BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE

PREVALENCE AND EFFECTS OF JANUARY DISEASE (THEILERIOSIS) IN COMMUNAL BEEF CATTLE PRODUCERS: A CASE FOR WARD 8, ZAKA DISTRICT.

MASHIRI SARUDZAI

REG NUMBER: B200131A

A DESSERTATION PROPOSAL SUBMITTED IN PARTIAL FULLFILMENT OF THE REQUIREMENTS OF THE BACHELOR OF SCIENCE HONOURS DEGREE IN AGRICULTURE.

DATE OF SUBMISION:01/01/2023

BINDURA UNIVERSITY OF SCIENCE EDUCATION

ADDRESS: House number 571 Jerera

CONTACT DETAILS: 0772243161, 0716055917 ***Email;***

sarumash3@gmail.com

ACADEMIC SUPERSIVORS: Mr K. Kunaka and Dr A. Chikwanda

DATE OF SUBMISSION: 01/01/2023

ACKNOWLEDGEMENTS

First and foremost, I would like to thank the Almighty God for granting me the time and strength to do this project. I would also like the express my heartfelt gratitude to Mr K. Kunaka and Dr A.T. Chikwanda for the supervision and constructive ideas they gave me to make this project a success. I would also like to thank my family and friends for the encouragement and companionship throughout the course of my studies. This project would have been completed without their help.

DEDICATION

I dedicate my work to God Almighty, my source of inspiration, wisdom, knowledge and understanding. My husband Joseph Gumbire who has always loved me unconditionally and whose good examples have taught me to work hard for the things that I aspire to achieve. I would also want to pass my sincere gratitude to my dear son, Anesu and daughter, Amanda Gumbire who have been a constant support and encouragement during the challenges of graduate school and life.

ABSTRACT

Farmers in Zimbabwe keep animals for numerous purposes including for meat production, draft power in the absence of mechanization, manure for organic material, breeding and for immediate social capital such as dowry payments. However, the major challenges these farmers face on beef cattle production are poor animal health as well as high livestock mortality rate. Tick borne diseases, pose a major challenge to beef production and management to smallholder farmers, particularly those in the communal areas like in Zaka district through lack of adequate tick control. The purpose of the study was to determine the prevalence and impacts of theileriosis on communal beef producers in Zaka district, Masvingo Province. In this study, the researcher used correlational research design. The design was used to investigate the prevalence impact relationship between variables, thus the design used questionnaires. In the research findings, the data shows that 92% of the farmers were aware of the disease and only 8% showed that they did not know about the disease and its impacts. The findings also revealed that the disease impacted negatively as the disease contributed to 90% of financial losses to cattle producers. From the findings, the disease can cause affect cattle production in the district if farmers are not educated on the prevention and control of the disease. To minimize cattle losses, the government should provide enough dipping chemicals especially in summer where there is high rainfall and high tick infestations which are vectors of the disease. Awareness campaigns on the causes and effects of the disease should be increased so that every cattle farmer is fully knowledgeable about the disease.

Key words: Smallholder farmers, January disease, Mortalities, Questionnaire, tick infestations, acaricides.

Table of Contents

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

AGRITEX: Agricultural, Technical and Extension Services

FAOSTAT: Food and Agricultural Organisation Statistics

JD: January Disease

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Zimbabwe is a landlocked country in the Southern African region, lying between 150 33' S and 220 24' S latitudes and 250 12' E and 330 03' E longitudes (Food et al., 1996). It borders Zambia in the North, Mozambique in the East, South Africa in the South and Botswana in the West. The total land area is 390 759 km^2 (Wolf et al., 2019). Zimbabwe is situated within the tropical savannah region and it can also be described according to five natural regions. These are classified mainly by the soil type and average rainfall. This classification determines the type of agricultural activity recommended for the natural region (Latif et al., 2001). More than two thirds of the country's total area lie in semi-arid regions known as Natural Regions III, IV and V (Sungirai, 2018). These agro - ecological zones lie below 900m above sea level, and usually receive less than 600mm of rainfall per year. The main agricultural activity suited for these regions is livestock production (Sungirai, 2018).

Agriculture is the mainstay of Zimbabwe's economy contributing between 15 and 20 per cent of GDP, which rose from US$ 6.7 billion to US$ 8.2 billion between 1987 and 1997, (Wolf et al., 2019). Agriculture also provides the bulk of the nation's food requirements in a normal rainfall year, 60 per cent of the raw materials for industry and 45 per cent of foreign exchange earnings. As at March 2001, agriculture provided 26 per cent of the formal employment in the country and 70 per cent of the population with employment or livelihood (Williams, 2005).

