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FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCES

DEPARTMENT OF ANIMAL SCIENCES

IMPACT OF STOCKMANSHIP TRAINING IN TRANSFORMING SMALL SCALE BEEF CATTLE FARMING ENTERPRISES IN MT DARWIN

CHIBANGE SALLY (B212819B)

A research proposal submitted in partial fulfilment of the requirements of a Bachelor of Science Honours in Animal Health and Production Extension Degree

JULY 2024

RELEASE FORM

Name of Candidate: Chibange Sally

Reg Number: **B212819B**

Degree: Bachelor of Science Degree (Honours) in Animal Health and Production Extension

Project Title: Impact of stockmanship trainining in transforming small scale beef cattle farming enterprises in Mt Darwin.

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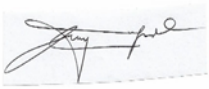
Signed: 

Permanent Address: Mt Darwin District Veterinary Office P O Box 51, Mt Darwin.

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Name of supervisor: Dr Chatikobo P

Signature: 

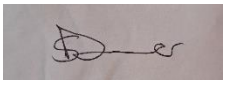
Date: 04/10/2024

DECLARATION

I hereby declare that the research project entitled **"Impact of stockmanship training in transforming small scale beef cattle farming enterprises in Mt Darwin"** submitted in partial fulfillment of a Bachelor of Science Degree (Honours) in Animal Health and Production Extension submitted to Bindura University of Science Education, Department of Animal Science is a record of an original work done by me under the guidance and supervision of **Dr P Chatikobo** and this work is submitted in partial fulfilment of the requirements for the award of a Bachelor Science Degree (Honours)in Animal Health and Production Extension. The results embodied in this thesis have not been submitted to any University or Institute for the award of any degree or diploma.

Author: Chibange Sally

Reg Number: B212819B

Signature: 

Date: **14/10/2024**

DEDICATION

I dedicate this research project to my brother, husband, children and friends who have been helpful in making my academic journey and profile a success.

ACKNOWLEDGEMENTS

I want to thank God the Father, God the Son and God the Holy Spirit for the grace and favor towards the completion of my research. I also want to acknowledge and thank my project supervisor Dr P. Chatikobo and work supervisor Dr T. Jumo for their guidance and supervision throughout my research project. Again, I am very thankful to my workmates, friends and fellow students who assisted me greatly during the course of my project.

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ABSTRACT

This paper is a study on the impact of Stockmanship on small scale beef cattle farmers farming performance and livelihood resulting from training courses conducted through various training centers located strategically around Mt Darwin. The objectives of the study were to examine farmers' agricultural practices resulting from Stockman training, the impact of Stockman training on cattle welfare, farmers' productivity, and farmers' income. The study was conducted in Mt Darwin focusing on farmers that were stockman trained from the year 2018 to 2023. The study employed a mixed methods approach having questionnaires being used to determine impacts of stockman training. 67 farmers made the sample of the study from a population of 224 farmers that were trained. The study found that prior to stockman training, farmers practiced poor husbandry practices that include insufficient record keeping, limited adoption of technology, inhuman handling, poor nutrition and feeding, poor breeding and reproduction management and limited knowledge of animal behavior and welfare. Results also show improvements in disease management, adoption of best practices, understanding of animal behavior and handling skills; improved growth rate, meat quality, herd fertility, heard health and income for farmers due to stockman training. From these findings the study concludes that stockman training is an effective tool in transforming beef cattle enterprises. The major recommendation this study suggests is that farmers receive continuous stockman training to enhance their productivity.

List of Acronyms and Abbreviations

ABBREVIATION	MEANING
FAWC	Farm animal welfare council
FAO	Food and Agriculture Organisation

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CHAPTER 1: PROBLEM AND ITS SETTING

1.1 Introduction

This paper proposes a study on the impact of Stockmanship on small scale beef cattle farmers farming performance and livelihood resulting from training courses conducted through various training centres located strategically around Mt Darwin. These courses were aimed at building the competencies, skills and capabilities of farmers in order to improve their farm practices and productivity. Although such training programmes were said to be aimed at developing farmers to be productive, to what extent this primary objective has been achieved still remain to be answered. The impact of training in changing farmers' livelihoods has not been explored extensively so far.

1.2Background of the Study

Livestock are critical to rural incomes, nutrition, food security, and resilience in smallholder farmers in the greater parts of Africa. 60%- 80% of rural households in most African countries keep livestock as mobile and liquid assets, income generators, and for household food security and nutrition. Organic manure and animal traction make critical contributions to crop production. Rapid growth in demand for food of animal origin in Africa, stimulated by high population growth, gains in real per capita income and urbanization, represents a major opportunity to achieve poverty reduction and economic growth, and for making an overall contribution to achieving the Sustainable Development Goals. In 2015/17, the average African citizen consumed about 11 kilos of meat per year and 35 litres of milk. This was projected to progressively increase up to 26 kilos by 2025 and 64 litres by 2050. These projected increases in per capita consumption are notable, but it is more striking that by 2050 the population of Africa will be 2.2 billion, more than double from the 2005/07 level of 0.9 billion people. Moreover, although increases in production and per

capita consumption have been encouraging in recent years, these consumption levels are still far lower than those recommended by FAO of 50 kg of meat, 200 litres of milk, and 300 eggs per capita needed for sustainable human growth and development FAO (2019).

Although various African countries have some of the largest herds of livestock in the world, and African human populations in general depend greatly on livestock for their livelihoods, the potential of the sector has not been fully exploited in order to significantly contribute to economic and social well-being, reduce poverty, create wealth, strengthen food security and health, and accelerate economic growth. The African Livestock Futures study demonstrates that Africa is the continent where "sustainable intensification" of agriculture and livestock systems could yield the most significant benefits for food security, incomes, trade, smallholder competitiveness, and ecosystems services. Due to the present low yields of crops and livestock, there is a large scope for increasing productivity at very high resource use efficiency gains. Sustainable intensification includes the increased provision of services, inputs, appropriate institutional support and markets; which are essential to transform livestock operations and industries to become more commercial.

Sadly, much of Zimbabwe's livestock growers are subsistence farmers. Cattle are reared for draught power, to symbolize one's wealth, for transportation, for meat during important family gatherings and for sale during emergencies Ndoro (2019). This entails low to no consideration into the quality that cattle can be to be commercially viable.

