District to identify causes, effects and find solutions to the problem. Thank you for taking your time to fill this questionnaire, your answers will be treated with complete confidentiality.

1. **Demographic Data**

a.Village……

b. Religion Christianity ATR Others specify

c. Gender Male Female

d. Age 20-30 31-40 41-50 51-60 61-Above

e. What crops do you grow? Cereals Legumes Cash crops Horticulture Both

f. What classes of livestock do you keep? Cattle Poultry shoats Pigs Both

g. What is the major source of income for your household? Crop sales Livestock sales Cash Transfers

2. **Cattle statistics**

a. How many cattle did you have before cattle deaths? ……..

b. How many cattle did you lost? ……

c. How many cattle do you have now? ……

d. What was the cause of death(s)? ……..

e. How often do you dip your cattle? Once a week Once a fortnight Thrice in 2 weeks

f. Which dipping system do you use? Plunge Hand spray Pour-on Both

g. Is your dipping program effective in tick control? Yes No

h. Have you ever attended extension services in livestock production? Yes No

i. Before cattle losses did you have access to enough food? Yes No

j. After cattle losses do you have access to enough food? Yes No

3. Household Food Insecurity Access Scale information

No	Question	Response Option	Code
1	In the past four weeks, did you worry that your household would not have enough food?	**0** = No (skip to Q2) **1** = Yes	….I _ I
1a	How often did this happen?	**1** = Rarely (once or twice in the past four weeks) **2** = Sometimes (three to ten times in the past four weeks) **3** = Often (more than ten times in the past four weeks)	….I _ I
2	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of lack of a resources?	**0** = No (skip to Q3) **1** = Yes	….I _ I
2a	How often did this happen?	**1** = Rarely (once or twice in the past four weeks) **2** = Sometimes (three to ten times in the past four weeks) **3** = Often (more than ten times in the past four weeks)	….I _ I
3	In the past four weeks did you or any household member have to eat a limited variety of foods due to lack of resources?	**0** = No (skip to Q4) **1** = Yes	….I _ I
3a	How often did this happen?	**1** = Rarely (once or twice in the past four weeks) **2** = Sometimes (three to ten times in the past four weeks) **3** = Often (more than ten times in the past four weeks)	….I _ I
4	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	**0** = No (skip to Q5) **1** = Yes	….I _ I
4a	How often did this happen?	**1** = Rarely (once or twice in the past four weeks) **2** = Sometimes (three to ten times in the past four weeks) **3** = Often (more than ten times in the past four weeks)	….I _ I
5	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	**0** = No (skip to Q6) **1** = Yes	….I _ I
5a	How often did this happen?	**1** = Rarely (once or twice in the past four weeks) **2** = Sometimes (three to ten times in the past four weeks)	….I _ I

		3 = Often (more than ten times in the past four weeks)	
6	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	**0** = No (skip to Q7) **1** = Yes	….I _ I
6a	How often did this happen?	**1** = Rarely (once or twice in the past four weeks) **2** = Sometimes (three to ten times in the past four weeks) **3** = Often (more than ten times in the past four weeks)	….I _ I
7	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	**0** = No (skip to Q8) **1** = Yes	….I _ I
7a	How often did this happen?	**1** = Rarely (once or twice in the past four weeks) **2** = Sometimes (three to ten times in the past four weeks) **3** = Often (more than ten times in the past four weeks)	….I _ I
8	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	**0** = No (skip to Q9) **1** = Yes	….I _ I
8a	How often did this happen?	**1** = Rarely (once or twice in the past four weeks) **2** = Sometimes (three to ten times in the past four weeks) **3** = Often (more than ten times in the past four weeks)	….I _ I
9	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	**0** = No (questionnaire is finished) **1** = Yes	….I _ I
9a	How often did this happen?	**1** = Rarely (once or twice in the past four weeks) **2** = Sometimes (three to ten times in the past four weeks) **3** = Often (more than ten times in the past four weeks)	….I _ I

10. What was your main source of food before cattle losses? Production Purchases Donations Other specify

11. What is your main source of food now? Production Purchases Donations Others specify

THE END: THANK YOU

Household food insecurity access (HFIA) categories.

HFIA category	Calculate the Household Food Insecurity Access category for each household: 1 = Food Secure, 2=Mildly Food Insecure Access, 3=Moderately Food Insecure Access, 4=Severely Food Insecure Access HFIA category = 1 if [(Q1a=0 or Q1a=1) and Q2=0 and Q3=0 and Q4=0 and Q5=0 and Q6=0 and Q7=0 and Q8=0 and Q9=0] HFIA category = 2 if [(Q1a=2 or Q1a=3 or Q2a=1 or Q2a=2 or Q2a=3 or Q3a=1 or Q4a=1) and Q5=0 and Q6=0 and Q7=0 and Q8=0 and Q9=0] HFIA category = 3 if [(Q3a=2 or Q3a=3 or Q4a=2 or Q4a=3 or Q5a=1 or Q5a=2 or Q6a=1 or Q6a=2) and Q7=0 and Q8=0 and Q9=0] HFIA category = 4 if [Q5a=3 or Q6a=3 or Q7a=1 or Q7a=2 or Q7a=3 or Q8a=1 or Q8a=2 or Q8a=3 or Q9a=1 or Q9a=2 or Q9a=3]