Livestock and livestock products play an important role in the socio-economic development of Zimbabwe. It contributes about 25 per cent of value of agricultural output in all farming sectors. Hides from cattle are also an important component of the agricultural sector in generating foreign export earnings in Zimbabwe.

Beef cattle production is the management and rearing of cattle for household meat consumption or for commercial sale of meat (Marai, *et al*., 2007). Many farmers in Zimbabwe keep animals for numerous purposes including for meat production, draft power in the absence of mechanization, manure for organic material, breeding, exhibition purposes, milk and cheese production or for immediate social capital such as dowry payments. In traditional systems,

cattle are culled or sold when infirm or too old to be productive (Jewel, 2001). The country is endowed with diverse breeds of all species, comprising both indigenous and exotic types. The exotic breeds are dominant in the commercial sector, which is the main source of marketed livestock products. Indigenous breeds are numerically predominant in the country and these are reared mainly in the smallholder sector where they perform multiple functions (Chiromo, 2004).

More than 80% of the 15 000 rural households in Zaka district of Masvingo province own cattle from which they derive meat, milk, hides, manure, draught power, transport, income and socio - cultural aspects (Marai *et al*., 2007). Mashona breed is the major cattle breed kept by most communal farmers in the district

However, the major challenges these farmers face on beef cattle production, management and marketing are poor animal health, high livestock mortality rate (20% per year), poor animal husbandry skills, weak support from public and private institutions, poor access to markets, uneconomic livestock prices (ZIMVAC, 2020). Poor cattle health and high mortality are attributed to prevalence of diseases and most of these diseases are tick-borne. Tick infestations are very rampant in Zimbabwe and Zaka in particular due to inadequate dipping by most communal farmers (Modell, 2007). Tick borne diseases, pose a major challenge to beef production and management to smallholder farmers, particularly those in the communal areas through lack of adequate tick control. Ticks species such as *Haemaphysalis spp*, *Hyalomma spp* and *Rhipicephalus spp* are very rampant in Zaka district. However, the *Rhipicephalus spp* is the vector that causes theileriosis. The disease is also called January disease (JD) in Zimbabwe because of its seasonal occurrences (Mudzonga, 2011). The disease causes high cattle mortalities especially in the communal areas due to poor cattle management and control methods.

1.2 Problem statement

The smallholder sector in Zaka district and Ward 8 in particular is known for its high livestock production trends. However, the area has suffered from the high prevalence of January disease.

Consequences of the disease include farmers' economic, social and cultural losses due to high cattle mortalities. These cattle losses are impacting negatively on communal farmers'

livelihoods and are mainly attributed to poor cattle management and inadequate dipping to control the vectors. **1.3Justification**

Zimbabwe's response to the outbreak of January disease has been hampered by farmer's lack of information as well as the unavailability of drugs to combat the disease. An assessment on the prevalence of the disease to the affected communities in Zaka, ward 8 will assist in farmer capacitation in terms of knowledge as well as reducing cattle losses due to the disease. Therefore, there is need to analyse and quantify the amount of these losses that communal farmers incur due to the prevalence of January disease and the effects to their livelihoods.

1.4 Main Objectives

To determine the prevalence and impacts of January disease on communal farmers.

1.4.1 Specific Objectives

1.4.1.1 To determine the prevalence of January disease in Zaka district, ward 8 over a six months' period

1.4.1.2 To determine the impacts of January disease on communal cattle populations in Zaka district, ward 8.

1.5 Hypotheses

1.5.1 Ho: January disease is not significantly prevalent in Ward 8

1.5.2 Ho: There is no significant impact of January disease on cattle populations.

CHAPTER TWO

LITERATURE REVIEW

2.1 GENERAL BEEF CATTLE MANAGEMENT

Proper management of beef cattle improves beef cattle production and productivity; herd sizes increase through reduced calving intervals, higher conception rates, higher births weights, improved growth rates, improved weaning weights, reduced mortalities, and eventually cattle reach the breeding weights and marketable weights earlier (Modell, 2007).