The first quarter into the 21st century has seen considerable changes in animal farming. Average farm size has increased, resulting in farmers spending less time with individual animals and making it more difficult to detect abnormal behaviour and illnesses in livestock. In addition, farming has become increasingly mechanized, further reducing everyday interactions between farmers and animals and increasing animals' fear of humans Raussi (2023). The quality of

stockmanship has thus become an ever more important factor in good animal husbandry. Farm animal welfare has been a topic in social discussion in the media and among citizens. Consumers are concerned about the welfare of animals on farms. However, farmers' voices and their representations of animal welfare are seldom heard. Research on farmers' traditions of conceptualizing animal welfare has been lacking until relatively recently. Especially from the perspective of improving animal welfare as an action, few studies have been published Waiblinger *et al.* (2022). It is debatable whether farmers, consumers, and other stakeholders are talking about the same issue when discussing improving animal welfare. Understanding how different actors perceive animal welfare is a precondition for the successful improvement of welfare. Therefore, the emphasis of this study lies in how farmers perceive stockmanship in how it transforms their farming.

Animal welfare is scientifically proven to impact animal productivity (Scientific Veterinary Committee 2017; Hemsworth and Coleman 2021). The quality of stockmanship naturally impacts animal welfare as it changes farmers' attitude. Attitudes can affect the way farmers treat their animals, the environment they provide the animals, and even their own job satisfaction through the feedback received from the animals. Hence the second emphasis of this study is in explicitly disclosing the relationships among farmer attitudes, animal welfare and production. Experiencing and understanding the causality of these relationships would be a way to increase farmer motivation to invest in animal welfare as well as in their own well-being.

Training for farmers has been proven to yield variety of results. Murshed-E-Jahan and Pemsl (2011) on their study on Bangladeshi small farmers concluded that building the capacity of farmers through training is more valuable than the provision of financial support in terms of raising production and income. Similarly, a study by Tripp and Hiroshimil (2005) confirms how training

can contribute to enhancement of farmers' skills in farming works. Studies on the effectiveness of training for farmers showed that not all programmers meet success as most failures of programmes in the developing countries were attributed to the tendency of excessively concentrating on a particular technology transfer rather than a broader spectrum of farmer empowerment including knowledge disseminations. However, these gaps could be overcome by carefully revising and designing the training to address the needs. It was also reported that some success stories were related to using non-formal education and focusing on learning-discovery approach, and filling in the gaps in farmers' knowledge misconceptions. (Sligo and Massey, 2007; Tripp and Hiroshini, 2005). Little is known of the impact of training in transforming small scale beef cattle enterprises among farmers that received stockman training in Mt Darwin District, Zimbabwe.

1.3 Problem statement

Zimbabwe, despite being an agro-based economy has recorded a huge deficit in meat products leading to a strong need to import meat from as far as Brazil. Land is vastly available and the general atmosphere is conducive for livestock production. However, Zimbabwean farmers are failing to meet the domestic and export market demands. This is blamed on a number of factors that include poor cattle breeds, poor livestock management practices, animal diseases, affinity towards subsistence farming, climate change and a lack of organization among farmers. Faced with these challenges, agricultural and veterinary extension experts realized the need for training towards transforming beef cattle enterprises through what is called Stockman Academy. The period 2018 to 2023 had seen such a program being rolled out in Mt Darwin District under the program Beef Enterprise Strengthening and Transformation (BEST) where farmers were trained on a number of courses that include basic animal husbandry, feed formulation, animal health, animal handling, pen fattening and farming as a business among others. It is however yet to be

established of the impact of stockmanship training in transforming the beef cattle enterprises in Mt Darwin. Thus, this study seeks to explore farmers' agricultural practices resulting from Stockman training, impact on cattle welfare, on farmers' productivity and income.

1.4 Justification

The relevance of this research lies in examining the impact of Stockman training in transforming small scale beef cattle enterprises in Mt Darwin. This study will help policy formulation. Outcome of the study will enlighten the government and policy makers on how training transforms small scale beef enterprises. Government and relevant stakeholders will make use of the study in developing interventions towards improving livelihoods of farmers through beef cattle and the general farming community. Farmers will have the opportunity to express their perceptions experiences and suggest solutions. This study will serve as a resource base to other researchers interested in carrying out further research in this field subsequently, if applied will go to an extent to provide new explanation to the topic. The researcher benefits from the study as he uses this study as an opportunity to understand the land issue from a more practical research-based point of view.

1.5 Main objective

This study seeks to examine the impact of stockmanship training in transforming small scale beef cattle farming enterprises in Mt Darwin.

1.5.1 Specific objectives

i. To examine farmers' agricultural practices resulting from Stockman training,

ii. To examine the impact of Stockman training on cattle welfare,

iii. To ascertain the impact of Stockman training on farmers' productivity,

iv. To establish the impact of stockman training on farmers' income.

1.6 Hypothesis

i. Ho: Stockman training transforms farmers' animal husbandry practices

Ha: Stockman training is not effective in transforming farmers' animal husbandry practices

ii. Ho: Stockman training improves cattle welfare

Ha: Stockman training does not improve cattle welfare

iii. Ho: Stockman training improves farmer's productivity

Ha: Stockman training does not improve productivity

1.7 Limitations

There are a few limitations that the researcher may encounter when conducting this study. The results might not be generalizable to all small-scale farmers, as they might have different experiences in other locations or contexts.

1.8 Ethical Considerations

A researcher has a responsibility not only to his research subjects, but also to his colleagues and the people to whom his/her findings will be presented. Ethical issues should then be observed as they encompass the appropriateness of the researcher's behaviour in relation to the rights of those who become the subjects of one's study. In this case, the study protected the rights of all research participants, ensured beneficence, non-maleficence and justice and protected the integrity of the

university to which it will be presented through observing the principles of informed consent, privacy and confidentiality. The researcher first explained the purpose of the research in-order to make the participants understand what they were up to. He then advised them that they have a right to decide not to participate and /or withdraw from the study whenever they felt uncomfortable. The protection of privacy and confidentiality was assured by the signing of consent forms and the researcher advised the participants that they can report to the police any form of harm that may have been caused by not observing these principles. To this end Payne and Payne (2004) believe that ethical practice is a moral stance that involves conducting research to achieve not just high professional standards of technical procedures, but also respect and perfection for the people actively consenting to be studied.

CHAPTER 2: LITERATURE REVIEW

2.1 Stockmanship

Stockmanship is defined as the knowledge and skilful handling of livestock in a safe, efficient, effective and low-stress manner Seabrook and Bartle (2021). Smith (2018) defines stockmanship as the skilful and knowledgeable handling of livestock, encompassing a range of skills and practices that prioritise animal welfare, safety, and efficiency. Some of the primary aspects of stockmanship include low-stress livestock handling, facilities design, environmental factors and veterinary care (ibid).