Good animal health management is important to improve beef production (Marai *et al.*, 2007). As a result, there is need to control and prevent the spread of diseases. Tick-borne diseases, for example, pose a major challenge to beef production and management to smallholder farmers, particularly those in the communal areas through lack of adequate tick control (Sakadzo et al., 2020). Ticks are transmitters of tick borne diseases, loss of blood, irritation and also animals become prone to other bacterial, fungal and other parasite infections. There are four main methods of tick control, which are plunge dipping, use of spray race, hand spraying, pour on method as well as use of injectables like ivomectin (Modell, 2007). Plunge dipping is the most commonly used dipping method whereby an animal leaps into a dip tank resulting in total immersion of the animal. It then swims through to exit ensuring thorough soaking of the body. On spray race, animals are forced to walk through a passage in which jets of spray wash are sprayed over the entire body of the animal resulting in wetting of the body. It can be as effective as plunge dipping (Singh *et al*., 2013). Hand spraying is used in small herds where there are no other alternative dipping facilities. For this method to be effective, the animal has to be thoroughly wetted. In pour-on, the dip chemical is applied from the poll of the head along the top line of the animal and up to the base of the tail. The chemical then spreads to cover the entire body. Pour-on acaricides are expensive and are mainly used in areas where water is scarce (Mudzonga, 2011). Poor tick control methods in cattle will result in tick-borne

infestations such as Heart water (cowdriosis), Red water (babesiosis), Anaplasmosis as well as January disease (theileriosis) (Khan, 2005).

2.2 January disease

Outbreaks of the disease are rampant during the summer months which coincides with peaks in nymphal activity in the life cycle of the vector (Chiromo, 2004). The disease, in most cases occur between January and March and it usually affects cattle over the age of one year and rarely seen in calves (Modell, 2007). Primary outbreaks usually occur in herds with a moderate to heavy tick burden and are often associated with new additions in the herd. The disease may appear in the resident cattle suggesting initiation of infection by introduced carriers or in the introduced cattle suggesting introduction of susceptible cattle into the endemically stable herd. The disease is likely to recur each year on an infected herd unless good tick control is achieved (Marai *et al*., 2007).

2.3 Impacts of January Disease

January disease represent threats to the environment, animal welfare, public health and the economy (Chiromo, 2004). The disease contributes to losses via increased mortality, reduced productivity, control costs, loss in trade, decreased market value and food insecurity. The economic and social impacts of livestock disease have been recognized globally, in both developed and developing countries. Quantifying the economic impact of an animal disease outbreak is important in support of prevention and control decisions for improved animal health (Chiromo, 2004).

2.3.1 Economic Impacts

The economic costs of animal disease can be categorized as either direct or indirect losses. Over the last decade, the direct cost of zoonotic diseases has been estimated at more than $20 billion and indirect losses at over $200 billion to affected economies as a whole (Spickler, *et al.,* 2019). This showed that indirect costs are an important aspect of the economic impact of an animal disease outbreak, and as these estimates suggest, can be larger in magnitude than direct costs. While direct disease costs are important, indirect costs are also of concern because

the costs of disease do not stop at the farm-gate, within the agricultural sector, or after diseasefreedom is declared. Disease can affect a wide range of sectors of the economy including rural business and tourism. Cattle disease outbreaks have serious economic effects, resulting in production losses, market declines, and increased unemployment in the food and agriculture sector (Yan *et al*., 2018). Quarantines and restrictions on animal movement in the diseaseaffected regions would paralyze the rural economy. Moreover, even a small outbreak of a serious animal disease like January disease would prompt trading partners to impose strict embargoes on imports of livestock products that could carry the infectious agent (Prathap, et al., 2017).

Variations in prices can be determined by the demand and supply effects. Market effects can similarly induce variations in wages for farm and processing employment and can otherwise spread through to upstream or downstream activities (Jewel, 2001). A disease outbreak can lead to higher prices if most production is domestically consumed or to lower prices if most production is exported and quarantine prevents such exports but not domestic consumption. Negative price effects can also occur where consumer health concerns lead to reduction in demand (Mudzonga, 2011). There are also budgetary implications of January disease. Control measures generally involve budgetary obligation. These include costs of inspection, monitoring, prevention and response. Also demands are often put on governments to extend financial assistance to the affected cattle producers (Khan, 2005).

2.3.1.1 Production

The most direct economic impact of January disease is the loss of or reduced efficiency of production, which reduces income (Khan, 2005). The severity of the economic effect will depend on the specific circumstances. If the farm economy is relatively diversified and other income opportunities exist, the burden will be reduced. Conversely, if the local economy is heavily dependent on one or a few vulnerable commodities, the burden may be severe and local food security impaired (Jewel, 2001). The impacts of reduced productivity of animals can be long-lasting and diseases can have lasting effects on livestock output in a number of hidden ways such as delays in reproduction leading to fewer off-springs and the consequences of a reduced population which often exceed the losses associated with clearly visible illness (Khan, 2005).