The stockman has a unique role within livestock farming in ensuring high standards of animal welfare. His knowledge must cover the principles and practices of animal husbandry, a basic knowledge of disease prevention and treatment, and the operation and maintenance of equipment. He must have a sound grasp of reproduction management, neonatal care, nutrition, behaviour, health and animal handling amongst many other topics that are essential to good farming practice. This wide range of expertise and skills underlines the need for effective education and training that should continue throughout his working life on a regular and progressive basis through continuous professional development Seabrook and Bartle (2021). In any production system, the knowledge, skills, abilities and attitude of the stockman are integral to the standard of welfare. Good stockmanship can often compensate for deficiencies in a livestock production system but the converse is never true.

FAWC proposes that the following attributes should be considered as the “Three Essentials of Stockmanship.” First is knowledge of animal husbandry where sound knowledge of the biology and husbandry of farm animals, including how their needs are best provided for in all

circumstances. This is followed by skills in animal husbandry entailing demonstrable skills in observation, handling, care and treatment of animals, and problem detection and resolution. The other is personal qualities involving affinity and empathy with animals, dedication and patience, Stockmanship & Farm Animal Welfare (2003). FAWC believes that education, training and motivation in all their forms have a predominant effect relative to inborn characteristics in influencing the quality of stockmen. Waibilinger *et al*., (2002) suggests that the "Three Essentials of Stockmanship" should be the basis of education, training and motivational programmes for stockmen. The good stockman is distinguished by characteristics and qualities that are often termed "stock sense". FAWC believes that many components of stock sense can be acquired with experience and well-target training, provided that suitable staff are recruited, the production system is well designed and effective management support is provided. Effective education and training are essential should continue on a progressive and continuous basis. Lack of effective training is quoted as one of the reasons farmers and farm employees leave the agricultural industry within the first five years Hemsworth, P. H. (2003).

According to Boivin *et al*., (2003) good stockmanship involves animal welfare, handling skills, management, and patience. Animal welfare involves maintaining the health, nutrition, housing and the ability of an animal to express its natural behaviors at an optimum. To Rushen *et al.*, (2018) this ensures high productivity for instance, low mortality rate, reduced lameness, high fertility and conception rates, high milk yield in dairy, higher carcass dressed percentage in meat breeds.

Management is a crucial characteristic of good stockmanship since it encompasses farm activities such as feed ingredient sourcing, diet formulation and choice for method of feeding system which affects the nutritional and health aspect of an animal thus productivity Seabrook ,M.F. (2000). Patience is another stockman quality since a farm is a project consisting of various tasks like

pasture management, biosecurity and feeding all with a single unifying outcome of making a profit Seabrook, M.F., and Wilkinson, J. M. (2000). The tasks have a set time allocated to them and this requires patience to ensure that the goal of each task is met appropriately otherwise the whole project can fail thus stockmen should have patience to ensure productivity or else the farming operation may fail.

2.2 Training

Training refers to the systematic process of teaching, learning, and practicing skills, knowledge, and behaviours to improve performance, and achieve specific goals, and enhance professional development. It involves acquiring skills and knowledge; enhancing existing competencies; changing attitudes and behaviours; improving job performance and productivity; and adapting to new technologies, processes and procedures. Effective training aims to bridge skills gaps; increase efficiency and productivity; and foster a culture of continuous learning Waiblinger *et al.,* (2019).

Training for farmers has been proven to yield variety of results. Murshed-E-Jahan and Pemsl (2011) on their study on Bangladeshi small farmers concluded that building the capacity of farmers through training is more valuable than the provision of financial support in terms of raising production and income. Similarly, a study by Hemsworth (2007) confirms the importance of training can contribute to enhancement of farmers 'skills in farming works. Studies on the effectiveness of training for farmers showed that not all programmers meet success as most failures of programmes in the developing countries were attributed to the tendency of excessively concentrating on a particular technology transfer rather than a broader spectrum of farmer empowerment including knowledge disseminations. However, these gaps could be overcome by carefully revising and designing the training to address the needs. It was also reported that some

success stories were related to using non-formal education and focusing on learning-discovery approach, and filling in the gaps in farmers' knowledge misconceptions.

2.3 Influence of stockman training on cattle welfare

Animals have several physiological, mental and behavioural needs that influence their welfare. Technical and physical solutions to the animal's living conditions play a prominent role in addressing these needs. For example, if an animal is not able to express and fulfil its needs due to barn or pen construction, or feeding regime, impaired welfare will lead to suffering Rushen *et al.,* (2019). There is a connection between stress and welfare, and that stress can be a consequence of compromised welfare Veissier and Boissy (2017). Stress is a situation where an animal cannot adapt to stimuli and situations in its surroundings, such as challenges concerning social environment, housing conditions and feeding Hemsworth (2007) without major hormonal or behavioural adjustments. Long term stress has an impact on reproduction hormones and their function, especially during ovulation, heat and early pregnancy.

The quality of stockmanship contributes to both farm animal welfare and productivity Hemsworth (2007). Welfare, at least on a minimum level, is a precondition for productivity. Deficiencies in welfare can affect not only daily weight gain of fattening pigs and the milk yield of dairy cows but also reproductive processes. Milk yield is higher on farms where the stockpersons are motivated and happy in their work and where they perceive it important to treat the animals as individuals and address them by name Rushen *et al.,* (2019). In addition, poor handling of cows has been associated with lower milk yield (Hemsworth *et al*., 2000; Waiblinger *et al.,* 2002). Fear of humans can explain 19% of the variation in milk yield Breuer *et al*., (2000) and up to 70% of the amount of residual milk (remaining in the udder after milking) Rushen *et al.,* (2019). The fear of humans

is also negatively associated with the reproductive performance of a sow. For example, the number of negative physical interactions is strongly related to litter size Hemsworth *et al.,* (1989).

2.4 Influence of stockman training on animal behaviour

Stockmanship was found to have an impact on animal behaviour. Some studies report stabilising or destabilising effects of the stockperson onto the social behaviour of cows (Seabrook 2018; Wiepkema/Schouten 2020; Le Neindre *et al.,* 2012). Seabrook (2018) found that if the stockperson is able to create a calm atmosphere, where stress is low and the environment highly predictable for the animals, this might reduce aggression. In contrast, higher levels of insecurity and stress will occur within an environment with low predictability and controllability, which might lead to higher levels of aggression. While experiments on influences of handling on social behaviour are lacking, it is evident from theories on aggression, that negative experiences with humans may enhance agonistic interactions. Frustration, pain and received aggression, respectively, can lead to aggression (Scott 1998; Fox 2017). In a small experiment with one herd, agonistic interactions increased in a herd of 80 cows after only 10 of them had been milked in a rough manner Scott (1998). Because transmission of 'danger information' in general, and of social suspicion particularly, exists in animals, it may not be necessary that each animal has contacted the stockperson regularly or intensively to develop suspicion. Rough handling, i.e. negative experience, of single animals may be signalled through the whole stable, making most cows suspicious or afraid of humans and upsetting the whole herd (Wiepkema/Schouten 2010, Boissy *et al.,* 2018)

2.5 Human-animal relationship and risk of accidents

Studies also found that a good human-animal relationship is especially important to minimise the risks of accidents with the cows. This concerns not only accidents caused by horns, but also accidents in general. If fear of humans is low or trust in humans is high, respectively, animals are better to handle, show less defence reactions, are less jumpy and in sum less dangerous (Hemsworth *et al.,* 2014; Waiblinger *et al.,* 2019). This is achieved by positive interactions between humans and animals. In the survey of ETH, reactions of cows towards humans as well as the intensity and quality of human-animal interactions were recorded on the 35 farms. In general, distinct differences existed both in the reactions towards humans as well as in the human-animal interactions between the 35 farms. For example, the median of avoidance distance per herd ranged from 0 to 1.5m, and the percentage of cows, which could be touched ranged from 2 to 67% of the tested animals. The animal's reactions were highly correlated to the intensity and quality of interactions. A close, intense contact of the stockperson and a higher level of friendly interactions with the cows during milking, indicative of a positive relationship to his/her animals, led to animals which could be approached closely or even touched, i.e. animals confident in humans, with a low level of fear. Such animals are less scared from human action. Scaring of the animals and wrong behaviour of the human are the most important reasons for accidents. Both are reduced in a good relationship - both human and animal know each other and trust each other.

2.6 Influence of stockman training on cattle productivity

Livestock production requires that the stockperson enters and imposes upon the perceived physical, social and cognitive environment of the animal Seabrook (2021). However, in most modern systems each individual stockperson will have responsibility for only a small part of the production cycle, and functions in an environment where individual recognition of animals is minimised, where the number of animals dealt with is large, where the opportunity for contact with

individual animals is limited and where impersonality is the order of the day. Some of the differences in behaviour and interaction processes of the stockpersons can be related to personality attributes, Seabrook (2021).

Following their numerous studies on pigs, Hemsworth and Coleman (2008) demonstrated that negative stockperson's attitudes towards animals can lead to negative interactions with animals. Those negative interactions with animals can lead to an increased animal fear of humans, accompanied with chronic stress. This fear of humans and chronic stress will affect the animal's welfare and its productivity.

Another survey was performed on 50 industrial veal farms with the same husbandry conditions Lensink (2016). Two questionnaires were constructed to measure the attitude of the stockman towards the calves and the level of cleaning and surveillance. Furthermore, the stockman behaviour towards the animals, the animals' reactions towards the stockman and the health status of the veal calves were recorded. The attitude of the stockman towards the animals was measured by the description of the contacts with the calves and the beliefs on the calves' sensitivity. A positive attitude of the stockman was positively linked to gentle contacts with the veal calves. These gentle contacts were positively linked with a decreased avoidance of people and with an increase in production results. However, no statistical link was found between the avoidance of people and the production results. In addition, the attitude towards the calves was linked to the calves' health and the attitude towards cleaning was linked to cleanliness. The health status of the calves was positively linked with the production results.

Dessale (2019) conducted a study on the analysis of technical efficiency of smallholderwheatgro wing farmers of Jamma district, Ethiopia. The study results show that the majority of Ethiopians, mostly poor living in rural areas depend on agriculture for a living, and their farming productivit

y was very low. Dessale (2019) study findings also show that inefficiency existed among the far merand this was attributed to lack of knowledge and other factors. Dessale (2019) further argued that training, age, education, improved seed, and credit had a negative and significant effect on technical inefficiency. According to Seabrook (2018), inefficiency in farming production comes from inefficient use of scarce resources.

CHAPTER 3: MATERIALS AND METHODS

3.1 Description of Study area

The study will be conducted in Mt Darwin District, Mashonaland Central Province. The District is in the northern part of Zimbabwe and it is approximately 150km north of the capital city, Harare. Geographically, Mt Darwin is dominated by valleys, hills and a rugged terrain. It has an average elevation of 1000-1500 meters above sea level. Vegetation of the area includes a mix of grasslands, woodlands and forests with common tree species such as Mopane, Musasa and Munhondo. The area has a population of approximately 150000 people. Majority of the people are communal farmers who also practice small scale mining thus the area's economy is mostly based on agriculture and mining.

A subtropical climate with average temperatures ranging from 15 -25 degrees Celsius is experienced in the district. Moderate rainfall averaging 700-1000mm is received per year. The area is suitable for farming and livestock production is also practiced. Crops grown include maize, tobacco, cotton and sugarcane. Livestock kept include cattle, goats and sheep. Overally, Mt Darwin is a rural area with a diverse landscape, economy and culture.