2.3.1.2 Food Security and Nutrition

January disease often have significant negative impacts on food security and nutrition. The huge number of cattle which are lost through the outbreak of the disease affects negatively on food availability and therefore poor nutrition (Jewel, 2001).

2.4 Social Impacts

For producers who have spent their entire lives with working routine of tending to their animals, the depopulation of premises as part of the disease control activities can leave them mentally and emotionally scarred and without a sense of purpose (Upreti, 2005). Given their loss of identity as a producer of quality livestock or safe food, their inability to provide for their families or the feelings of remorse or guilt for the destruction of their livelihoods, despair is very much expected (Speckler, *et al*., 2019). When economic losses occur, families may be forced to redefine their immediate priorities. Typical sacrifices, which can have social impacts include loss of ability to fund education and the withdrawal of children from studies, the ceasing of attending social, community and cultural activities leading to isolation, the decision of the next generation to leave the agriculture sector and the need to apply for social assistance and welfare programme to make ends meet. In instances where poverty dictates that the sole means of feeding one's family is based on cattle rearing, the occurrence of diseases such as January disease can eliminate the primary source of nutrition, further exacerbating health consequences (Jewel, 2001).

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Research site

The research was carried out in ward 8 of Zaka district, Masvingo province. Ward 8 is located 100 kilometers South East of Masvingo town, 20.3508°S, 31.3542°. Livestock production, especially the Mashona breed, is a source of income for most households in the ward. The area lies in Agro-Ecological Region IV and receives less than 500mm of rainfall per annum and high temperatures of between 20-40 degrees Celsius. Soils in the ward are relatively unbleached, of high base status and have a moderate to high clay content. These soils have a very high agricultural potential but the main limitation is the aridity of the environment they occur. The district's semi-arid environment supports extensive woodlands of *Colophospermum mopane* whose leaves have high protein content and high nutritive value for cattle (Marai, ***et al***., 2007).

3.2 Research Design

In this study, the researcher used correlational research design. The design was used to investigate the prevalence impact relationship between variables, thus the design used questionnaires. Since there was no secondary data to analyse, attention was shifted to primary data obtained through questionnaires.

3.3 Statistical Analysis

Data was obtained through the administration of questionnaires which were pre-tested before use. SPSS version 21 was used to analyse the data. A reliability test to check for reliability of questions asked during data collection and descriptive statistics to identify the mean, standard deviation and other measures of central tendency and variability of constructs was used. To seek for the causal relationship between the prevalence and effect of the disease, a regression analysis was applied. Lastly, an evaluation on the correlation between the two variables since the research used a correlation research design was conducted.

3.4 Targeted Population

Each district is divided into political and administrative boundaries called wards. These wards are subdivided into VIDCOs or villages. According to the department of Veterinary services, ward 8 has a population of 254 cattle producing farmers. The research focused on cattle producing farmers, opinion leaders and Veterinary Officers who were all interviewed in this survey.

3.5 Sampling design and sample size

A sample of 152 respondents, which translates to 60.8% of the population of the cattle producing farmers was used.

3.6 Sampling Technique

Random sampling technique was used to select the 152 farmers for interviews as it gave the most reliable representation of the whole population and free from bias (Coetzee and Tustan, 2004). Random sampling was also used because the population was very large and homogeneous whereby more farmers possessed livestock from all classes which were in the area affected by the disease (January disease).

3.7 Research Techniques

Household interviews, focus group discussions, questionnaires, key informants such as Chiefs and Headman and personal observations were done. The survey also provided detailed demographic profiles and this was significant in the study as it reflected on a number of issues including age groups of people who own cattle and number of people who were into cattle production in the study area. This would assist in drawing conclusions on the impacts of the disease to the affected community.

3.7 1 Interviews

Primary data was obtained from household interviews. Interviews were used as they assisted in getting in-depth information, other content of interest (Creswell, 2003). They paved a way for accessing respondents' perceptions, meanings, and definitions of situations and constructions of reality (Barceló *et al*., 1991). Each cattle farmer from a selected household was asked the same series of questions and responses were organized so that conclusions could be drawn from them. Key informants were interviewed such as chiefs and headman who had, observed January disease prevalence over the years they lived in the area so as to generate information on the practice used to control the disease.