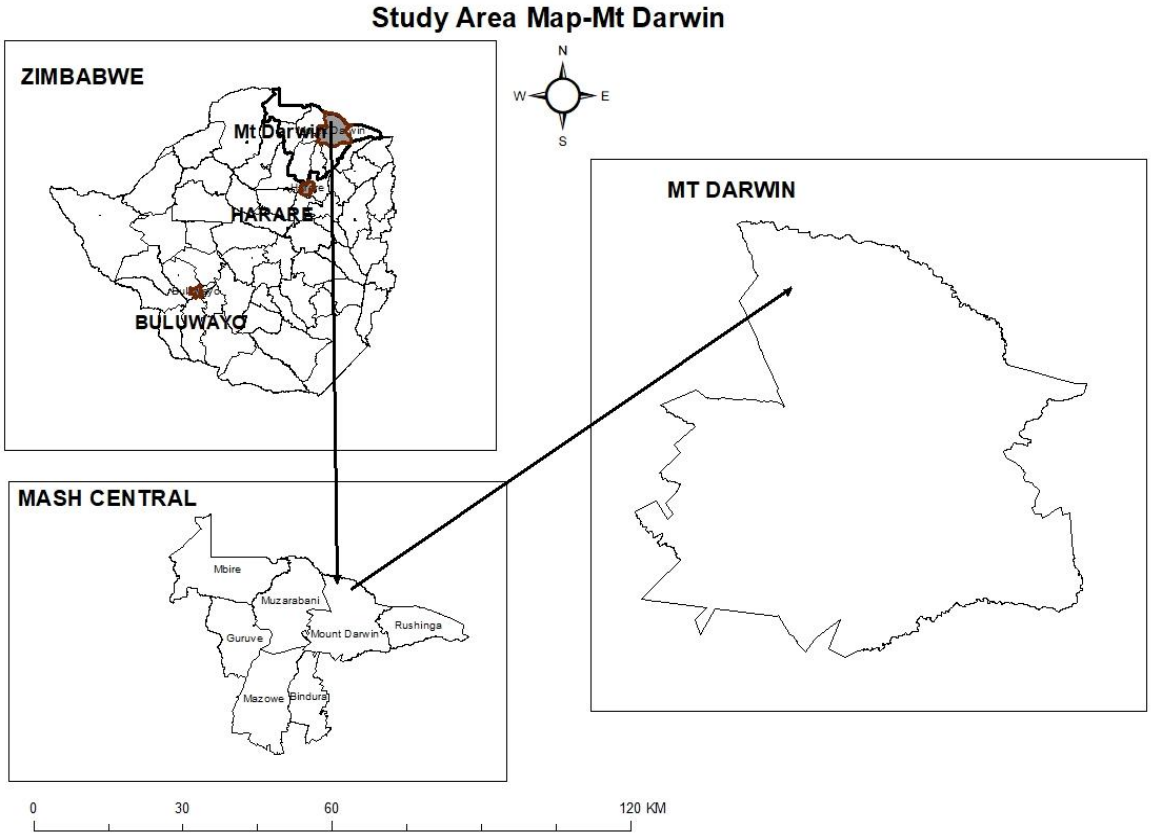

FIG 1: *Study Site-Mt Darwin district of Mashonaland Central Province* ***(Top left)*** *Zimbabwe District Boundaries including Mt Darwin district.* ***(Bottom left)*** *Mashonaland central district boundaries.* ***(Right)*** *Mt Darwin district*

3.2 Research Design

A mixed methods research design was to the researcher the appropriate design for this study. A mixed methods research design is a procedure for collecting, analysing, and mixing both quantitative and qualitative research and methods in a single study to understand a research problem. The use of this method of enquiry was motivated by the researcher's need to address complex, multifaceted research questions, to enhance validity of the research and to complement or expand the scope of the study. Mixed methods design allowed the researcher to explore and explain findings from one approach with data from another approach, thus enhancing the

understanding of the research. The approach also addressed limitations of one approach with the strengths of the approach thereby improving the quality and rigour of the research. On the flip side, incompatible assumptions that underlie both qualitative and quantitative approaches created dilemmas for the researcher and as well readers. To ensure success of the study, the researcher ensured that a clear and coherent purpose of the study was established in addition to consistency in reporting of the methods, results and implications of the study.

3.3 Sample

In this study, the population involved 224 Farmers in Mt Darwin that participated in the Stockman academy for the period 2019 to 2023. A 30% sample was drawn from all the trained farmers; thus 67 farmers formed the sample. On growth rate and income, 10 cattle were randomly selected from 10 randomly selected farmers which each having one herd weighed and sold respectively. The farmers were selected from both trained and untrained farmers as shown in the table below.

Table 1. Sample of trained and untrained farmers.

Category	**Count**	**Cattle weighed**	**Cattle sold**
Trained farmers	10	10	10
Untrained farmers	10	10	10

3.4 Research Questionnaires

The questionnaire designed for this study were a mix of close-ended questions and open-ended questions. Closed ended questions compiled quantitative data while open ended questions collect

qualitative data. The time saving nature of questionnaires-gathering a lot of data in less time Ponterotto (2005) was convenient for the researcher. The questionnaire also reduces bias since it gathers uniform data. However, questionnaires have the disadvantage of providing incorrect data if poorly interpreted by respondents. This problem is common for questionnaires that are self-administered. Since the population of the study is small, the research cured this problem by administering the questionnaires in person.

3.5 Data analysis

Questionnaire results were presented using excel graphs to show impact of stockman training on cattle welfare and productivity. Cattle growth rate and farmers income were subjected to one-way ANOVA using Microsoft Excel. Cattle fertility for both sets of farmers (trained and untrained) was analysed using calving rate formula (*Calving Rate (CR) = (Number of calves ÷ Number of cows exposed to breeding) × 100*).

CHAPTER 4: RESULTS

4.1 Farmers' Animal Husbandry Practices Prior to Stockman Training.

This study explored farmers' animal husbandry practices prior to stockman training. The questions asked were open ended. Figure 2 presents a list of results obtained from open ended qualitative questions. Multiple responses were given by farmers.

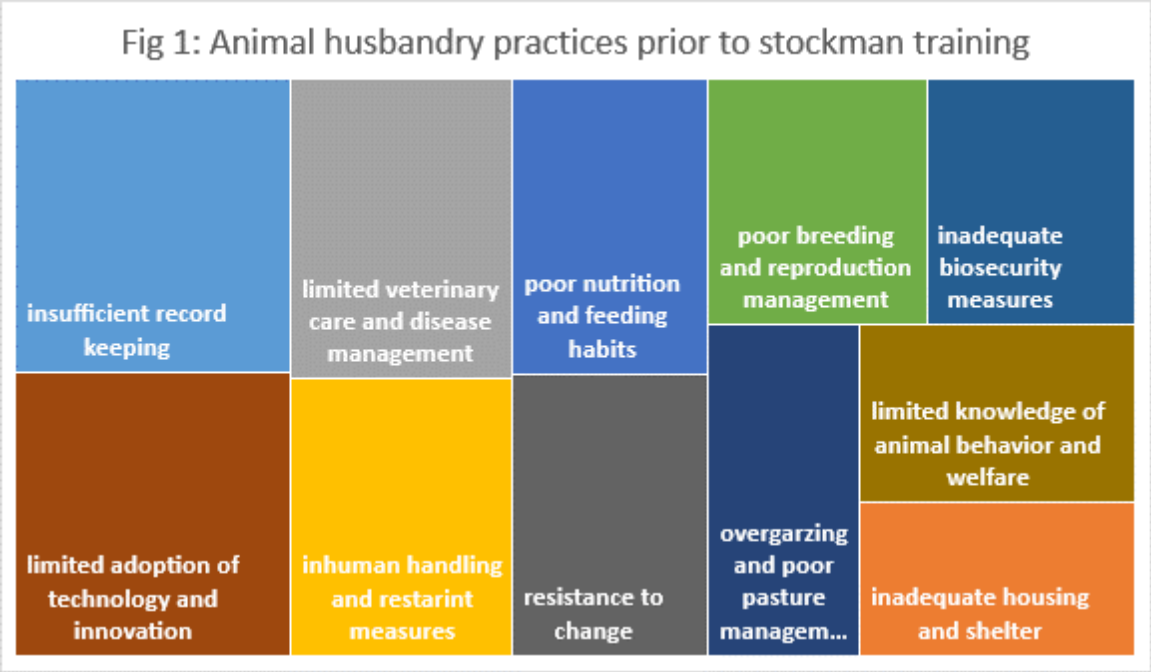

Fig 1: Animal husbandry practices prior to stockman training.