3.7.2 Focus group discussions

One Focus Group Discussion was conducted in the ward. The focus group discussion allowed the researcher to facilitate, moderate, monitor and record the responses and less act as an interviewer. The discussion was directed by questions and topics posed.

3.7.3 Questionnaire*s*

A questionnaire was used in the study to solicit information related to cattle production and farmer perceptions on January disease. The survey targeted the selected farmers in the ward. Targeted farmers were those who own cattle. A structured questionnaire consisting of both closed and open-ended questions was administered to the selected farmers. To ensure the best possible data quality, the researcher issued each questionnaire as one on one interview since the goal of the study was to establish the prevalence of January disease to cattle farmers (Yam, *et al*., 2018). Participants were required to give their views on a Likert scale of 1- 5 where 1

represented strongly disagree, 2 represented disagree, 3 represented neutrals, 4 represented agree and 5 represented strongly agree.

3.7.4 Secondary sources

A wide range of secondary data sources namely the internet, electronic journals, text books and research papers were used in the study.

3.8 Ethical considerations

The researcher upheld confidentiality of participants through promoting anonymity like not writing their names on the questionnaire. There was no sharing of information of any participant to a third person (Creswell, 2003). All information was collected in confidence and was reported in anonymity, with no direct reference to respondents' identities. Respect for privacy of respondents was also upheld to avoid the infringement of individual's autonomous right and protect what is personal to them, (Hammersley *et al*., 2012). Permission to carry out the study was sought from the, Headman and District Administrator.

CHAPTER FOUR RESULTS!

4.0 DESCRIPTIVE STATISTICS

Demographic data obtained from cattle farmers was interpreted and presented using tables, bar graphs and pie charts.

4.1 Age of participants

Table 4.1 below shows that among the 152 interviewed farmers, 41.4% were aged between 40 and 49, followed by 21.7% for ages between 30 and 39, 17.8% aged 50 and above. It also shows that farmers between the age of 40 and 49 are the most group with cattle in the ward. Fig 4.1 below also presented the results as a percentage of the total participants in the form of a bar chart.

Table 4.1: Age of participants

Age	Frequency	Percent	Valid %	Cumulative %
Below 19	6	3.9	3.9	3.9
19-29	23	15.1	15.1	19.1
30-39	33	21.7	21.7	40.8
40-49	63	41.4	41.4	82.2
>50	27	17.8	17.8	100.0
Total	152	100.0	100.0	

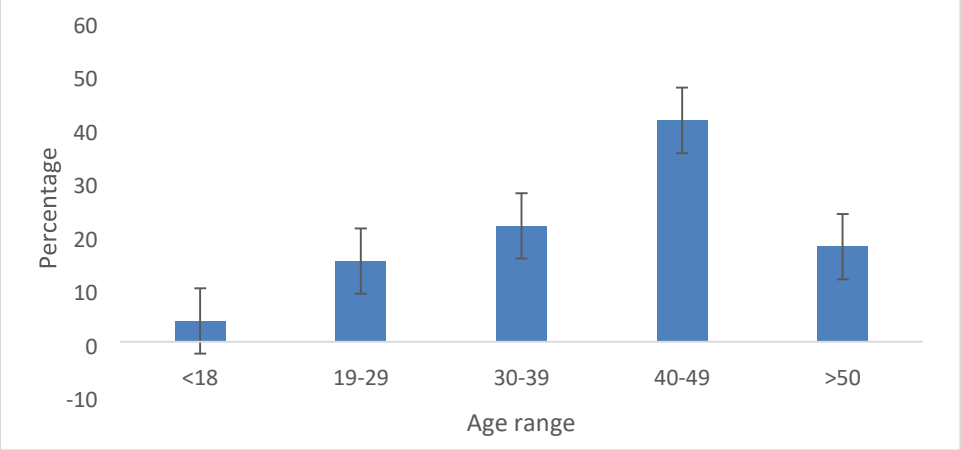

Fig 4.1: Percentage range of participants

4.2 Gender of participants

Results from the study showed that of the 152 farmers who participated in the survey, 92.1% were males and only 7.9% were females. This indicates that most cattle owners in the ward are males. Table 4.2 below shows the frequency and valid percentages obtained from the survey.