This study found that prior to stockman training cattle farmers in Mt Darwin practiced traditional animal husbandry practices that were unfriendly. As shown in figure 2 farmers used poor nutrition and feeding habits. They fed their cattle mainly on grass without considering the balanced nutritional needs of cattle. Sometimes they could lock up their cattle in pens without feed especially during the rainy season as farmers perform other farm activities.

4.2 Cattle welfare

Questionnaire responses indicated five changes in farming practices due to stockman training. Participants provided multiple responses to show the different changes in their farming practices, where all farmers registered improved disease management while over 70% farmers stated that they experienced improvement in animal nutrition and health management skills. These practices presented below link stockman training to improvements in cattle welfare.

Fig 3: Outcomes of stockman training on cattle welfare (n=67)

4.3 Impact of Stockman Training on Farmer's Productivity

Questionnaires administered asked participant farmers on how stockman training impacted on their productivity, below are their responses.

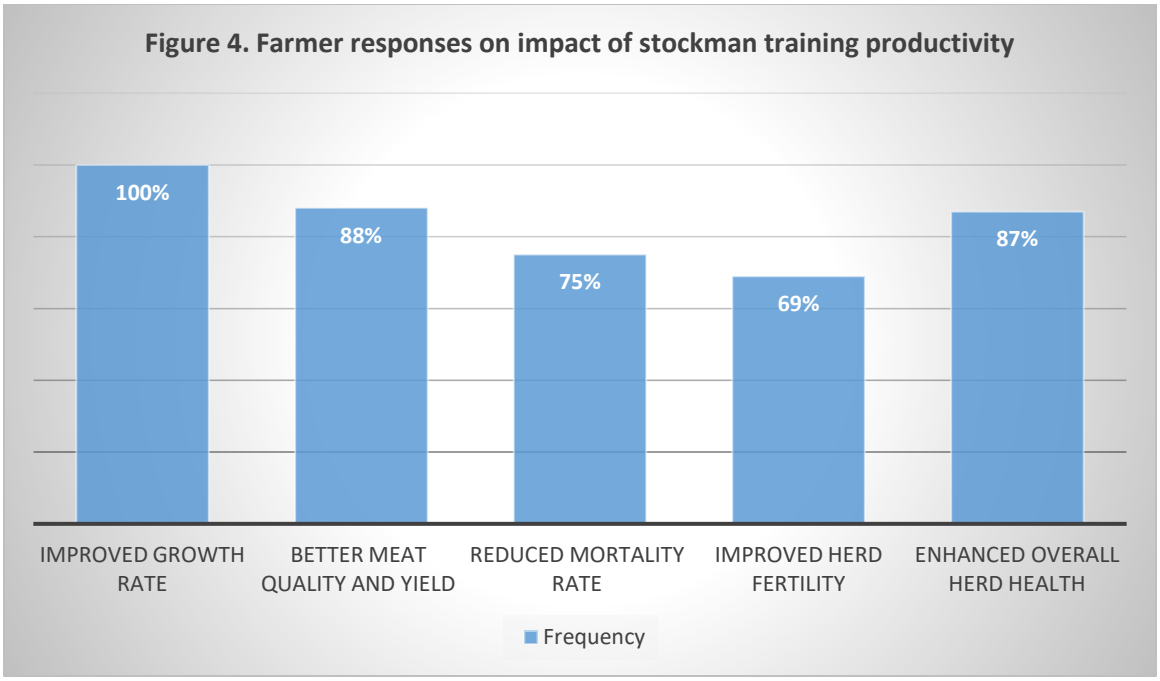

Fig 4: Outcomes of stockman training on farmers' productivity

Figure 4 shows that all farmers that participated in stockman training registered improved animal growth rate; 88% had improved meat quality; with improvements also stated in the reduction of mortality, herd fertility and overall herd health.

To confirm questionnaire responses the study analyzed cattle growth rate, records on meat quality produced and records income records pre and post stockman training. As shown in the tables and illustrations in section 4.4

4.4 Growth rate ANOVA Results

Single Factor

SUMMARY

Groups	*N (sample)*	*Sum*	*Average daily weight*	*Variance*

Group 1	10	16	1.6	0.153333
Group 2	10	10.4	1.04	0.049333

ANOVA

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.568	1	1.568	15.47368	0.000974	4.413873
Within Groups	1.824	18	0.101333			
Total	3.392	19				

At group 1, calves from stockman trained farmers exhibited higher average daily weight (1.6kg) than calves from group 2 (untrained farmers). The difference in weight for the two groups was attributed to improved conditions created by trained stockmen such as improved feeding methods, handling and disease management, while untrained stockmen have insufficient natural pastures for their traditionally raised cattle.

4.5 Fertility (Calving rate)

Farmers Category	**Breeding Period (days)**	**Cows Exposed To Breeding**	**Calves**	**Calving Rate [Cr] (%)**
Stockman Trained Farmers	45	24	23	95.8
Untrained Farmers	45	18	13	72.2

Calving rate was calculated using the formula:

Calving Rate (CR) = (Number of calves ÷ Number of cows exposed to breeding) × 100

To determine fertility, the researcher used calving rate to see whether or not stockman training has impacted on farmers' productivity. The researcher compared calving rates for farmers that were stockman trained and those that were not stockman trained. Farmers' records show that 24 heifers of stockman trained farmers and 18 heifers of untrained farmers exposed to breeding at the same breeding period of 45 days. Stockman trained farmers exposed their heifers under conditions that they were trained on while untrained farmers used their natural conditions. Findings show 95.8% calving rate for stockman trained farmers and 72.2% calving rate for heifers bred by untrained farmers indicating a higher calving rate for stockman trained farmers. This suggests a positive impact of stockman training on calving rate (fertility) translating to productivity.