Table 4.2: Gender of participants

Gender	Frequency	Percent	Valid %	Cumulative %
Female	12	7.9	7.9	7.9
Male	140	92.1	92.1	100.0
Total	152	100.0	100.0	

4.3 Level of education of participants

Results from the study showed that 52.6% of the participants attained secondary education, 23.7% attained tertiary education, 16.4% had primary education while those with no level of education had 7.2%. This showed that most farmers who own cattle in the ward attended

secondary education. Table 4.3 below shows the different levels of education and the percentages for farmers in the ward.

Table 4.3: Participants' level of education

Education level	Frequency	Percentage	Valid%	Cumulative %
No education	11	7.2	7.2	7.2
Primary	25	16.4	16.4	23.7
Secondary	80	52.6	52.6	76.3
Tertiary	36	23.7	23.7	100.0
Total	152	100.0	100.0	

4.4 Total number of cattle owned by participants

Results from the survey indicated that many participants owned cattle less than ten and this constituted 49% of the total followed by participants which had 10-20 cattle with a 38.2% contribution and farmers with above 20 cattle were at 12.5%. Results are summarized in table 4.4 below

Table 4.4: Total number of cattle owned

Number of cattle	Frequency	Percentage	Valid %	Cumulative %
<10	75	49.3	49.3	49.3
10-20	58	38.2	38.2	87.5
>20	19	12.5	12.5	100.0
Total	152	100.0	100. 0	

4.5 Source of income by participants

Results from the study showed that 10.5% of the cattle farmers were getting between $10 and $20, 28.9% of the farmers had between $21 and $30, 26.3% were getting $31and $40, followed by 20% who were getting between $41 and $50 while 13.9% were getting above $50 per month.

Table 4.5 below shows the average income for cattle producers in the ward.

Table 4.5: Source of income

Average income ($)	Frequency	Percentage	Valid %	Cumulative %
10-20	16	10.5	10.5	10.5
21-30	44	28.9	28.9	39.4
31-40	40	26.3	26.3	65.7
41-50	31	20.4	20.4	86.1
>50	21	13.9	13.9	100.0
TOTAL	152	100.0	100.0	

4.6 Descriptive statistics of number of farmers who have heard about January disease.

Results from the study show that 63% of farmers in the ward were aware of January disease and only 36% of the cattle farmers in the ward were unaware of the disease. Table 4.7 below gives a summary of the study findings.

Table 4.6: Number of farmers who knew about January disease

Knowledge of January disease	Frequency	Percentage	Valid %	Cumulative%
No	56	36.8	36.8	36.8
Yes	96	63.2	63.2	100.0
Total	152	100.0	100.0	

4.8 Reliability analysis, construct validity and correlation of variables.

In the study, an investigation on the reliability of questions administered was done. There was one independent variable, which was January disease and two branches of dependent variables which were the economic impact of the disease which comprised of production, price and the market effect, food security and nutrition as well as financial costs. The second dependent variable was the social impact which comprised of education, cultural effect, mental effect as well as emotional disturbances. For each variable to be reliable, it must have an alpha value which is 0.7 and above but below 0.95 otherwise the results might be unreliable and biased. Results for analysis of reliability are shown on table 4.8 and they show that all variables were

reliable sine the indices alpha are all greater than 0.7. This meant that the data from participants can be relied upon and can be further used for analysis.

Table 4.7: Reliability analysis

Variable	Cronbach's Alpha
January disease	0.87
Production	0.74
Price and market	0.76
Food security and nutrition	0.91
Financial cost	0.82
Education	0.78
Community and cultural	0.83
Mental and emotional disturbances	0.87

4.9 Regression analysis

4.9.1Regression between January disease and production

January disease was regressed against production as a dependent variable. Results show that January disease had an effect on production of cattle (Sig=0.00<0.05
). The coefficients of the regression model are significant (t=16.09 and t=6.58) as shown in the ANOVA table 4.9. The Sig values are all 0.00<0.05 and the regression equation is given as:

Prod=3.461-0.412*JD

Table 4.8: Regression coefficients for January disease and production

Model	Unstandardized coefficients		Standardized coefficients	T	Sig
	B	Std error	Beta		
Constant	3.416	215		16.09	0.00
JD	-282	0.43	-412	-6.58	0.00

4.9.2 Regression between January disease, price and market effect

January disease had an effect on price and market effect of cattle (Sig 0.000<0.05). The coefficients of the regression model are significant (t-values greater than 2 and Sig =0.000). 61% of validity in the model is being explained by the independent variable as shown on Table 4.9.1 below. Hence, the regression equation is given as:

Price=2.67+0.445*JD

Table 4.9: ANOVA table for price and market effect

Model	Sum of Squares	Df	Mean square	F	Sig
Regression	38.970	1	38.970	52.386	0.000[b]
Residual	201.707	150	0.774		
Total	196.677	151			

Table 4.9.1: Regression coefficients for January disease, price and market effect

Model	Unstandardized coefficients	Unstandardized coefficients	Standardized coefficients	T	Sig
	B	Std error	Beta		
Constant	2.670	0.303		8.818	0.000
January disease	0.468	0.065	0.445	7.238	0.000

4.9.3 Regression between January disease and Food and Nutrition

January disease was regressed against food security and nutrition and the results showed that the disease has an effect on food security and nutrition (Sig=0.000). The coefficients of the regression model are all significant (Sig=0.000). The negative coefficient on the independent estimate indicates that January disease has a negative effect on food security and nutrition, meaning that increment in January disease causes a % decrease in food security as shown on Table 4.9.2. The regression equation is given as:

Food=2.922-0.317*JD

Table 4.9.2: Regression coefficients between January disease and food

Model	Unstandardized coefficients	Unstandardized coefficients	Standardized coefficients	T	Sig
	B	Std error	Beta		
Constant	2.922	0.395		12.311	0.000
JD	-0.333	0.069	-0.317	-.4.858	0.000

4.9.4 Regression between January disease and financial costs

Results from the analysis showed that all the coefficients are significant (Sig=0.000) and are positive. The t-values are all greater than 2. R-squared value is 0.322 that means 32.2% of validity in the model is being explained by the independent variable. Therefore, January disease positively affects financial cost of cattle producers. This is indicated on table 4.9.3 which shows the coefficients of the regression model. The regression equation is given as:

Fin=2.454+0.322*JD

Table 4.9.3: Regression coefficients between January disease and financial costs

Model	Unstandardized coefficients	Unstandardized coefficients	Standardized coefficients	T	Sig
	B	Std error	Beta		
Constant	2.454	0.482		5.087	0.000
JD	0.396	0.080	0.322	4.945	0.000

Table 4.9.4: Summary of the regression model

Independent	Dependent	Constant	Beta	Sig	Effect
January Disease	Production	3.461	-0.412	0.000	Yes
	Price and market	2.670	0.445	0.000	Yes

	Food security	2.922	-0.317	0.000	Yes
	Financial cost	2.454	0.322	0.000	Yes
	Education	3.661	-0.180	0.008	Yes
	Cultural activities	4.101	0.0137	0.045	Yes
	Mental and emotional	2.653	0.302	0.000	Yes

CHAPTER FIVE

5.0 DISCUSSION

Results from the study showed that 41.4 % of the total participants were between the ages of 40 and 49 years and males having the greatest proportion. The data showed that most of the participants attained secondary education and this made the questionnaire easy to administer as most of the participants were literate. About 49% of the farmers had less than ten cattle and this showed that in the communal area farmers do not have cattle which exceeds twenty and the numbers are mainly affected by rampant disease outbreaks like January disease. From the survey it also showed that the farmers' main source of income is from farming which constitutes to 80.9% and cattle production is one of major sources of income in the area. Average family income from farming showed that 28.9% of the farmers were getting $21-$30 per month. However, cattle production, which is the main contributor to family income, was affected by January disease as most of the cattle died from the effects of the disease.

The analysed data showed that January disease has an effect on cattle production as many farmers who were interviewed lost cattle due to the disease. This was noticed by comparing the total number of had at the time of the survey against the total number of cattle they had lost to the disease since it started. Most farmers reported having been affected by the disease socially, morally and financially. Socially, farmers could no longer perform social events like paying lobola and other social functions that required use of cattle as they no longer had enough cattle to do those activities leaving them morally strained. The negative coefficient on the independent estimate indicates that January disease had a negative effect on food security and nutrition, meaning that 1% increment in the disease causes a percentage decrease in food security. Food reduction was attributed to this loss in cattle as communal farmers use cattle for ploughing, therefore area to crop production was negatively affected. The disease had a negative effect on education as most of the farmers could no longer afford to send their children to school. Most farmers indicated that they withdrew their children from school because they could no longer afford the fees as they had lost cattle to the disease which were the source of revenue. This also affected most farmers socially and morally.