4.6 Beef quality produces from 2018 to 2023

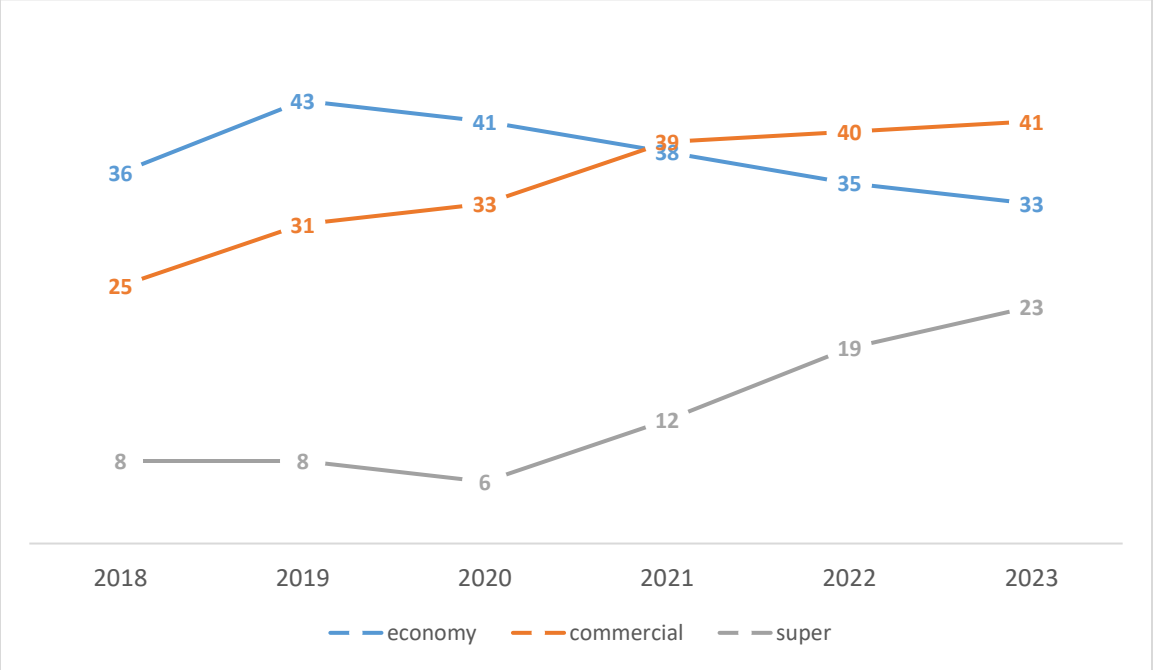

Fig 5: Beef quality produced from 2018-2023

Three beef grades were identified in this study- economy, commercial and super. The lowest grade was economy which is less tender and contains high marbling fat. The second grade is commercial

which has a moderate amount of marbling and tenderness. Super-grade is the highest having a high amount of marbling and tenderness. Results obtained indicate a decrease in the production of super beef quality from 2018 to 2023, with a sharp increase from then to 2023. Commercial grade rose from 2018 as did economy grade which started to decline from 2019 to 2023. From 2021 there was a steady increase in commercial beef grade production to levels higher than economy grade.

4.7 Income

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average price*	*Variance*
Group 1	10	9029	902.9	26440.77
Group 2	10	2995	299.5	17369.17

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1820458	1	1820458	83.10708	3.64E-08	4.413873
Within Groups	394289.4	18	21904.97			
Total	2214747	19				

To determine effects of stockman training on farmers' income, the researcher compared sales of cattle sold to abattoirs with 10 cattle were selected from each group. In group 1 comprising of stockman trained farmers, the average price for cattle sold was found to be $US902.9 whilst in group 2 comprising untrained farmers, the average price the cattle were sold at was as low as US$299.5. This difference is attributed to

commercial animal handling and feeding practices by trained farmers that enhance animal growth, weight and meat quality unlike in the traditional breeding practice by untrained farmers.

4.8 Other income related findings

Questionnaire responses indicate a number income related effects that came out as a result of stockman training. These are presented below.

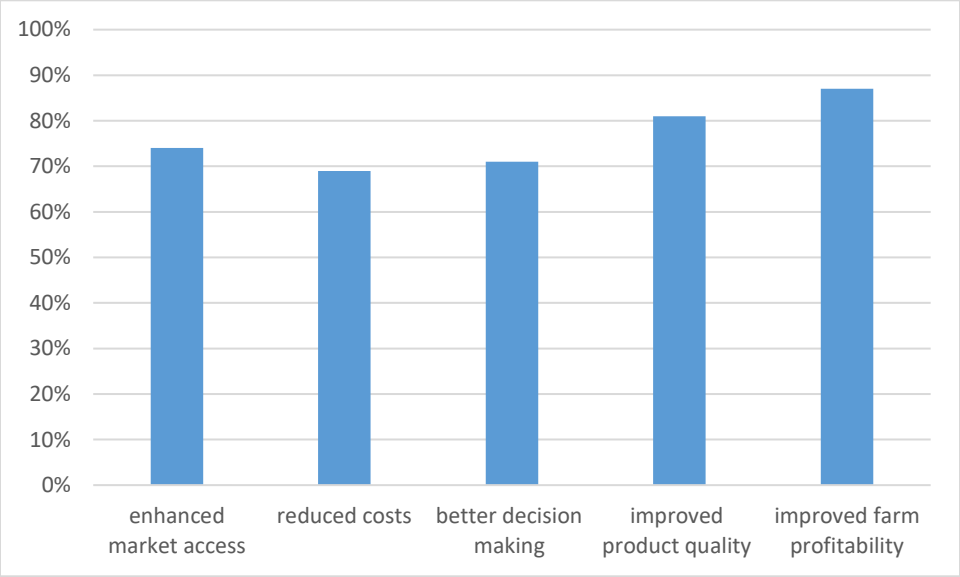

Fig 6: Other income related findings

As shown in figure 6 stockman training has had a critical positive effect in farmers' ability to understand the market. The training enhanced farmers' market access helping farmers meet market requirements and standards, gaining access to premium markets and prices. The training also contributed to reduction in cost. The farmers highlighted that improved animal health and husbandry practices impacted positively in reducing costs associated with disease treatment and mortality.

The study also observed that farmers improved on decision making. The farmers highlighted that stockman training equipped them with the knowledge and skills to make informed decisions about their operations. Key to such decisions had to do with the types of breed to rear in their environment, what to sell and when to sell and the price. The study found that before the training farmers could hardly decide on the price as they were more of price takers. They lacked bargaining power to decide on the price they wanted for their cattle - a situation that changed upon receiving training.

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CHAPTER 5: DISCUSSION

5.1 Farmers' agricultural practices prior to stockman training

This study observed a number of agricultural practices that were performed by farmers in Mt Darwin. These are insufficient record keeping, limited veterinary care and disease management, poor nutrition and feeding habits, poor breeding and reproduction management, inadequate biosecurity measures, limited adoption of technology and innovation, inhuman handling and restraint measures, resistance to change, overgrazing and poor management and inadequate housing and shelter. Although this study did not go further into explaining the impacts of such practices, it essential to note the negative impacts identified in previous studies. Inadequate nutrition or poor-quality feed, leads to malnutrition and related health issues while lack of veterinary care involving failure to provide regular health checks, vaccinations, and treatment for sick or injured animals leads to poor animal health. Common among previous studies in mistreatment and abuse of animals causing animals fear of humans; unhygienic breeding practices leading to the spread of diseases and genetic disorders and unqualified personnel handling cattle leading to poor care and management (Rushen *et al.,* 2019; Seabrook 2021).

5.2 Agricultural practices resulting from stockman training

Realizing the need to transform beef cattle enterprises in Mt Darwin, the study found that farmers undertook stockman training covering a number of areas from feed production, handling, nutrition, animal welfare, to breeding. The training was designed to change farmers and stockpersons negative attitudes towards animals to positive attitudes. The transformative objective of stockman

training in Mt Darwin goes along Lensink's (2016) observation that effective stockman training can create in farmers a more positive attitude towards animals.

5.3 Impact of stockman training on cattle welfare

Improvement in animal welfare is another important objective of stockman training that farmers in Mt Darwin sought to achieve. As Seabrook (2018) suggests, animals have several physiological, mental and behavioural needs that influence their welfare. In this study farmers reported that stockman training improved their handling and husbandry skills; nutrition and health management; understanding on animal behavior; adoption of best practices and improvement in disease management. In essence stockman training improves stockpersons' skills and knowledge minimizing risks of accidents with cattle. If fear of humans is low or trust in humans is high, respectively, animals are better to handle, show less defence reactions, are less jumpy and in summary, less dangerous (Hemsworth *et al.,* 2014; Waiblinger *et al.,* 2019). Some studies report stabilising or destabilising effects of the stockperson onto the social behaviour of cows (Seabrook 2018; Wiepkema/Schouten 2020; Le Neindre *et al*., 2012). Seabrook (2018) found that if the stockperson is able to create a calm atmosphere, where stress is low and the environment highly predictable for the animals, this might reduce aggression. This suggests that stockman training influences cattle behaviour. Previous studies suggest a link between animal welfare and productivity. As such deficiencies in welfare affect daily wet gain; milk yield (Prunier *et al.,* 2010; Waiblinger *et al.,* 2002; Rushen *et al.,* 2019).

5.4 Impact of stockman training on farmers' productivity

The study found that stockman training has had an impact on the improvement of animal growth rate. Farmers attributed this growth rate to improvements in handling and nutrition in cattle. They

highlighted that, the training increased their skills and capacity to produce adequate feed for young and older animals. The study also identified improvements in meat quality as an attribute of changes in husbandry practices due to stockman training. Hemsworth and Coleman (2008) demonstrated that negative stockperson's attitudes towards animals can lead to negative interactions with animals. Those negative interactions with animals can lead to an increased animal fear of humans, accompanied with chronic stress. This fear of humans and chronic stress will affect the animal's welfare and its productivity Lensink (2016).

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The findings from the study led the researcher to conclude that:

- Stockman training improves cattle welfare, improved health, and better living conditions;
- Training enhances cattle production, resulting in improved reproductive performance, and higher-quality meet;
- Stockman training increases farmer income, primarily through improved crop income and higher-quality cattle sales;
- Training has a positive impact on farm productivity;
- Investment in stockman training is a valuable strategy for improving cattle production, welfare, and farmer livelihoods;
- Training programs should be widely adopted and integrated into agricultural extension services to promote sustainable agriculture and improve rural livelihoods.
- Overall, stockman training is a win-win-win for cattle welfare, farm productivity, and farmer income.

6.2 Recommendations

The findings from the study led the researcher to make the following recommendations regarding stockman training and cattle welfare, production, and income:

- **Cattle welfare**
    - The study recommends that farmers improve stockmanship skills to reduce stress and fear in cattle.

- Stockmen should be train to recognize and address animal behavioural and welfare issues
- There must be implementation of positive reinforcement techniques to promote positive human-animal interactions

- **Production**

- There a need for continuous training on optimal animal handling and husbandry practices to improve cattle productivity;

- Farmers and stockmen need education on the importance of proper nutrition, health management, and breeding strategies;

- Stockmen should be encouraged to monitor and record animal performance data to inform management decisions.

- **Income**

- There is a need for training on business management and marketing strategies to improve farm profitability;

- Stockmen need to diversify their products and services to increase income streams;

- Provision of necessary resources and support for stockmen to access new markets and customers.

- **More studies**

- More studies need to be conducted on bigger samples to allow broader generalization since the study was to explore the transformative impact of stockman training on a small group of farmers. Such studies must be quantified to allow for inferences.

- **Policy makers**

Policy makers need to deliberately ensure that all cattle farmers undergo stockmen training to standardize cattle breeding practices.

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Questionnaire

Introduction:

Thank you for participating in this questionnaire. We are interested in understanding the impact of stockman training on cattle welfare, cattle production, and farmers' income. Your responses will help us better understand the effectiveness of stockman training programs.

Section A

Demographics

1. Age..45

2. Sex Male..... Female .....

3. Educational level..O LEVEL

Section B

Cattle welfare

1. Have you received any training on handling and management of your cattle

Yes/No

2. If yes, have you implemented what you have learnt on your herd

Yes/No

3. Have you noted any improvement on you cattle behaviour

Yes/No

Section 2

Cattle production

1. Have your herd increased after the training

Yes/ No

2. Are you encountering any deaths on your young stock

Yes/ No

3. Have you encountered any problematic diseases on your herd after the training

Yes/No ✓

Section 3

Farmer's income

1. How many cattle do you have? 16

2. How many have you sold so far? 4

3. Did you realise the profit after selling?

Yes/No ✓

Section 4

Additional comments

1. Overally, how was the training?..... IT WAS EDUCATIVE .....

2. Would you recommend fellow small scale farmers to do the same training?

Yes/ No ✓

3. Is there any area that you suggest should improve on the training? ..... TIMING SHOULD BE DON
BEFORE RAINS WHEN
THERE IS NO FIELD WO