On the financial aspect, most farmers could not get revenue from the enterprise since cattle prices decreased. The quality of the beef was also affected by the disease and therefore, not safe for consumption. The analysis clearly showed that January disease had negative financial implications to farmers as they were incurring high costs of preventing and treating the affected animals. The cost of inspecting beef cattle by the Veterinary service department was also very high for farmers that most of them failed to meet these costs leading to high cattle mortalities.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

In the research findings, the data shows that most of the farmers were aware of the disease though a small proportion of the farmers showed that they did not know about the disease and its impacts. The data shows that most cattle owners in Zaka, ward 8, attained secondary education and this made administering of the questionnaire easy as they could read and write. The findings also found that the disease impacted negatively to cattle producers in many aspects including financial, social and moral aspects.

To minimize these losses incurred by farmers, the government should provide enough dipping acaricides for adequate dipping especially in summer where there is high rainfall and high tick infestations which are vectors of the disease. Awareness campaigns on the causes and effects of the disease should be increased so that every cattle farmer is fully knowledgeable about the disease. This may reduce cattle mortalities due to the disease.

CHAPTER SEVEN

7.0 REFERENCES

Birkelo, C.P, Johnson, D.E and Phetteplace, H.P, (1991), Maintenance Requirements of Beef Cattle as Affected by Season on Different Planes of Nutrition: *Journal of Animal Science, 69:1214–1222.*

Brown C. and Torres A, (2008), USAHA Foreign Animal Diseases, Seventh Edition. Committee of Foreign and Emerging Diseases of the US Animal Health Association. Boca Publications Group, Inc. Cambridge

Chiromo S.A, (2004), Research Methods and Statistics in Education.

Coetzer J.A.W and Tustin R.C, (2004), Infectious Diseases of Livestock, 2nd Edition. Cape Town, South Africa: Oxford University Press Southern Africa.

Creswell J.W. (2003), Research Design: Qualitative, Quantitative and Mixed Approaches;

Dawson. (2002), Practical Research Methods, New Delhi: UBS Publishers

Irny S. I. and Rose A, (2005), Designing a Strategic Information Systems Planning Methodology for Malaysian Institutes for Higher Learning

Jewel, H, (2001), Constructing Questions for Interviews, Cambridge University Press: United Kingdom.

Kadokawa, H, Sakatani, M., and Hansen, P.J, (2012), Perspectives on Improvement of Reproduction in Cattle during Heat Stress in a Future Japan. *Animal Science Journal, 83 (6): 439-445.*

Kahn C.M. (2005), Merck Veterinary Manual, 9th Edition. Merck & Co. Inc. and Merial Ltd. Whitehouse. Station, NJ: Merck.

Marai, I.F.M, El-Darawany, A.A., Fadiel, A and Abdel-Hafez, M.A.M, (2007), Physiological Traits as Affected by Heat Stress in Sheep—A Review, Small Ruminant Research, 71:1-12.

Modell. E. M. (2007), A professional guide to systems analysis: 2nd edition

Mudzonga. E. (2011), Farmers' Adaptation to Climate Change in Chivi District of Zimbabwe
Panneerselvan.R. (2004), Research Methodology: Prentice Hall of India Private Limited: New

Punch. F.K. (1998), Introduction to Social Research; Quantitative and Qualitative Approaches:

Singh, M, Chaudhari, B.K., Singh, J.K., Singh, A.K and Maurya, P.K. (2013), Effects of Thermal Load on Buffalo Reproductive Performance during Summer Season: *Journal of Biological Sciences 1 (1): 1-8.*

Spickler, A and Rovid B. (2019), Theileriosis Retrieved from http://www.cfsph.iastate.edu/DiseaseInfo/factsheets.php.9

Upreti, D.C. (1999), Rising Atmospheric Carbon dioxide and Crop Response. SASCOM Scientific Report, 1–8.

World Organisation for Animal Health. (2015), Terrestrial Animal Health Code. OIE, Paris. Watts J.G., Playford M.C. & Hickey K.L. (2016) *Theileria orientalis*: a review. NZ Vet. J., PubMed PMID.

World Organisation for Animal Health. (2019), Manual of Diagnostic Tests and Vaccines for Terrestrial Animals. OIE, Paris.

World Organisation for Animal Health. (2020), Online World Animal Health Information Database (WAHID). Website accessed in 2020. Alvarez, M. B and Johns, H.D, (1973), Environmental Heat exposure on Cattle Plasma Catecholamine and Glucocorticoids: *Journal of Dairy Science, 56:189-194*

Yam J., Bogema D. & Jenkins C, (2019), Oriental Theileriosis Ticks and Tick-Borne Pathogens, intechopen.com

ZIMSTAT, (2012), Census: Masvingo Provincial Report.